Incremental vs. symmetric accounts of presupposition projection: an experimental approach[*]

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Abstract

The presupposition triggered by an expression E is generally satisfied by information that comes before rather than after E in the sentence or discourse. In Heim's classic theory (1983), this left-right asymmetry is encoded in the lexical semantics of dynamic connectives and operators. But several recent analyses offer a more nuanced approach, in which presupposition satisfaction has two separate components: a general principle (which varies from theory to theory) specifies under what conditions a presupposition triggered by an expression E is satisfied; and an 'incremental' component specifies that the principle must be checked on the basis of information that comes before E. Several researchers take this incremental component to be a processing bias, which can be overcome at some cost. If so, it should be possible, though costly, to satisfy presuppositions 'symmetrically', i.e. by taking into account linguistic material that comes both before *and after* the presupposition trigger. We test this claim with experimental means. Using inferential (and to some extent acceptability) tasks involving the anaphoric trigger *aussi* ('too') in French, we argue that symmetric readings are indeed possible (albeit degraded) in environments involving the connectives *if, or*, and *unless*.

Keywords: presupposition projection; symmetry; incremental; processing; experiment.

Utterances unfold in time. It is uncontroversial that the temporal asymmetry between what comes earlier and what comes later ('left-right asymmetry' for short) crucially affects sentence processing. Does it also affect semantics? Proponents of 'dynamic semantics' have argued that left-right asymmetries reach down to the *lexical representations* of logical operators. This claim entails that binary operators that are usually thought to treat their arguments symmetrically, for instance *and* and *or*, should in fact be given an asymmetric treatment. A crucial piece of evidence comes from *presupposition projection*, i.e. the way in which complex sentences inherit the presuppositions of their parts. Recently, proponents of various alternatives to dynamic semantics have argued that this radical move — putting left-right asymmetries in the lexical representations — was unnecessary; without denying that left-right asymmetries play a role in presupposition projection, they have argued that these should be treated as a bias which ultimately should be reducible to processing considerations. The debate revolves around the nature of these asymmetries: are they 'soft' constraints that can be overcome at some cost, or are they hard-wired in the lexical representations? We offer a concise introduction to this debate, and we show that it can in principle be decided on

experimental grounds with techniques based on inferential and acceptability judgments obtained from naive speakers. While our results are preliminary, they suggest that the alleged asymmetry has been mostly overestimated and that a lexical account is unwarranted. Less contentiously, they show that experimental evidence can be brought to bear on a foundational debate that has not yet been the object of much psycholinguistic research. We will also point out a number of difficulties for the present enterprise as well as for future research — difficulties that arise in particular because few presupposition triggers can lead to interpretable results.

1 The debate about symmetric readings

1.1 Asymmetries in presupposition projection

Presupposition projection is traditionally taken to be computed 'from left to right', in the sense that a presupposition triggered by an expression E should be satisfied by information that comes before E in the sentence or discourse. In the case of a simple conjunction, this generalization is motivated by the contrast in (1) (the definite description *the king of Moldova* triggers a presupposition that Moldova has a king):

(1) a.   Moldova is a monarchy and the king of Moldova is powerful.

b.   # The king of Moldova is powerful and Moldova is a monarchy.

In Stalnaker's pragmatic theory (Stalnaker 1974), the presupposition triggered by an expression E must be entailed by what is usually called the 'local context' of E, construed as a belief state of the speech act participants at the point at which E is uttered. The asymmetry in (1) is derived because local contexts are computed incrementally, as a sentence unfolds in time: the local context of the definite description includes the information that Moldova is a monarchy in (1a), but not in (1b), where the information appears only in the second conjunct, after the definite description — and thus 'too late' to satisfy its presupposition.

Following in this respect Karttunen (1974), Heim's dynamic semantics (1983) captures the same generalization, but encodes it in the *lexical semantics* of *and*, realized along dynamic lines: the update of a context C with a conjunction *F and G* is the successive update of C with F, and then with G. Writing C[H] for the update of the context set C with a formula H, we obtain:

(2)   C[F and G] = (C[F])[G]

Unlike Stalnaker's framework (Stalnaker 1974), which only accounted for the behavior of a couple of connectives, Heim's analysis could be extended to all connectives and operators (Heim 1983). But it was criticized by several researchers (including Heim herself) as lacking explanatory depth because it fails to explain why 'deviant' connectives, such as *and**, are never instantiated in natural languages:

(3)   C[F and* G] = (C[G])[F]

When *F* and *G* are non-presuppositional, *and** has the same semantic effects as *and*. But in the general case this is not so: if the conjunction in (1) were *and**, (1a) would be deviant and (1b) would be acceptable, which is the opposite of what we find in English (cf. Soames 1989; Heim 1990).

The problem is general and severe: each 'classical' operator can be given a great number of dynamic homologues which all make the same predictions on non-presuppositional sentences but disagree on presuppositional ones. The problem isn't merely formal: as is for instance discussed in Schlenker (2009b), different authors have provided different lexical entries for disjunction, without providing a general motivation for distinguishing between them. Thus Beaver (2001) provides a dynamic entry for *or* equivalent to that in (4a), which predicts that *(G or H)* inherits the presuppositions of *G*, as well as a conditional presupposition that if *G* does not hold, the presupposition of *H* is satisfied. By contrast, Geurts (1999) defines a dynamic entry that predicts that a disjunction inherits the presuppositions of each of its component parts, as indicated in (4b) (see also Krahmer 1998 for discussion); and there are other conceivable choices (throughout this discussion, we use # to encode semantic failure).

(4)   a. $C[(G \text{ or}_1 H)] = \#$ iff $C[G] = \#$ or $C[(\text{not } G)][H] = \#$.
             If $\neq \#$, $C[(G \text{ or}_1 H)] = C[G] \cup C[(\text{not } G)][H]$.

       b. $C[(G \text{ or}_2 H)] = \#$ iff $C[G] = \#$ or $C[H] = \#$.
             If $\neq \#$, $C[(G \text{ or}_2 H)] = C[G] \cup C[H]$.

Similarly, the connective *unless* has been explicitly argued to be symmetric by some researchers (Soames 1989). Heim's theory gives no recipe to choose among all these candidate lexical entries, and thus it fails to predict the presuppositional behavior of connectives on the basis of their standard logical (non-presuppositional) behavior.

Several recent theories have sought to address this problem by adopting modular accounts in which the left-right asymmetries derive from the fact that presuppositions are checked incrementally, i.e. as soon as a presupposition trigger is encountered (Schlenker 2008a, 2009a; Fox 2008; Rothschild 2008b; Chemla 2009b). More specifically, these new theories each have two components: (a) a general principle (which varies from theory to theory) determines under what conditions a presupposition is satisfied when one has access to the entire sentence; (b) an 'incremental component' requires that the principle in question be guaranteed to be satisfied as soon as the presupposition trigger is encountered, i.e. no matter how the sentence ends. This modular approach is in the spirit of Stalnaker's pragmatic account, since linear order plays a distinguished role in the analysis (at the same time, it improves on Stalnaker's approach in being applicable to all connectives and operators). But it also raises a new question about the nature of the incremental component: is it a 'hard' constraint, or is it a bias (possibly due to processing) that can be overcome at some cost? This question could not be raised within the non-modular analysis of dynamic semantics, but it has taken a new urgency with the development of these new modular accounts. Three positions could be adopted:

(5)   **P1: Incremental Theory.** Left-right asymmetries are a *core property* of presupposition projection.

       P2: Strict Symmetric Theory. Left-right asymmetries are *not a property* of presupposition projection.

       P3: Mixed Theory. Left-right asymmetries are *a bias* that can be overcome at some cost.

P1 is the standard *incremental* position which motivates, for instance, Heim's dynamic semantics. P2 is a *strict symmetric view*. This is a straw man position, which has not really been defended. P3 is a less extreme symmetric view. It can be seen as a *mixed account*, one which is explicitly endorsed by several recent theories, including Chemla (2008a, 2009b), Rothschild (2008a,b),

Schlenker (2007, 2008a, 2009a). It predicts graded judgments of acceptability, which have been disputed in the literature (e.g., by Beaver 2008). We propose to start settling this controversy by collecting the relevant data with experimental means, as was urged by Krahmer (2008) (see also Chemla 2008b).

While we concentrate on the debate between Heim's dynamic semantics (which follows in this respect Karttunen 1974) and recent modular theories, we note for completeness that another influential theory, DRT, should also be affected by this debate, although in a more complicated way. DRT (van der Sandt 1992; Geurts 1999) differs from dynamic semantics in providing a representational rather than a semantic account of presupposition projection; one of its key tenets is that presupposition resolution is a species of anaphora resolution. DRT is similar to dynamic semantics in one respect, however: it must state some conditions on a connective-by-connective basis. Specifically, it must specify for each presupposition trigger what its 'accessible' antecedents are, and 'accessibility' involves special stipulations that must be defined for each connective. It is worth noting that Geurts (1999) explicitly states for a related case (that of pronominal resolution) that 'incremental interpretation is just a processing strategy', and thus that it could in principle be overridden. However, while he gives examples involving pronouns (p. 124), he is silent on the issue of presupposition projection. So the current situation of DRT with respect to the debate on symmetric readings is not entirely clear.[1]

1.2   Controlling for triviality

The initial data in (1) would seem to offer overwhelming support for the incremental view in P1: the canonical order in which the trigger comes last seems to be far more acceptable than the opposite order, in which the trigger comes first (we will henceforth call this the 'inverse' order). But in fact there is a confound that could explain the deviance of (1b): whenever the first conjunct is true, so is the second. As a result, the latter is redundant — and it can be ascertained independently of the issue of presupposition projection that this configuration is ruled out, as is shown by the contrast in (6):

(6)   a.   John is in Paris and he is staying near the Louvre.

       b.   # John is staying near the Louvre and he is in Paris.

Thus, independent principles require that the second conjunct should not follow from the first one.[2] As we will see, when this confound is eliminated, the facts are considerably less clear — which makes the debate between P1, P2, and P3 in (5) all the more interesting.

To avoid the problem of redundancy, one should ensure that the non-presuppositional conjunct does not follow from the first conjunct, but that it still satisfies its presupposition. The desired configuration is obtained in examples such as (7) or their schematic representations in (8), where

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[1]We do not attempt to discuss Gazdar (1979) in the present context. Some of his statements suggest that he favors a Strict Symmetric Theory. Specifically, he criticizes the asymmetric account of disjunction in Karttunen (1974), and remarks explicitly that his system predicts symmetric patterns of presupposition projection in this case. (In his system, a presupposition 'projects' if it is not incompatible with the entailments or implicatures of a sentence. He notes explicitly on pp. 145-146 that his rules of implicature generation are not sensitive to linear order, and that as a result he predicts symmetric patterns of projection for disjunctions.)

[2]In dynamic terms, an expression should not be 'locally trivial', in the sense that it should not be equivalent to a tautology — nor for that matter to a contradiction — when evaluated in its local context (Stalnaker 1978). Although any theory needs some way to account for this generalization, we will not be concerned with the best way to do so.

p^+ represents a proposition that asymmetrically entails p. Throughout our discussion, we adopt the convention of underlining the presuppositional component of an elementary clause, so that for instance *John stopped smoking* is written as *q̲q'* with *q=John used to smoke* and *q'=John doesn't smoke*.

(7) a. John used to smoke five packs a day, and he has stopped smoking.

   b. John has stopped smoking, and he used to smoke five packs a day.

(8) a. p^+ *and* *p̲p'*

   b. *p̲p'* *and* p^+

It can be seen that the contrast we found in (1) is by no means as clear in (7), which makes it necessary to explore this question with experimental means.

1.3   An example of a modular account

To illustrate the modular approach, we focus on a trivalent theory of presuppositions discussed in Fox (2008). It was pioneered by Peters 1979 and developed in different forms by Beaver and Krahmer (2001) and George (2008a,b); see also Schlenker (2009b) for discussion. Readers who are not interested in details of implementation, or are already familiar with recent modular approaches, may wish to jump directly to Sect. 2. Simplifying quite a bit, we start from a supervaluationist analysis in which semantic failure is treated as a kind of uncertainty about the value of an expression. Roughly, the idea is that if *John has stopped smoking* is evaluated in a world w in which its presupposition is not met, i.e. John never smoked, we just cannot tell whether the entire clause is true or false in w — although we assume that it has a classical value (true or false). The semantic module outputs the value # just in case this uncertainty cannot be resolved — which systematically happens with unembedded sentences whose presupposition is not met, since we cannot tell whether they are true or false. However, the problematic clause may be embedded in a complex sentence whose semantics guarantees that *no matter* how the uncertainty is resolved, one will still be in a position to determine unambiguously the value of the entire sentence. This may for instance happen if we evaluate *John used to smoke and he has stopped smoking* in a world w in which John never smoked. The value of the second conjunct is uncertain (and hence it has the indeterminate value #) in w; but the first conjunct is false, and therefore *no matter how the uncertainty is resolved*, the entire sentence will be false as well. Now we reason analogously with respect to every world in the context set: for any world w, the sentence will have a determinate truth value because either John used to smoke, which guarantees that the consequent has a classical value (since its presupposition is satisfied); or John didn't use to smoke, which makes the first conjunct false and the entire sentence equally false. In this situation, we will say informally that we 'use' the first conjunct to satisfy the presupposition of the second.

   In the general case, then, the approach we sketched posits that a sentence F is presuppositionally acceptable in a context set C just in case for every world w of C, F evaluated according to the supervaluationist scheme has a classical truth value in w:

(9) **Presuppositional acceptability (simplified version)**

   A sentence F uttered in a context C is *presuppositionally acceptable* if and only if for every world w of C, F evaluated according to the supervaluationist scheme has a classical value in w.

For a sentence *p and qq'*, the rule in (9) requires that for any world w of C, either (i) *p* is false in w (which makes the entire sentence false no matter how the second conjunct is evaluated), or (ii) *p* is true, and the presupposition *q* of the second conjunct must also be true in w (for otherwise the value of *qq'* would be indeterminate, which would make the value of the entire sentence indeterminate too). In other words, we derive the same conditional presupposition as was predicted by Heim's dynamic semantics: if *p* is true, it should be the case that *q* is true as well. We say informally that we can 'use' *p* to satisfy the presupposition of *qq'*, since we only need to check that the presupposition *q* holds in those worlds that satisfy *p*.

At this point, nothing in the theory accounts for the left-right asymmetry we observed in (1): we make exactly the same predictions for *p and qq'* as we do for *qq' and p*, since the supervaluationist account treats the two conjuncts symmetrically. The asymmetry is introduced by an independent component of the theory, which requires that when the presupposition trigger *qq'* is processed, any semantic failure it may produce is guaranteed not to be transmitted to the entire sentence, *no matter how that sentence ends*. To implement this idea rigorously, we would need to discuss the details of the syntax; since this has been done elsewhere, we will be content to leave the discussion at an intuitive level (for different implementations, see George 2008a,b; Fox 2008; Schlenker 2009b). Consider again *p and qq'*. The presupposition trigger occurs at the end of the sentence, and we take this to mean that there is no uncertainty as to how the sentence will end; as a result, the sentence is acceptable just in case it satisfies the condition in (9), hence the conditional presupposition *if p, q*. Now consider the inverse order *qq' and p*. The incremental component requires that we be in a position to determine as soon as *qq'* is uttered that *no matter how the sentence ends* it will have a classical truth value in every world of the context set C. The sentence could, among others, end with the string *and* $\top$, where $\top$ is a tautology.[3] But when we apply (9) to *qq' and* $\top$, we obtain a presupposition that *if* $\top$*, q*, or more simply: *q*. In this way, we can explain why the inverse order *qq' and p* carries a much stronger presupposition than the canonical order *p and qq'*.

To state the principle in greater generality, we define a 'good final' for a string *x* to be any string *y* which guarantees that *xy* is a well-formed sentence. One possible statement of the incremental component is as follows (see Fox 2008 for an alternative):

(10)   **Incremental presuppositional acceptability**

   F uttered in C is *incrementally acceptable* just in case for all strings a, b, and for any expression *dd'*, if $F = a$ *dd'* b, then for every good final b' which contains no underlined material,[4] a *dd'* b' is presuppositionally acceptable, i.e. for every world w of C, a *dd'* b' evaluated in accordance with the supervaluationist scheme has a classical value in w.

1.4   Presuppositions predicted by various theories

Modular accounts that have an incremental component raise an obvious question: what is the status of the left-right bias? Within the trivalent framework, the three positions we outlined in (5) can be restated as follows (they could be adapted to all recent theories):

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[3] See Chemla (2006) for a discussion of the (mostly harmless) role of tautologies in theories of this kind.

[4] The restriction to good finals that do not contain underlined material is made necessary by the trivalent nature of this particular account (it is not shared by other recent accounts, such as Chemla 2008a, 2009b or Schlenker 2008a,b, 2009a). Without such a requirement, we would in essence predict that *qq' and p* is never acceptable, because we would need to consider good finals that include all conceivable presupposition triggers.

(11)   **P1: Incremental Theory.**   Presupposition projection is entirely ruled by condition (10).

      P2: Strict Symmetric Theory.   Presupposition projection is entirely ruled by condition (9).

      P3: Mixed Theory.   Presupposition projection is preferably ruled by condition (10) (= incremental bias), but a sentence whose presupposition only satisfies condition (9) should have an intermediate status (= the bias can be overcome, but at some cost).

When the presupposition trigger appears at the end of the sentence, all accounts make the same predictions (since in such cases the incremental component adds nothing). Things are different in other environments. We will report the predictions made for various constructions: conjunctions, disjunctions, conditionals (which we analyze for simplicity as material implications), and sentences with *unless*. We already derived the results for conjunctions in Sect. 1.3:

(12)   Predicted presuppositions for conjunctive sentences

    a.   *p and qq'*   All theories predict the presupposition: *if p, q*

    b.   *qq' and p* $\begin{cases} \text{– Incremental Theory: } q \\ \text{– Symmetric Theory: } \textit{if p, q} \end{cases}$

Turning to disjunctions, all accounts predict that *p or qq'* should presuppose that *if not p, q*. For let us consider any world w of the context set. If p is true in w, the disjunction is true anyway, and thus the presupposition of the second disjunct need not be satisfied. If p is false, everything hinges on the value of the second disjunct — and if its value in w is indeterminate, so is that of the entire sentence. So in such cases the presupposition of the second disjunct must be satisfied — hence the presupposition that *if not p, q* (here too, we will say informally that we can use the negation of the first disjunct to satisfy the presupposition of the second disjunct). For the inverse order *qq' or p*, the symmetric account makes exactly the same prediction as for the canonical order *p or qq'*: it should be presupposed that *if not p, q*. But the incremental account makes different predictions; for the string *qq'* can be turned into a well-formed sentence by adding *and* $\top$ to it, where $\top$ is a tautology. This yields the sentence *qq' and* $\top$, which we already considered in our discussion of conjunction, and thus the conclusion is the same: every world of the context set should satisfy q (and it is easily checked that if this condition is satisfied, the condition in (10) is satisfied as well).

(13)   Predicted presuppositions for disjunctive sentences

    a.   *p or qq'*   All theories predict the presupposition: *if not p, q*

    b.   *qq' or p* $\begin{cases} \text{– Incremental Theory: } q \\ \text{– Symmetric Theory: } \textit{if not p, q} \end{cases}$

With the same kind of reasoning, we can derive predictions for conditionals. For simplicity, we will treat the latter as material implications (essentially the same results would be obtained if they were treated as strict implications). Since *if p, qq'* has the same truth conditions as *(not p) or qq'*, and since in addition p and q appear in the same order in the two constructions, the predictions are the same as for *(not p) or qq'*: we predict a presupposition that *if p, q* (and since the trigger appears at the end, the same prediction is made by the incremental and by the symmetric account).

Let us now consider the sentence *if not qq', not p*: since it is its contraposition, it has the same meaning as *if p, qq'*, but its arguments appear in the inverse order. It is clear that the symmetric account will also predict a presupposition that *if p, q* (since it is not sensitive to the order in which the arguments appear). As for the incremental account, it will predict a presupposition that q. This

is because *if not qq',...* could be turned into a well-formed sentence by adding as a consequent a contradiction ⊥, yielding: *if not qq', ⊥*, which is equivalent to *qq'*. So it must be presupposed that *q*.

(14) Predicted presuppositions for sentences with *if*:

    a. *if p, qq'*   All theories predict the presupposition: *if p, q*

    b. *if not qq', not p* $\left\{ \begin{array}{l} \text{– Incremental Theory: } q \\ \text{– Symmetric Theory: } \textit{if p, q} \end{array} \right.$

For future reference, we also include predictions for sentences with the connective *unless*. Since *unless F, G* means very much the same thing as *if not F, G*, we can immediately derive some predictions from the preceding example: *unless not p, qq'* has the same presupposition as *if p, qq'*; and *unless qq', not p* has the same presupposition as *if not qq', not p*. This leads to the following results:

(15) Predicted presuppositions for sentences with *unless*:

    a. *unless not p, qq'*   All theories predict the presupposition: *if p, q*

    b. *unless qq', not p* $\left\{ \begin{array}{l} \text{– Incremental Theory: } q \\ \text{– Symmetric Theory: } \textit{if p, q} \end{array} \right.$

When *if F, G* is treated as a material implication, and *unless F, G* is given the same meaning of *if not F, G*, the following expressions are given the very same classical truth conditions : *if F, G*; *if not G, not F*; *not F or G*; *G or not F*; *unless F, not G*; and *unless G, not F*. This will allow us to design paradigms in which, as a first approximation, the (classical) truth conditions remain constant, while only the connectives and the order of the lexical material change.

Let us summarize our results with reference to the positions described in (5). For all the examples above, the Strict Symmetric Theory P2 predicts weak (conditional) presuppositions no matter what the position of the presupposition trigger is. By contrast, the Incremental Theory P1 predicts unconditional presuppositions when the trigger occurs early in the sentence, since the end of the sentence cannot serve to satisfy a presupposition that comes before (when the trigger comes last, P1 and P2 make the same predictions). The Mixed Theory P3 predicts that a sentence is most acceptable if its presupposition is satisfied incrementally, but that the presupposition may also be satisfied symmetrically, albeit at some cost.

2   How to test symmetric readings

There are two ways to test the existence of symmetric readings: (i) by considering the *inferences* that presuppositional expressions give rise to in various linguistic environments; and (ii) by assessing the *acceptability* of various presuppositional sentences. This paper is primarily concerned with the inferential method, but we will also briefly discuss data obtained from acceptability judgments. We believe that our inferential data provide an argument against the Incremental Theory. By contrast, the acceptability judgments we obtained are not conclusive, and they primarily show that the sentences from which we obtained inferential judgments were not unacceptable; we do hope, however, that acceptability judgments could further illuminate the debate in the future.

Our experiment crucially relies on the inferences produced by a particular kind of presupposition trigger, called *anaphoric trigger* — in our data, the French version of the particle *too* (= *aussi*). As we will see, the specific properties of *too* are necessary to design inferential tests that can lead to interpretable results. To anticipate: (i) the fact that *too* needs an antecedent will serve to overcome the left-right bias and force information that comes after the trigger to be used to satisfy its presupposition; in addition, (ii) the fact that, according to the literature, *too* does not allow for 'local accommodation' will prove crucial to show that the conditional inferences we obtain are genuinely due to presupposition projection (rather than local accommodation).

We start (Sect. 2.1) by reminding the reader of the mechanisms by which presupposition triggers produce inferences. We then (Sect. 2.2) lay out our hypotheses about *too*. We explain how this particle can be used to obtain inferential judgments that can decide between the Incremental Theory and the Mixed Theory (Sect. 2.3), and we briefly lay out a similar logic for acceptability judgments (Sect. 2.4). Finally, we motivate the choice of linguistic environments we tested (Sect. 2.5), and gather all our predictions in a condensed format (Sect. 2.6).

2.1 Varieties of presupposition satisfaction

2.1.1 Simple satisfaction

The presupposition of a clause can be satisfied on the basis of information which is explicitly provided by the rest of the discourse, as in (16), or which is just taken for granted by the speech act participants, as in (17).

(16)   John is having breakfast in New York, and Mary knows that he is.

(17)   Mary knows that Obama is a Democrat.

x knows that p presupposes that *p*. The presuppositions of both sentences are satisfied: in (16), because of the first conjunct; and in (17), because the speech act participants take for granted that Obama is a Democrat (this fact is part of the 'common ground' of the conversation).

2.1.2 Global accommodation

When a presupposition is not satisfied by the preceding discourse or by the common ground of the conversation, the speech act participants may still be willing to adjust their beliefs for the sake of the communicative exchange. This process is called *global accommodation* because they adjust their beliefs about the context of the entire speech act — in effect tinkering with what counts as the 'common ground'. Thus from (18) we typically infer that John is in fact having breakfast in New York. This is because we (globally) accommodate the presupposition triggered by *know*: for the sake of the conversation, we may be willing to add this assumption to our initial beliefs in order to make sense of the speaker's utterance.

(18)   Mary doesn't know that John is having breakfast in New York.

Importantly, global accommodation might yield inferences that are slightly stronger than what is strictly necessary to satisfy the presupposition of the target sentence. Consider the following example, which will play a role in our experiment:

(19)   Ann won't decide to study abroad, or her brother too will make a stupid decision.

Schematically, (19) is of the form *not p or qq'*, with *p = Ann will decide to study abroad*, *q = Ann will make a stupid decision*, and *q' = Ann's brother will make a stupid decision*. As discussed above, the predicted presupposition is: *if p, q*, where the conditional is construed as a material implication. In other words, the minimal global accommodation should guarantee that in each world of the context set, *Ann decides to study abroad ⇒ Ann will make a stupid decision* is true. But we naturally infer from (19) something stronger, namely that *it would be stupid of Ann to decide to study abroad*. Unlike the minimal accommodation, which leaves indeterminate the nature of the stupid decision, the inference we do obtain specifies it — by establishing a causal link between the proposition which is the antecedent of *too* (here: *Ann will decide to study abroad*) and the proposition it must entail (here: *Ann will make a stupid decision*). By virtue of this additional assumption, we infer something of the form *(if p, q) and r* rather than just the minimal accommodation *if p, q*. Importantly, when no antecedent proposition is available, such a strengthening is not applicable:

(20)   Ann's brother too will make a stupid decision!

It is clear that this sentence does not make it possible to identify the source of the stupid decision. As a result, we only obtain an unconditional presupposition that *q* — i.e. *someone (presumably Ann) will/did make a stupid decision*. Importantly, when the strengthening seen in the conditional case is taken into account, the resulting inference *fails* to be entailed by the unconditional one: although *q* entails *if p, q*, it is not the case that *q* entails *(if p, q) and r*.[5]

2.1.3   Local accommodation

Still, there are cases in which even global accommodation won't help. Consider the following example (which is presumably somewhat marked):

(21)   John certainly doesn't know that I am going to hire him — for the simple reason that I will *never* do so.

If we globally accommodated the presupposition triggered by the verb *know*, we would add to our initial beliefs the assumption that *I am going to hire John*; but this would make the second part of the sentence contradictory. However, no contradiction is obtained in this case. Rather, *John doesn't know that I am going to hire him* is essentially interpreted as *not (q and q')*, with *q = I am going to hire John*, and *q' = John believes that I am going to hire him*. In other words, the presupposition triggered by *know* is in this case treated as if it were part of the assertive component of the clause embedded under the negation. This process, by which a presupposition gets turned into part of the assertive component, is called *local accommodation* because it only tinkers with the local environment of the trigger, without directly affecting the common ground which is assumed for the entire speech act.

2.2   Assumptions about anaphoric triggers

In this section, we lay out an analysis of the anaphoric trigger *too*, which differs from regular triggers in ways that will greatly matter for our experiment.

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[5]In addition, we should note that the statement *It would be stupid of Ann to decide to study abroad* has counterfactual entailments, unlike the minimal accommodation, which only imposes constraints on worlds *within* the context set. This extension of the inference to counterfactual worlds need not be surprising: if the inference holds within the context set, it should hold of worlds that are sufficiently close to it as well.

When a presupposition is explicitly justified in the discourse, the triggers *know* and *too* share the same behavior:

(22)   John is having breakfast in New York, and Mary knows that he is eating right now.

(23)   John is having breakfast in New York, and Mary too is eating right now.

In both cases, the presupposition is satisfied by the preceding discourse. In particular, in (23) *too* triggers a presupposition which is roughly that a salient person other than Mary (presumably John) is eating — and this presupposition is of course satisfied by the first conjunct. But (23) makes special demands on its environment; intuitively, it requires an antecedent in the discourse, and is for this reason 'anaphoric'. How should this requirement be formally cashed out?

2.2.1   An analysis of *too*

While there are a variety of proposals in the literature, most agree that *too/also* is a *focus-sensitive* particle; we will try to derive its anaphoric nature from this basic observation. Taking a hint from Rooth's analysis of contrastive focus (Rooth 1992), as well as from Bos's specific analysis of *too* (Bos 1994), we will assume that *too* requires a *clausal* antecedent.[6]

In (23), the antecedent of *too* is the entire first conjunct, *John is having breakfast in New York*. The requirement that there should be a clausal antecedent is not special to *too*: it has been argued to hold of contrastive focus as well — and in Rooth's theory, of focus constructions quite generally. To give an example, the sentence in (24a) is analyzed by Rooth (1992) as in (24b), where the argument of the $\sim$ operator is anaphoric to the first clause.

(24)   a.   Mary called John a Republican, and then HE insulted HER.
        b.   [Mary called John a Republican]$_i$, and then [he$_F$ insulted her$_F$]$\sim$ i

Specifically, in Rooth's (1992) analysis, it must be presupposed that an alternative of the clause *[he$_F$ insulted her$_F$]*, of the form *x insulted y*, is entailed by the antecedent clause. Alternatives of *[he$_F$ insulted her$_F$]* are obtained by considering all possible replacements of the focused pronouns with their alternatives — so that we obtain a set of propositions that can be expressed as *x insulted y* for some *x* and *y*. In this way, we obtain a presupposition that for some x different from John and for some y different from Mary, *if Mary called John a Republican, x insulted y* — hence an inference that x = Mary, y = John, and also that Mary's calling John a Republican is tantamount to an insult.

We take the semantics of *too* to add one main requirement, namely that the antecedent clause should be presupposed to be true. This difference correctly accounts for the contrast between (25a) (modified from Rooth) and (25b): the first sentence is acceptable, but the second sentence is quite deviant because the presupposition triggered by the main clause is not satisfied.

(25)   a.   Although it is doubtful that she called him a Republican, HE insulted HER.
        b.   # Although it is doubtful that she called him a Republican, [HE insulted HER] too.

When the antecedent clause is asserted to be true, the judgments change:

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[6]This is not the only possible theory. Several theories in the literature take *too* to require a nominal antecedent when the focused element it associates with is itself nominal, e.g., Heim (1992). Relatedly, the particle *again*, which has many properties in common with *too*, is often analyzed as requiring a time-denoting antecedent, e.g., in Beck (2006).

(26)   She called him a Republican, and [HE insulted HER] too.

The theory we will assume has the advantage of building on a compelling account of contrastive focus, with the addition of a presuppositional condition. An added benefit is that the issue of the *global accommodation* of the relevant presupposition has been discussed in some detail in the focus literature (for instance for examples such as (24a)), whereas it has remained understudied in several accounts of *too*.

On a technical level, we posit the following lexical entry for *too*, which together with its propositional index will be written as too_i. This entry is defined within Rooth's semantic framework: each expression E has an ordinary value $[\![E]\!]_o$ and a focus value $[\![E]\!]_f$. The interpretation function is relativized to an assignment function s, and to a world of evaluation w; in our examples, indices will denote propositions because we are interested in the antecedence relations between focused elements and their propositional antecedents. If too_i takes a clause *IP* as its argument, the result will have the value in (27).

(27) $[\![too_i \ IP]\!]_o^{s,w} = \#$ unless

    (i)   s(i) denotes a proposition which is true at w, i.e. s(i)(w) = true; and

    (ii)   for some proposition α in $[\![IP]\!]_f^{s,w}$,

        (a) α is an alternative distinct from $[\![IP]\!]_o^s$,[7] and

        (b)   relative to the context set, s(i) entails α.

    If $[\![too_i \ IP]\!]_o^{s,w} \neq \#$, then $[\![too \ IP]\!]_o^{s,w} = [\![IP]\!]_o^{s,w}$.

To see how this works, consider the sentence in (28a), analyzed as in (28b):

(28)   a.   Mary will decide to study abroad, and $John_F$ too will make a stupid decision.

    b.   [Mary will decide to study abroad]$_i$, and too_i [$John_F$ will make a stupid decision]

The sentence is acceptable, but it forces one to accommodate the assumption that *if Mary decides to study abroad, she will make a stupid decision* (presumably because the decision to study abroad would be stupid). Let us see how we derive this result. First, we see that *too* has a propositional antecedent (namely the first conjunct), as is required. Second, the focus alternatives of *[John_F will make a stupid decision]* are all the propositions that can be expressed by a clause of the form: *x will make a stupid decision*. Now we see that s(i) entails a (distinct) alternative of *[John will make a stupid decision]* just in case, for some x (presumably Mary), *Mary will decide to study abroad* entails that *x will make a stupid decision*. This forces the accommodation of the assumption that *if Mary decides to study abroad, she will make a stupid decision*. Let us add that the point we made in Sect. 2.1.2 about the global accommodation of conditional presuppositions applies in this case as well: the assumption that does get accommodated establishes a causal connection between Mary's particular decision and the existence of a stupid decision on her part; as a result, we get an inference such as *It would be stupid of Mary to study abroad*.

2.2.2   Specific properties of *too*

Let us now list the properties of *too* that will be crucial for our experiment.

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[7]More precisely: α neither entails nor is entailed by $[\![IP]\!]_o^s$.

Property 1: Anaphora resolution Since too_i needs a clausal antecedent, the particle is usually deviant if the preceding discourse does not provide one. Thus (29a) uttered on its own is less natural than (29b), despite the fact that they trigger comparable presuppositions.

(29) a. # John too is having breakfast in New York.

  b.   Mary knows that some people are having breakfast in New York.

  Two provisos should be added.

1. First, the denotation of the propositional index could in principle be provided deictically rather than anaphorically. This may indeed occur. For instance, a distressed prisoner could start an utterance addressed to his guards with *I am human, too*. We could take the entire context set to be the antecedent of *too* in this case. We take this option to be extremely restricted, however:

(30)   The propositional index of *too* is preferably resolved anaphorically rather than deictically.

2. Second, the denotation of the propositional index can sometimes be obtained by way of a sophisticated mechanism of 'donkey' anaphora resolution (also called 'E-type anaphora'). This is uncontroversial for individual-denoting pronouns. Thus in (31), the antecedent of the pronoun *it* is somehow made available by the *negation* of the first disjunct (why this is so should follow from a complete theory of anaphora resolution; see for instance Krahmer 1998; Elbourne 2005). The same mechanism is at play in (32), except that this time the antecedent of *it* is propositional (*it* refers to the fact that Bin Laden *was* hiding in Afghanistan).

(31)   This house has no bathroom, or it is well hidden. [attributed to Partee]

(32)   Bin Laden wasn't hiding in Afghanistan, or the CIA didn't know it.

  Whatever the mechanism responsible for propositional anaphora resolution in (32), we take it to be available as well in some examples involving *too*: in (33a), the antecedent of *too* is not the first disjunct, but rather its negation. It certainly wouldn't do to give *too* the index i in (33b); rather, *too* must carry an index k which denotes the negation of the first disjunct — using whatever mechanism is responsible for the denotation of *it* in (32).[8]

(33) a. Mary will not decide to study abroad, or John$_F$ too will make a stupid decision

  b. [Mary will not decide to study abroad]$_i$, or too$_k$ [John$_F$ will make a stupid decision]

Property 2: Global accommodation. As was noted when we discussed (28a), the presupposition triggered by *too* may be satisfied thanks to global accommodation. This point is quite standard in

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[8]There are at least two ways in which *it* in (32) could come to have the desired denotation: by way of coindexation with the sister of the negation found in the first disjunct; or by way of coindexation with the 'local context' of the second disjunct (since this local context entails the negation of the first disjunct). We remain agnostic for the moment: either solution could extend to (33a), with index k denoting a proposition that entails an alternative to *[John$_F$ will make a stupid decision]*. Importantly, however, the two theories make divergent predictions for examples in which the first disjunct of (33a) is replaced with one that is contextually equivalent but does not contain a syntactic negation (e.g., *Mary will stay in France*). We leave a comparison between these two conceivable theories of propositional donkey anaphora for future research.

the literature on contrastive focus, but it is often overlooked in the literature on *too*.[9] Thus (28a) can be readily accepted by someone who does *not* initially assume that it would be stupid of Mary to decide to study abroad. If in that sentence *make a stupid decision* is replaced with *make a reasonable decision*, the opposite presupposition will be (globally) accommodated, namely that for Mary to decide to study abroad would be a *reasonable* decision.

Property 3: Role of the antecedent. There appears to be a presumption that the antecedent clause of *too* plays a role in satisfying the presupposition it triggers. To see what this condition amounts to, consider the contrast between (34) and (35).

(34)   Mary is eating popovers, and John too is overeating.

(35)   # Mary is drinking Bordeaux, and John too is overeating.

In both cases, *too* has a clausal antecedent, namely the first conjunct. In (35), one could in principle accommodate the information that *Mary is overeating* — but as a matter of fact this appears to be quite difficult; no such problem arises in (34): even if one does not know what popovers are, it is easy to accommodate the presupposition that *to eat popovers is to eat too much*. We would like to suggest that the crucial factor to account for the contrast is whether the first conjunct plays a role in satisfying the presupposition triggered by *too*. More precisely, if one is willing to accept that *if Mary is drinking Bordeaux, she is overeating*, this is probably because one believes the consequent of the conditional, i.e. *Mary is overeating*. By contrast, one could grant the condition *if Mary is eating popovers, she is overeating* without necessarily granting the consequent. Technically, the presupposition which is accommodated in (35) is not significantly weaker than the one that would be accommodated if the first conjunct were not present (in which case one would presumably take the entire context set as a deictic antecedent of *too*); things are different in (34). So we posit the following condition:

(36)   The propositional antecedent of too_i should play a role in satisfying the presupposition triggered by *too*. More precisely, the presupposition which is accommodated when i denotes this antecedent should not be equivalent to the presupposition that would have to be accommodated in its absence, i.e. if i denoted the context set.

Property 4: Difficulty of local accommodation. Local accommodation of the presupposition triggered by *too* appears to be quite difficult. This point was recently made by Klinedinst (2012), who in turn followed remarks by Simons (2001) and Abusch (2002), among others. A slightly modified version of Klinedinst's example is given in (37):

(37)   – Teacher: Johnny claims that you gave him a black eye. Is this true?
        – Bill: I don't know, but #if I give Susie a black eye too, they'll be twins.

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[9]Soames (1989) does discuss the possibility of global accommodation, but only with respect to the 'distinctness' requirement, i.e. in our schematic examples the presupposition that the focused NP should denote a different individual from the corresponding NP of the antecedent clause. Other authors sometimes say that the presupposition triggered by *too* cannot be accommodated at all (Beaver and Zeevat 2007). But by this, they usually mean that the presence of an antecedent in the discourse is non-negotiable; they do not consider the cases we discuss here, where an antecedent is present but the presupposition triggered can only be satisfied if some additional assumptions are granted by the speech act participants.

Importantly, in (37) *too* has an appropriate propositional antecedent: thanks to the teacher's utterance, there is a salient proposition of the form ⟨*Bill*⟩ *gave y a black eye*, where *y* is Johnny; this anaphoric antecedent is itself an alternative to the proposition *I give Susie$_F$ a black eye* (as uttered by Bill), and so it obeys conditions (ii.a-b) of (27). In other words, the anaphoric condition (Property 1 above) is satisfied. But this is not enough: by condition (i) of (27), this propositional antecedent must be presupposed to be true. Crucially, however, the truth of this proposition cannot be *globally* accommodated, as this would contradict the pragmatics of the situation (the teacher is *asking* whether the child gave Johnny a black eye, and the child himself replies that he *doesn't know*). Thus only *local accommodation* should be an option — but it seems to be unavailable: Klinedinst takes the second utterance to be deviant. If local accommodation were available, however, the conditional should be acceptable, with a meaning akin to: *if I GIVE JOHNNY A BLACK EYE and I give Susie a black eye, they'll be twins*, where the capitalized part results from the local accommodation of the truth of the antecedent proposition. We conclude, with Klinedinst, that local accommodation of the truth of the antecedent proposition is not really possible with *too*.

We tentatively submit that the same conclusion can be reached on the basis of examples that are quite similar to the ones we investigated in our experiments (see Sect. 3). For instance, starting from (33a), we can ask whether local accommodation is available in a minimally different discourse that guarantees that the anaphoric condition (i.e. Property 1) is satisfied.

(38)   I don't know whether Mary will decide to study abroad. But if her brother also makes a stupid decision, their parents will be devastated.

It seems rather difficult to understand (38) in such a way that (i) it (globally) presupposes that it would be stupid of Mary to study abroad (to satisfy the anaphoric condition), and that (ii) the conditional is acceptable and means: *If MARY DECIDES TO STUDY ABROAD and her brother makes a stupid decision, their parents will be devastated*, with local accommodation of the truth of the capitalized proposition.

Note that one could be tempted to argue against the possibility of local accommodation on the basis of examples that are more radically deviant. Consider for instance the contrast obtained between a standard trigger, such as the possessive description *Ann's car* in (39a) (which presupposes that Ann has one car), and the trigger *too* in (39b):

(39)   a.   I have talked to Ann. It's impossible that John will come with Ann's car: she only has a motorbike.
        b.   # I have talked to Ann. It's impossible that John too will come: Ann is abroad.

In (39a), the second sentence is understood as *It's impossible that (q and q')*, with *q = Ann has exactly one car* and *q' = John will come with the car that Ann owns* — a standard instance of local accommodation. An analogous reading appears to be nearly impossible in (39b), which cannot mean *It's impossible that (Ann will come and John will come)*. Importantly, however, the deviance of (39b) does *not* show that local accommodation is impossible with *too*, because the sentence is independently ruled out by the anaphoric condition (Property 1).[10] Specifically, there is no salient proposition which can plausibly entail an alternative to *John$_F$ will come*. Hence independently of

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[10]Thanks to the NALS editors for pointing out a mistake on precisely this point in an earlier version of this paper.

the issue of local accommodation, (39b) should be ruled out.[11]

Things would be different if we had a theory in which the anaphoric antecedent of *too* is nominal rather than propositional. On such an analysis, in (39b) the focused element *John* must have a salient nominal antecedent, presumably *Ann*; and it triggers the presupposition that *Ann will come*. Within this alternative framework, (39b) could be taken to show that local accommodation *per se* is unavailable with *too*. It is because we originally believed in such a 'nominal' theory of *too* that we investigated sentences such as (39b) in order to assess the availability of local accommodation. In view of our current theory, this was a mistake. We will come back to this point in the conclusion.

2.3   Inferential judgments

We will now explain how inferential data can be used to decide the debate between Incremental and Mixed theories. We will make crucial use of the properties of *too* which we introduced in the previous section.

2.3.1   The import of anaphoric triggers for inferential judgments

The *inferential method* is based on the observation that subjects can draw from a sentence the inference that its presupposition is satisfied given the global context of the conversation (if necessary, by way of global accommodation). Thus one infers from (40) and (41) alike that John is having breakfast in New York:

(40)   Mary knows that John is having breakfast in New York.

(41)   Mary doesn't know that John is having breakfast in New York.

Consider now a sentence of the form *qq' or p*. As we described in (13b), the Incremental Theory predicts that it presupposes *q*, while the Mixed Theory predicts that it might presuppose instead *if not p, q* (we refine this point below). The two theories also predict different *inferences* if a sentence of the form *qq' or p* is uttered in a (relatively) null context. If the Incremental Theory is correct, subjects should infer that *q* (this is because the second disjunct comes 'too late' to satisfy the presupposition). If the Mixed Theory is correct, subjects could infer instead that *if not p, q* (because the second disjunct *can* be used to satisfy the presupposition of the first conjunct).

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[11]This point is somewhat subtle, and would require a longer discussion. Consider again condition (ii.b) in (27): *relative to the context set, s(i) entails p*. Suppose first that the 'context set' in question must in all cases be the global context. Since the only salient propositional antecedent is *I have talked to Ann*, the global context should be accommodated so as to guarantee that *I have talked to Ann* entails *x will come*, where *x* is an alternative to *John* — probably *Ann*. Plausibly, any reasonable assumption that one can make to enforce this entailment will also guarantee that *x will come* is true; as a result, we will have run afoul of Property 3, which stipulates that the propositional antecedent should play a role in satisfying the presupposition triggered by *too*. However, there is a second possibility we should consider, namely that the 'context set' mentioned in (ii.b) in (27) is the *local* context. If so, local accommodation applied to (39b) should yield a meaning akin to: *It's impossible that (i) 'I have talked to x' entails 'x will come', and (ii) I have talked to Ann, and (iii) John will come*, with *x* an alternative to *John* (probably *Ann*). Here we do not run afoul of Property 3, as no presupposition is triggered (since by assumption local accommodation is applied). But a generalization of Property 3 would probably rule out this reading, as the *meaning* we obtain is not significantly different from what we would have obtained (with local accommodation) if *too* were anaphoric to the entire global context set rather than to the sentence *I have talked to Ann*. So it is likely that on this alternative interpretation of 'context set', (39b) is again ruled out independently of the issue of local accommodation proper.

But this reasoning is not quite correct. It *would* be if the Mixed Theory claimed that symmetric justification is cost-free. But this is not so: unlike the straw-man position which we called the 'Strict Symmetric Theory', the Mixed Theory posits that symmetric justification is possible, *but at some cost*. In the case of a sentence of the form qq' *or p*, one must compare two costs: the cost of globally accommodating q on the one hand, and the joint cost of symmetric satisfaction plus global accommodation of the weaker *if not p, q* on the other hand. Now with triggers such as *know*, global accommodation is usually taken to incur little, if any, cost. Hence, proponents of the Mixed Theory could argue that they too predict that subjects will draw from qq' *or p* the inference that q — because the cost of symmetric satisfaction is just too high. Thus the Mixed Theory and the Incremental Theory might end up making the same predictions.

It is possible, however, to tease apart their predictions by considering anaphoric rather than non-anaphoric triggers. As we saw, *too* comes with a propositional index which is preferably resolved anaphorically (= Property 3 above). We can pit this requirement against the cost of symmetric accommodation so as to distinguish the predictions of the two theories. In Sect. 2.3.2 and 2.3.3 below, we articulate our reasoning for the example of qq' *or p*, where we take the presupposition q to be triggered by *too*, as in (42).[12]

(42)   Ann too$_i$ will make a stupid decision, or her brother won't decide to study abroad.
       qq' *or p*

We will not discuss the canonical order (*p or* qq'), since the Incremental Theory and the Mixed Theory make exactly the same predictions in this case (both predict an inference that *if not p, q*; see Sect. 1.4). With respect to the inverse order, the reasoning we develop for *or* immediately extends to other connectives, and in particular to *if* and *unless*, which will play a role in the experimental discussion below.

2.3.2   Incremental Theory

To the extent that it is acceptable (a point to which we return below), the sentence qq' *or p* is predicted by the Incremental Theory to trigger the presupposition that q, since the second disjunct comes 'too late' to play any role in satisfying the first one. Let us see how this general conclusion applies to the case of anaphoric triggers. In (42), *too$_i$* comes with a propositional index i. By the lexical entry of *too* in (27), i must denote a true proposition s(i) which entails an alternative to *Ann$_F$ will make a stupid decision* — hence for some x denoting a salient person different from Ann, s(i) should entail: *x will make a stupid decision*. Since the only other person mentioned in the discourse is Ann's brother, it is safe to assume that this alternative should be of the form: *Ann's brother will make a stupid decision*. Let us now see how we can find the denotation of i. It could in principle be obtained anaphorically (presumably the preferred option), or deictically. We consider each option in turn.

(A) *Anaphoric resolution:* As we saw when we discussed Property 1 (second part), when *too$_i$* appears in the second disjunct, its propositional index i can denote a proposition s(i) which is the negation of the first disjunct, with s(i) equivalent to *Ann's brother will decide to study abroad*. By

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[12]Some of our examples have a slightly different structure:

(i)   Ann's brother too will make a stupid decision, or Ann won't decide to study abroad.

the second part of the lexical entry for *too* in (27.ii), s(i) must entail *Ann's brother will make a stupid decision*. By the first part of the lexical entry of *too* in (27.i), s(i) must be presupposed to be true. But in the present case, the order of the disjuncts is reversed. This raises two problems.

- First, how can the index *i* be resolved? Dynamic theories usually posit a tight link between the availability of 'donkey' anaphora resolution and of presupposition projection. Incremental theories that predict that the second disjunct cannot play a role in satisfying the presupposition of the first disjunct might well have to claim that the index *i* should, for the same reason, be unable to denote the appropriate proposition (i.e. the negation of the second disjunct).

- Second, even on the assumption that the index *i does* denote the appropriate proposition, we will obtain an unfortunate pragmatic outcome. Suppose that in (42) the index *i* denotes the proposition that *Ann's brother will decide to study abroad* (i.e. the negation of the second disjunct). In the first disjunct, *too* triggers the presupposition that *this proposition is true* (by the first part of the lexical entry for *too*, (27.i)). Crucially, because the theory is incremental, this presupposition will have to be *globally* accommodated (the second disjunct comes 'too late' to justify it). But when it is presupposed that s(i), i.e. that *Ann's brother will decide to study abroad*, the second disjunct becomes trivially false, and is thus idle — a clear violation of standard conditions on disjunctions.

We take these considerations to suggest that anaphoric resolution is not feasible in this case, and that deictic resolution must be chosen instead.

(B) *Deictic Resolution:* Let us now see what happens when the index *i* is resolved deictically, presumably to the entire context set. The context set must then entail that someone salient in the conversation — e.g. Ann's brother — will make a stupid decision. Importantly, this does not force the (global) accommodation of the proposition that *Ann's brother will decide to study abroad*, and thus the pragmatic problem we encountered in (A) does not arise.

In sum, on an incremental theory the index *i* should be resolved deictically, and we are likely to get an unconditional inference that *Ann's brother will make a stupid decision*.

2.3.3   Mixed Theory

What does the Mixed Theory predict? Given the cost incurred by symmetric satisfaction, its predictions are in agreement with those of the Incremental Theory, *unless* some other constraint forces symmetric satisfaction. This is precisely what happens in this case, thanks to the special properties of anaphoric triggers (specifically, to Property 3): anaphoric resolution is preferred to deictic resolution of the index *i*. We start the reasoning as in case (A) of the previous section: we take the index *i* to denote the negation of the second disjunct, equivalent to *Ann's brother will decide to study abroad*; we refer to this proposition as *s(i)* (note that we can certainly assume that the second disjunct can be appealed to in order to provide a denotation for the index *i*, since the theory under consideration is symmetric). By the second part of the lexical entry for *too* in (27.ii), *s(i)* must entail *Ann's brother will make a stupid decision*. By the first part of the lexical entry of *too* in (27.i), *too* triggers the presupposition that s(i) is true. *But now we don't run into the pragmatic problem we encountered in (A)*: by the process of symmetric satisfaction, the negation of the second disjunct can be used to satisfy this presupposition. We end up with a *conditional* presupposition that *if Ann's brother decides to study abroad, he will make a stupid decision*. As was discussed

earlier, the conditional assumption which is globally accommodated is tantamount to *It would be stupid of Ann's brother to decide to study abroad.*

The key assumption in this argument is that the cost of deictic resolution of i should be greater than the cost of symmetric justification of the presupposition that s(i) is true. It is thanks to this assumption that we can derive from the Mixed Theory the prediction that material in the second part of a sentence can play a role in justifying a presupposition triggered by the first part, thus leading to conditional rather than unconditional inferences.

2.4 Acceptability judgments

The second possible method to test the availability of symmetric readings is based on acceptability judgments. Here as well we rely on the fact that *too* leads to degraded acceptability unless (i) it can find a clausal antecedent in the discourse (Property 1), and (ii) its antecedent plays a role in satisfying the presupposition triggered by *too* (Property 3).

2.4.1 Incremental Theory

Let us first consider the sentence *p or qq'*, where *not p* can, possibly with some global accommodation, entail that *q* — which according to incremental rules of presupposition projection should satisfy the presupposition of the second disjunct.

(43)   Ann's brother won't decide to study abroad, or Ann too will make a stupid decision.

The sentence is in the canonical order: the trigger comes last, and what justifies its presupposition comes first. The index i can be anaphoric to the negation of the first disjunct. When this is the case, both conditions on anaphoric triggers should be satisfied: (i) the trigger has an antecedent in the first disjunct; (ii) with some global accommodation, rules of (incremental) presupposition projection guarantee that the first disjunct does play a role in satisfying the presupposition of the second disjunct. In our example, global accommodation can guarantee that *if Ann's brother decides to study abroad, he will make a stupid decision*; and the negation of the first disjunct can be used to guarantee that the proposition denoted by i is true.

Things are different if the order of the disjuncts is reversed, as in *qq' or p*.

(44)   Ann too will make a stupid decision, or her brother won't decide to study abroad.

Rules of incremental presupposition projection predict that the second disjunct cannot be appealed to in order to satisfy the presupposition triggered in the first disjunct. As we saw when we discussed this very example in the preceding section, one must choose one's poison: if the index i is resolved anaphorically (to the negation of the second disjunct), one ends up presupposing that this anaphoric antecedent is true, which makes the second disjunct idle. If one chooses to resort to deictic resolution instead, one must use a process of resolution which appears to be degraded in standard cases. Either way, then, the result should be degraded.[13]

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[13]Note that it won't help to use as a propositional antecedent for *too* the second disjunct of (44) (rather than the *negation* of that disjunct, as assumed in the text). This is because such a measure would imply that the second disjunct is globally presupposed to be true ('globally', because we are assuming incremental rules of presupposition projection); and this too would make the second disjunct idle.

2.4.2 Mixed Theory

With respect to the canonical order *p or qq'*, the predictions of the Mixed Theory are in agreement with those of the Incremental Theory. But they differ in the case of the inverse order *qq' or p*: since the Mixed Theory takes symmetric justification to be available, though at some cost, it predicts that sentences of this form should have an intermediate acceptability status. In particular, one may expect that these cases are not perfect, but still more acceptable than examples such as (45), in which one cannot find a clause with an antecedent for *too* which plays a role in satisfying its presupposition.

(45)   I have just talked to Ann. Her brother too will make a stupid decision.

2.5 Choice of linguistic environments

In principle, one can and should study the debate between the Incremental and the Mixed Theory using a variety of triggers and linguistic environments. For reasons outlined above, we have made systematic use of the anaphoric trigger *too*. Due to practical limitations, we only focused on three linguistic environments, involving the connectives *or*, *if*, and *unless*. There are two reasons for this choice:

- First, it allowed us to construct paradigms in which all our examples have roughly the same truth conditions. This was desirable to make sure that any asymmetry we would get could not be attributed to a more basic difference in meanings. Doing so while incorporating a conjunction would have been difficult. To get an equivalent of *not F or G* using *and*, we would need two negations: *not (F and (not G))*. This would have made the subjects' task complicated.

- Second, introspective judgments as well as early experiments we performed suggested a very complex picture for conjunctions: we thought that symmetric presupposition justification was available for *but*, and more difficult with *and*. But we did not know what might cause the contrast and decided to leave this for future research.

We also decided to use examples in which the purported antecedent of *too* was *not* equivalent to the presupposition it triggered; thus we used examples such as (47) rather than (46):

(46)   Ann's brother too will make a reasonable decision, or Ann won't make a stupid decision.

(47)   Ann's brother too will make a reasonable decision, or Ann won't decide to study abroad.

This choice is in part motivated as follows. In Sect. 2.3.2(B), we derived the prediction that deictic resolution in (47) should be possible according to the Strict Incremental Theory. As the reader will recall, the predicted presupposition was: someone salient other than Ann — probably Ann's brother — will make a stupid decision. But this reasoning would have failed in (46): the presupposition that Ann's brother will make a stupid decision would have the result of making the second disjunct entirely idle, which is prohibited by standard Gricean principles. This is independently shown by the sharp deviance of the discourse: *Ann's brother will make a stupid decision. Ann too will make one, or he won't.* By contrast, deictic resolution of (47) does *not* have the effect of making the second disjunct idle.

In sum, the conditions we considered were the following:

(48)   Canonical order   (49)   Inverse order

    a. *if p, qq'*   a. *if (not qq'), not p*

    b. *(not p) or qq'*   b. *qq' or (not p)*

    c. *unless (not p), qq'*   c. *unless qq', (not p)*

As a first approximation (which is reasonably accurate in some contexts; see Stalnaker 1975 for discussion), conditionals can be treated as material implications, with the result that *if F, G* is roughly equivalent to *(not F) or G*. Taking $F = p$ and $G = qq'$, this gives us a near-equivalence between (48a) and (48b). Since *if F, G* means very much the same thing as *unless (not F), G*, we also get the near-equivalence between (48a) and (48c). The equivalence with the inverse order is immediate in the case of disjunction. In the case of conditionals, it is just the rule of contraposition: *if F, G* is, as a first approximation, equivalent to *if (not G), (not F)*; and by the same token, *unless (not F), G* is roughly equivalent to *unless G, (not F)*.

With this choice of environments, we obtain two desirable results: (i) in each case, the meaning of the entire sentence remains roughly constant across the canonical and the inverse conditions (except possibly for presuppositional reasons, of course); (ii) in addition, the meaning is also roughly constant across the various linguistic environments we consider — see (50)-(54) and Appendix A for a corresponding list of concrete examples.

2.6   Summary of the predictions

Table 1 reports the predictions of the Incremental Theory and the Mixed Theory in terms of inferences. The conditional and unconditional inferences we tested are those derived when the corresponding conditional and unconditional presuppositions are accommodated. As discussed in section 2.1.2, these two inferences are logically unrelated (neither entails the other). For sentences in the canonical order (i.e. with a trigger at the end of the sentence), the Incremental Theory and the Mixed Theory both predict a conditional presupposition and therefore both predict a conditional inference. For sentences in inverse order, the Incremental Theory predicts an unconditional inference, while the Mixed Theory still predicts an advantage for the conditional inference.[14,15]

Table 2 reports the predictions of the Incremental Theory and the Mixed Theory in terms of acceptability. The Incremental Theory predicts that the inverse order should be unacceptable (Sect. 2.4.1), while the Mixed Theory predicts that it should be acceptable relative to some appropriate baseline (as argued in Sect. 2.4.2). Ideally, we should have two baselines. First, we should test cases of local accommodation, in which all other constraints attached to anaphoric triggers are satisfied. Showing that such cases are degraded, or more degraded than symmetric cases, will

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[14]In the Mixed Theory, the conditional presupposition comes at a cost in the inverse order. A more fine-grained version of the Mixed Theory might thus predict that the conditional inference receives lower endorsement rates in the inverse order than in the canonical order. Our results might well confirm this possibility (see footnote 18), but we leave this complex issue aside for the sake of simplicity.

[15]Notice that there could exist an independent bias against conditional inferences. In the literature, proponents of conditional presuppositions believe that these are in many cases strengthened into unconditional ones, quite independently of the order factor we are interested in here (this problem is known as the *Proviso Problem*). This bias, if systematic, would obscure the differences between the two accounts. While our results bear on this issue, we leave this topic for future research.

	CANONICAL ORDER	INVERSE ORDER
Incremental Theory (see Sect. 2.3.2)		
CONDITIONAL INFERENCE		
UNCONDITIONAL INFERENCE		
Mixed Theory (see Sect. 2.3.3)		
CONDITIONAL INFERENCE		
UNCONDITIONAL INFERENCE		

Table 1: Visual summary of the predictions for the inferences. The dark line schematizes the subjective availability of an inference: the longer the line, the stronger the inference.

demonstrate that local accommodation cannot explain conditional inferences found in the inferential test. Second, we should test cases of global accommodation, in which the anaphoric condition is satisfied (Property 1). If such cases are worse than symmetric cases, this will suggest that symmetric satisfaction is indeed a possibility.[16]

We have tested cases such as (57) which require local accommodation of *too and* violate Property 1 (= the anaphoric condition). As a result, we cannot fully exclude the possibility that local accommodation is responsible for our inferential judgments, nor will we be able to use the acceptability judgments alone to assess the relative availability of symmetric satisfaction.

	Incremental Theory	*Mixed Theory*
INVERSE		
CANONICAL		
BASELINE (UNACCEPTABLE)		
	see Sect. 2.4.1	see Sect. 2.4.2

Table 2: Visual summary of the predictions for acceptability judgments. The dark line schematizes the subjective acceptability of a given construction: the longer the line, the more acceptable a sentence.

3   Experiments

We gathered acceptability and inferential judgments in five experiments (see Table 3). They were administered to three different groups of naive speakers. The inferential experiments 1 and 4 provide the more reliable results with respect to our initial issue. But we will report all the results in order, because the acceptability judgments offer some evidence that our sentences were decent enough — and also for completeness (which is good statistical practice whenever multiple experiments are run).

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[16]In order to test the availability of global accommodation when the anaphoric condition is satisfied in the same way as for the 'symmetric' condition, we could for instance use a structure of the form *pp' or ATT(q)*, where we add an attitude operator ATT to our previous *pp' or q* to guarantee that the second disjunct will be neither trivial nor contradictory once global accommodation has been performed (see discussion in (A) in Sect. 2.3.2).

	Group 1	*Group 2*	*Group 3*
Inferences	Experiment 1	Experiment 4	
	(before Experiment 2)	(after Experiment 3)	
Acceptability	Experiment 2	Experiment 3	Experiment 5
	(after Experiment 1)	(before Experiment 4)	(on its own)

Table 3: Our five experiments were designed to gather acceptability judgments and inferential judgments. Some acceptability and inferential experiments were administered in pairs to the same group of participants (Group 1 and Group 2).

3.1 Experiment 1: Inferential judgments

The goal of the first experiment is to assess the existence of conditional presuppositions in various environments. To do so, we asked participants to assess the robustness of the conditional inference and the robustness of the corresponding unconditional inference.

3.1.1 Method

Participants. 18 native-speakers of French aged between 18 and 31 (12 women and 6 men) participated in the experiment for a small fee.

Task, measure, and instructions. Participants were asked to assess whether the inferences were robust on a scale ranging continuously from *no* to *yes*. This continuous rating scale was inspired by the *magnitude estimation* paradigm developed in psychophysics (Stevens 1956) and already used in linguistics to collect grammaticality judgments (see, e.g., Bard et al. 1996, Cowart 1997). In our study, however, no reference point or *modulus* was explicitly provided.[17] All the results we report correspond to normalized answers: the set of judgments of each subject is linearly modified to adjust the mean and standard deviation of each subject to the mean and standard deviation across all participants.

The instructions given on screen urged participants to follow their intuition, explaining that in some cases there may be individual variation and that we were interested in their own judgments. The examples from Fig. 1 were provided to make the task concrete (we mentioned that the ratings were only provided for purposes of illustration).

Material and presentation. Each item consisted of one target sentence followed by two inferences to be evaluated. The two inferences were paraphrases of the conditional presupposition and of the unconditional presupposition (presented in random order from one item to the next).

The target sentences were obtained as follows. From a base sentence such as (50), we constructed 5 test sentences, according to the schema discussed in (48/49): the base disjunctive sentence in canonical order (50) and in inverse order (51); a conditional version in canonical order (52) and its contraposition, that is, a corresponding sentence in inverse order (53); and an *unless* version of the base sentence in inverse order (54). The actual examples were in French and are reported extensively in Appendix A.

(50)   Jeanne will not decide to study abroad, or her brother too will make a stupid decision.

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[17]A similar scale of judgment was used in Chemla (2009a,c) to investigate other pragmatic inferences.
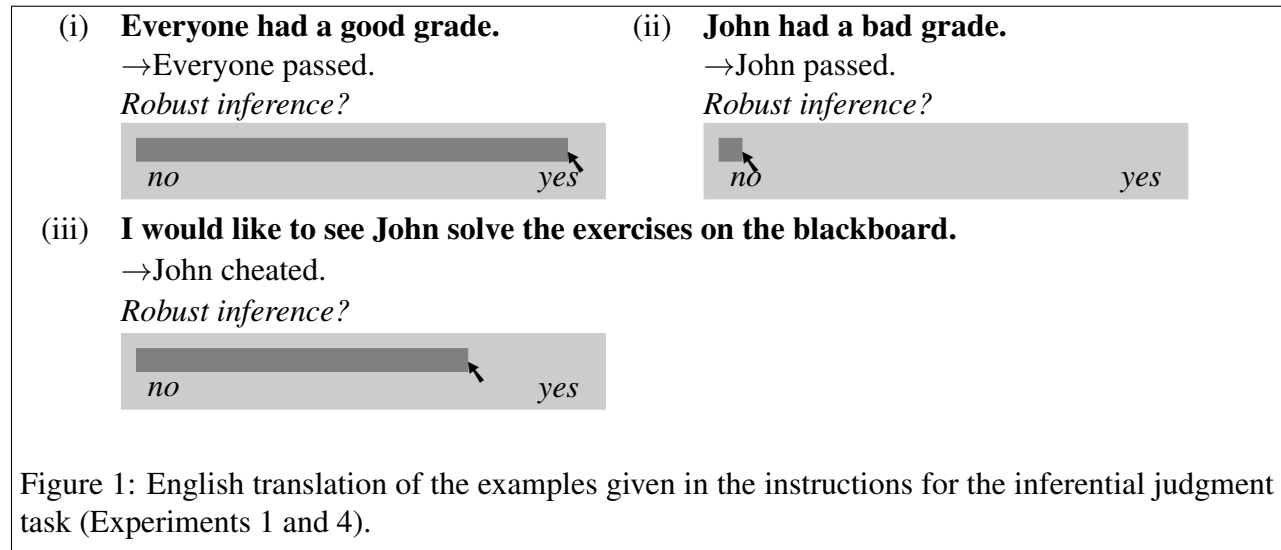

(i) **Everyone had a good grade.**   (ii) **John had a bad grade.**
   →Everyone passed.   →John passed.
   Robust inference?   *Robust inference?*

no   yes   no   yes

(iii) **I would like to see John solve the exercises on the blackboard.**
   →John cheated.
   Robust inference?

no   yes

Figure 1: English translation of the examples given in the instructions for the inferential judgment task (Experiments 1 and 4).

[*literally:* ... her brother will-make him too a decision stupid.]

(51) Jeanne's brother too will make a reasonable decision, or Jeanne will not decide to study abroad. [*literally:* The brother of Jeanne will-make him too a decision reasonable, ...]

(52) If Anne decides to study abroad, her brother too will make a reasonable decision. [*literally:* ... her brother will-make him too a decision stupid.]

(53) If Anne's brother too does not make a reasonable decision, Anne will not decide to study abroad. [*literally:* If the brother of Anne NE makes not him too a decision reasonable, ...]

(54) Unless Marie's brother too makes a stupid decision, Marie will not decide to study abroad. [*literally:* Unless the brother of Marie makes him too a decision stupid, ...]

In order to make fully explicit which expression associated with *too*, we doubled the intended associate with a strong pronoun, thus showing that it was focused and had to associate with *too*, i.e. French *aussi*. Partial glosses are provided above; a full example is seen in the French sentence in (55). The underlined pronoun doubles *son frère* (= *her brother*), which shows that it is with this Noun Phrase that *aussi* associates. This has, among others, the advantage of ruling out association of *aussi* with a Verb Phrase.

(55) Jeanne ne décidera pas de faire ses études à l'étranger, ou alors son frère prendra lui aussi une décision stupide.
Jeanne will not decide to study abroad, or else her brother will-make him too a decision stupid.

As can be seen in (50)-(54), proper names were systematically varied from example to example to avoid unnecessary repetitions. We also made systematic use of antonyms in the lexical content of the clause containing the associate of *too* — for instance, we used both the terms *reasonable decision* and *stupid decision*. The rationale for this was to guarantee that the inferences could be attributed to the linguistic material rather than to world knowledge: the latter could certainly not account both for an inference that *studying abroad would be reasonable of Ann* and that *studying*

abroad would be stupid of Ann. However, we had too few items per condition to run per-item analyses and we are not in a position to evaluate the effect of this precaution.

The conditional (56a) and unconditional (56b) inferences associated with these target sentences were the same across all variants (except for the corresponding surface modifications we just described):

(56)   Inferences corresponding to (50)-(54):

      a. Unconditional inference: Ann will make a {reasonable/stupid} decision.

      b. Conditional inference: Studying abroad would be {reasonable/stupid} of Ann.

We constructed four base sentences and thus obtained $4 \times 5 = 20$ target sentences. An inferential example with no presupposition trigger (one that was close to the examples given in the instructions) was given first to allow the participants to familiarize themselves with the display and with the task. The remaining items were presented in random order to all participants.

3.1.2   Results

The mean results are given in a condensed format in Table 4. Most importantly, the conditional inferences get higher endorsement rates than the unconditional inferences in all types of sentences (conditionals, disjunctions, and *unless*-sentences) and in both orders (canonical and inverse order).[18,19,20,21]

3.1.3   Discussion

Our test sentences support the conditional inferences more robustly than the unconditional inferences. While we would like to take this result as evidence for the existence of conditional presuppositions, we must first entertain a lower-level explanation: it might be that participants had a general preference for conditional inferences, *independently* of the test sentences. For instance, one could reason that conditional inferences are logically weaker than their unconditional counterparts (since *if p, q* is entailed by *q*). If there is a general preference for weaker commitments, the data could be explained without further ado. In our particular examples, however, the conditional and unconditional inferences were formulated in such a way that they were *not* in an entailment relation. The reason was that our version of the conditional inference did not just incorporate the conditional presupposition, but also a pragmatic inference that naturally follows from it (subjects' responses show that this did not prevent them from giving high endorsement rates to the inference as we stated it). Consider once again (55), uttered relative to a Common Ground C. The inference which is generated by analyses that predict a conditional presupposition is that C guarantees that *in each situation (or 'world') in which Jeanne decides to study abroad, she makes a stupid decision.*

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[18] For the sake of simplicity, we do not investigate the interaction between order and type of inference (conditional vs. unconditional). However, in this set of results as well as in the results presented in Table 7, such an interaction might be present. Crucially, however, this is not the interaction that follows from the Incremental Theory (which predicts a reversal of the preference for the two types of inferences). Rather, as discussed in footnote 14, this interaction is compatible with a more refined version of the Mixed Theory.

[19] All analyses were computed per subject and not per item (because there were only 4 items per condition).

[20] The η^2s reported in the tables correspond to *partial* η^2s.

[21] We also used bootstrapping methods (which are in particular non-parametric tests) to assess the significance of the differences and found entirely similar results (all $ps < .012$).

	CANONICAL ORDER	INVERSE ORDER
if-sentences		
CONDITIONAL	87%	73%
UNCONDITIONAL	58%	49%
cond. vs. uncond.	$F(1,17) = 32, p < .001, \eta^2 = .40$	$F(1,17) = 16, p < .001, \eta^2 = .33$
or-sentences		
CONDITIONAL	75%	75%
UNCONDITIONAL	40%	58%
cond. vs. uncond.	$F(1,17) = 45, p < .001, \eta^2 = .42$	$F(1,17) = 6.6, p < .05, \eta^2 = .22$
unless-sentences		
CONDITIONAL		67%
UNCONDITIONAL		33%
cond. vs. uncond.		$F(1,17) = 22, p < .001, \eta^2 = .36$

Table 4: Mean results (normalized per subject) and standard errors for the inferential judgments collected in Experiment 1. The error bars represent standard errors to the mean. Statistical figures come from one-way ANOVAs documenting the differences between conditional and unconditional inferences.

This condition will of course hold in case C entails that *Jeanne will make a stupid decision* (the unconditional presupposition). But instead of testing for the explicit conditional statement, which would have raised problems of its own,[22] we used the sentence: *Studying abroad would be stupid of Jeanne*. While this is a very natural paraphrase of the explicit conditional statement, it is a bit stronger (as was already discussed in Sect. 2.1.2): it incorporates the assumption that if Jeanne decides to study abroad, *this very decision* is stupid; in other words, we rule out the (highly unlikely) interpretation on which *if Jeanne decides to study abroad, she makes a* possibly different *decision which is stupid*. Importantly, once this common sense assumption has been incorporated into the statement of the conditional inference, the latter *fails* to be entailed by the unconditional inference. This means that a general preference for 'weaker' statements could not possibly account for the subjects' preference for the conditional inference over the unconditional one.[23]

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[22]Specifically, an explicit conditional statement of the form *if p, q* would have raised two difficulties: (i) it would have been structurally much more complex, and longer, than the corresponding unconditional statement (= *q*); (ii) it would have come with an implicature that the consequent is not known to be true, which inference goes beyond the predicted presupposition (for instance, this is incompatible with the unconditional presupposition, while the conditional presupposition is obviously not). Neither problem arises with our version of the conditional statement. For instance, *Studying abroad would be stupid of Jeanne* does not seem to be more complex than *Jeanne will do something stupid*; and unlike the sentence *If Jeanne studies abroad, she will do something stupid*, it does not give rise to the inference that we do not know whether Jeanne will do something stupid.

[23]In principle, there are ways to test more systematically the hypothesis that we are dealing with a general preference for weaker inferences. The general idea is to assess whether the difference in endorsement rate between the conditional and unconditional inferences is tied to our test sentences to begin with. Hence, we could modify the relation between the 'premises' and the conditional and unconditional inferences and see how this affects the difference. This would lead to three testable predictions. (i) With control premise sentences which *uncontroversially* imply the conditional inference and not the unconditional one, we should find a comparable effect. (ii) With premise sentences which uncontroversially imply the unconditional inference (and therefore the conditional one as well), the effect should disappear

Given that the main alternative explanation (in terms of an entailment relation between the inferences we tested) is not available here, we will be content to take these results as evidence in favor of the existence of conditional presuppositions. The robustness of our findings involving sentences in inverse order is thus in line with the predictions of the Mixed Theory, while these findings are unexpected for the Incremental Theory.

Could one object that sentences in inverse order were so degraded that subjects did not understand them, and used some other strategy to decide among conditional and unconditional inferences? As we noted, one would still have to explain why subjects preferred the conditional inferences to the unconditional ones, rather than the other way round. Still, to rule out this possibility we tried to assess the *acceptability* of sentences in inverse order. Our goal in the following discussion is a very modest one: we simply wish to show that sentences in inverse order are not so degraded that participants did not understand them.

3.2 Experiment 2: Acceptability judgments

The goal of this experiment was to test the acceptability of the sentences we used in the inferential task. In the long run, one would like to show that the sentences in inverse order are not as degraded as predicted by the Incremental Theory (see Sect. 2.4). Our results do not answer this long-term question. But they do suggest, more modestly, that the sentences in inverse order are *sufficiently* acceptable to trust our inferential results.

3.2.1 Method

Participants. After a short break, the participants of Experiment 1 took part in this new experiment.
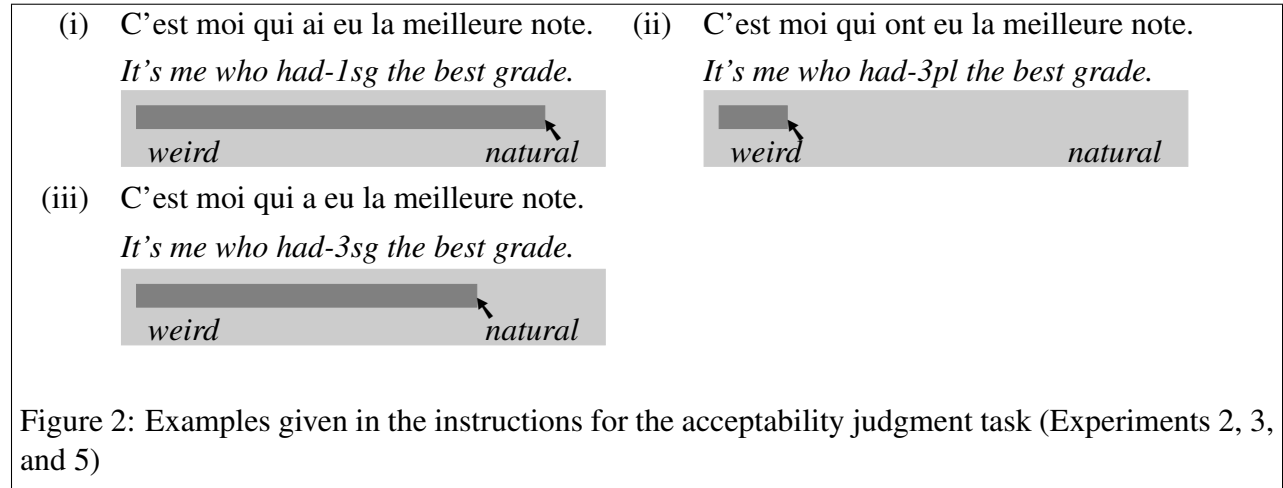**Task and instructions.** Participants were asked to assess whether some sentences sounded natural to them. As before, they were asked to provide their judgments on a continuous scale. For this new experiment, the scale was described as ranging from *weird* to *natural*. The instructions mentioned explicitly that there could be inter-individual variation and that participants should follow their own intuition. The examples from Fig. 2 were provided to illustrate the task. In these examples, agreement is realized differently: (i) conforms to the prescriptive rule, (ii) is impossible, and (iii) is ruled out by prescriptive rules but often produced in colloquial French. Notice that these illustrative examples introduce a bias towards the detection of *syntactic* violations. This bias may have induced the participants to give high absolute ratings to all our examples, hence we will focus our analyses on *differences* between conditions (rather than on absolute ratings).[24]
Material. The main sentences from the previous experiment were included (without the inferences). Four additional conditions involving different types of accommodation were designed to provide a baseline for the judgments (see Sect. 2.1). (i) We included sentences which require local accommodation with *too* to be felicitous (57). As discussed in the context of the analogous example (39b), Property 1 of *too* was *also* violated in these examples; for simplicity we will still refer to

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(or be weakened). (iii) We should not find that participants accept conditional inferences more than unconditional ones when the premise sentences do not contribute one way or the other.

[24]A further consequence is that it will be difficult to guarantee that we are not in the presence of floor effects even with high absolute ratings. In order to exclude this possibility, we will have to contrast these cases with conditions which are worse (in the discussion below, we use examples in which some property of *too* has been violated to provide such conditions).

(i) C'est moi qui ai eu la meilleure note.   (ii) C'est moi qui ont eu la meilleure note.

It's me who had-1sg the best grade.   *It's me who had-3pl the best grade.*

weird   natural   weird   natural

(iii) C'est moi qui a eu la meilleure note.

It's me who had-3sg the best grade.

weird   natural

Figure 2: Examples given in the instructions for the acceptability judgment task (Experiments 2, 3, and 5)

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them with the label 'local accommodation$^\oplus$'. (ii) We also added sentences in which the presupposition triggered was fully justified and did *not* require local accommodation, such as (58), as well as (iii) sentences without any presupposition trigger at all, such as (59). Finally, (iv) we included cases which require local accommodation, but with a different presupposition trigger, namely a definite description as in (60) (which is similar to (39a)).

(57) I have just talked to Melanie. It's impossible that Matthew will come too: Melanie is abroad.

(58) Anne is going to visit me. It's impossible that John will come too: he is abroad.

(59) I have just talked with Josette. It's impossible that she and Peter will both come: Josette is abroad.

(60) I have just talked to Christine. It's impossible that Nicolas will come with Christine's car: she only has a motorbike.

The actual French examples are reported extensively in Appendix B. The four new conditions were derived from 5 base sentences. We thus obtained 40 sentences: $4(\text{examples}) \times 5(\text{conditions})$ for the target sentences (as above) and $5(\text{examples}) \times 4(\text{conditions})$ for the new baseline sentences. Sentences appeared one by one on the screen. They were presented in random order except for the first couple of sentences, which reproduced the examples given in the instructions.

3.2.2 Results

Table 5 shows the mean ratings for all test sentences. Notice first that the ratings for the control accommodation conditions follow the expectations from our discussion above: local accommodation of a definite description is suboptimal, and local accommodation$^\oplus$ with *too* is even worse, although this further cost may be attributable to the additional violation of Property 1 for anaphoric triggers.

Most importantly, the target conditional, disjunctive, and *unless*-sentences from Experiment 1 are all rated above the local accommodation$^\oplus$ condition for *too* (all Fs > 10, $p < .01$).

For disjunctive sentences, the choice between canonical and inverse order does not make a difference, which suggests that there is no reason to believe that inverse order *degrades* intelligibility. (Acceptability is low in both orders, but presumably above 'floor', given that acceptability

is even lower in the local accommodation$^{\oplus}$ condition. We come back below to the relatively low acceptability of disjunctions.)

Conditional sentences are rated lower in inverse order than in canonical order. If we were to consider the cases of local accommodation$^{\oplus}$ as an informative baseline (see Table 2), it would be important to notice that this difference is not as large as the difference between cases of local accommodation$^{\oplus}$ and cases in which a presupposition is fully justified (as proven by the corresponding 2-way ANOVA: $F(1, 17) = 7.9, p < .05, \eta^2 = .24$). In other words, the inverse order constitutes a weaker violation than local accommodation$^{\oplus}$ with *too*.

if-sentences		
INVERSE	60%	
CANONICAL	87%	
or-sentences		
INVERSE	55%	
CANONICAL	53%	
unless-sentences		
INVERSE	64%	
control sentences		
(57) **LOCAL ACCOMMODATION$^{\oplus}$ (*too*)**	32%	
(58) **JUSTIFIED PRESUPPOSITION**	80%	
(59) **NON PRESUPPOSITIONAL**	71%	
(60) **LOCAL ACCOMMODATION (*the*)**	54%	

Table 5: Mean acceptability ratings for Experiment 2. Error bars correspond to standard errors.

3.2.3 Discussion

From the judgments about conditional sentences at least, we see that the canonical order is preferred to the inverse order. Although this contradicts the Strict Symmetric Theory, this result is in line both with the Incremental and with the Mixed Theory. More subtly, the full pattern of results shows that inverse order does not have an irreversible cost: it is not as strong a violation as local accommodation of an anaphoric trigger is. For our disjunctive sentences, one cannot even see an order effect on acceptability.

The results of Experiment 2 thus confirm that presuppositional sentences in inverse order are not infelicitous and validate the inferential judgments obtained from the same participants in Experiment 1. However, one may wonder whether the fact that the acceptability judgments were obtained after the key sentences had already been studied (to provide the inferential judgments requested in Experiment 1) could not have artificially boosted the ratings of these sentences. This claim was evaluated with Experiments 3 and 4, which correspond to Experiments 1 and 2 albeit administered in the opposite order, as well as with Experiment 5.

3.3 Experiments 3 and 4: Acceptability and inference judgments

These experiments were run to investigate potential contamination of the inferential judgments (Experiment 1) from the acceptability judgments (Experiment 2). Practically, they are thus identical to Experiments 1 and 2, with the only difference that they were administered to a new set of participants and in a different order: acceptability judgments came first, and inferential judgments second.

3.3.1 Method

Participants. 17 (new) native speakers of French aged between 19 and 30 participated in the experiment for a small fee (13 women, 4 men).
Task, instructions and material. These two experiments were similar to Experiments 1 and 2, except that for this new set of participants, the acceptability judgments came first (Experiment 3≈Experiment 2) and the inferential judgments came last (Experiment 4≈Experiment 1).

3.3.2 Results for Experiment 3: Acceptability judgments

Table 6 presents the mean acceptability ratings for each condition. The target sentences from the inferential judgment task are rated lower than in Experiment 2. This confirms our general worry that sentences might be rated artificially high when they have already been presented in a preceding experiment. Still, the local accommodation$^{\oplus}$ condition for *too* is rated significantly lower than the conditional sentences (canonical order: $F(1, 16) = 206, p < .001, \eta^2 = .48$; inverse order: $F(1, 16) = 6.8, p < .05, \eta^2 = .23$) and also lower than the *unless*-sentences in inverse order ($F(1, 16) = 10, p < .01, \eta^2 = .28$).

Importantly, two earlier results are not replicated. First, the difference between the conditional sentences in the two orders cannot be claimed to be smaller than the difference between local accommodation$^{\oplus}$ with *too* and the justified presupposition conditions ($F(1, 16) = 1.3, p = .27, \eta^2 = .07$; see Sect. 3.2.2 for a different outcome). Second, disjunctive sentences (in *both* orders) are rated very low, and the difference between these sentences and the condition involving local accommodation$^{\oplus}$ with *too* is not significant anymore. Note that none of these results contradicts our previous results: for instance, they do not show that the disjunctive sentence in inverse order is particularly degraded. In fact, it is rated higher than its corresponding version in canonical order (n.s.).[25]

We take these results to show that participants can provide useful inferential judgments about our test sentences. Even though some ratings are fairly low, it is crucial to notice that there is no reason to believe that there is a cost to symmetric satisfaction which *specifically* impairs the sentences in inverse order and which could prevent us from interpreting the inferential results for these conditions.

3.3.3 Results for Experiment 4: Inferential judgments

The results from the inferential judgment task administered after the acceptability judgment task are provided in Table 7. As we found in Experiment 1, the conditional inference is rated higher

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[25] A bootstrapped p-value for the difference between disjunctive sentences in inverse order and local accommodation of *too* actually almost reaches significance: $p = .054$.

if-sentences		
INVERSE	41%	
CANONICAL	83%	
or-sentences		
INVERSE	36%	
CANONICAL	30%	
unless-sentences		
INVERSE	42%	
control sentences		
LOCAL ACCOMMODATION$^{\oplus}$ (*too*)	28%	
JUSTIFIED PRESUPPOSITION	80%	
NON PRESUPPOSITIONAL	78%	
LOCAL ACCOMMODATION (*the*)	77%	

Table 6: Mean acceptability ratings for Experiment 3. Error bars correspond to standard errors.

than the unconditional inferences for all types of sentences. The differences for *if* and *or* in inverse order do not reach significance in this new experiment (although they do reach p-values of .085 and .030 respectively if we use non-parametric tests, see foonote 21). The results of this experiment could be influenced by the acceptability judgment task administered before, and thus the results of Experiment 1 should be considered more trustworthy. Still, it is reassuring to obtain here a partial replication of these results.

	CANONICAL ORDER	INVERSE ORDER
if-sentences		
CONDITIONAL	83%	61%
UNCONDITIONAL	64%	50%
cond vs. uncond	$F(1,16) = 11, p < .01, \eta^2 = .29$	$F(1,16) = 2.0, p = .18, \eta^2 = .10$
or-sentences		
CONDITIONAL	64%	66%
UNCONDITIONAL	36%	54%
cond vs. uncond	$F(1,16) = 23, p < .001, \eta^2 = .37$	$F(1,16) = 4.2, p = .056, \eta^2 = .17$
unless-sentences		
CONDITIONAL		63%
UNCONDITIONAL		39%
cond vs. uncond		$F(1,16) = 11, p < .01, \eta^2 = .29$

Table 7: Mean results (normalized per subject) and standard errors for the inferential judgments collected in Experiment 4. The error bars represent standard errors to the mean. Statistical figures come from one-way ANOVAs documenting the differences between conditional and unconditional inferences.

3.3.4 Discussion

The results gathered in Experiments 3 and 4 constitute a partial replication of the results from Experiments 1 and 2. They provide additional evidence that (a) conditional presuppositions exist and (b) presuppositional sentences in non-canonical order are not fully unacceptable, although this second result was less robust.

In Experiment 5, we tried to improve on the acceptability judgments obtained in Experiment 3 as follows. We noted that our target sentences were quite complex as compared to the baseline sentences (the baseline examples were actually composed of several short sentences). As a result, participants may have used a parameter like length or complexity as an important rating factor (the relevant parameters of acceptability or naturalness were left implicit in the instructions). This strategy would penalize the target sentences artificially. In Experiment 5, we thus added complex filler sentences to our material. This manipulation was designed to increase the overall complexity of the sentences that our (new) participants would see. We reasoned that this could lead subjects to get used to complex sentences in general (and not to our specific target sentences, as can be objected for Experiments 1 and 2) and even to understand (consciously or not) that complexity was not a factor (since it would lead to a rejection of a large number of sentences in the experiment).

3.4 Experiment 5: Acceptability judgments with complex fillers

This experiment is similar to Experiments 2 and 3. The key features of this new experiment were that it was not preceded by an inferential judgment task (unlike Experiment 2) and that it contained complex fillers (contrary to both Experiments 2 and 3) designed to implicitly suggest that complexity was not a relevant acceptability factor for the task.

3.4.1 Method

Participants. 16 new native speakers of French aged between 19 and 31 (10 women, 6 men) participated in the experiment for a small fee.
Task and instructions. The task and instructions were similar to the other acceptability judgment experiments (2 and 3).
Material and presentation. The material was similar to the material presented in Experiments 2 and 3 except that complex fillers were added. These complex sentences were selected on the basis of their poor ratings in previous studies. None of these sentences contained the presupposition trigger *too*, none had any presupposition which required any effortful accommodation (according to our own informal judgment); 4 were long conditional sentences, 4 were long disjunctive sentences, 12 were quantified sentences (8 with the quantifier *No*, 4 with *Each*). The first items that were administered were close to the examples discussed in the instructions (as before), 5 of the new "complex" sentences were administered right after these preliminary examples (to maximize the chances that these complex items could affect the rest of the experiment), and the rest of the material was then presented in random order. The new items are reported in Appendix C.

3.4.2 Results

Table 8 presents the mean acceptability ratings in all conditions. The target sentences from the inferential judgment task are rated higher than in Exp. 3 — in other words, they are rated more

highly when they are surrounded with complex sentences. The *unless*-sentences in inverse order are rated significantly more highly than cases of local accommodation with *too* ($F(1, 15) = 5.3, p < .05, \eta^2 = .21$). The conditional sentences in inverse order and the disjunctive sentences in both orders are also rated more highly than the local accommodation$^\oplus$ condition, although these differences do not reach statistical significance ($F < 1.1$, n.s.). As before, the disjunctive sentences in *both* orders received fairly low ratings, which suggests that the presence of the complex fillers did not alter participants' judgments for these sentences, and that complexity was not the reason why disjunctive sentences were rated low (disjunctive sentences were not rated any lower than the complex fillers, which were rated at 54% on average).

In search of another explanation, one might entertain the possibility that the disjunctions were judged poorly in these experiments because of the salient comparison with the conditionals: the disjunction *not p or q* is roughly equivalent to the conditional *if p, q*, which does not contain a negation and may be seen as a better way of saying the same thing. We did not investigate this possibility any further, and leave the low acceptability of our disjunctive sentences as an open problem, albeit one that hopefully does not obscure our main conclusion.

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if-sentences

INVERSE	52%	
CANONICAL	86%	

or-sentences

INVERSE	49%	
CANONICAL	45%	

unless-sentences

INVERSE	60%	

control sentences

LOCAL ACCOMMODATION$^\oplus$ (*too*)	45%	
JUSTIFIED PRESUPPOSITION	78%	
NON PRESUPPOSITIONAL	83%	
LOCAL ACCOMMODATION (*the*)	77%	

Table 8: Mean acceptability ratings for Experiment 5. Error bars correspond to standard errors.

3.5 Meta-analyses (including earlier experiments)

Experiments 1 to 5 were designed to show that (a) conditional presuppositions exist and (b) presuppositional sentences in inverse order are not unacceptable, since they are more felicitous than sentences involving local accommodation$^\oplus$ of *too*. Both results were obtained repeatedly, although some evidence for the second claim was embodied by differences which did not reach the normative threshold of statistical significance.

At this point, it is interesting to carry out a modest meta-analysis of our data with a simple binomial/sign test. We tested the difference between inverse order sentences in three different experiments (1, 4, and 5), each time using three different environments (*if*, *or*, and *unless*). We thus carried out 9 different tests. If there had been no difference between the inverse order and the local

accommodation cases, there would have been less than a .2% chance to systematically get, as we did, the inverse order rated (significantly or not significantly) higher than the local accommodation$^{\oplus}$ condition.[26] Even if we remove the first experiment from this analysis to get rid of the order bias, chance could have led to the 6 positive results that we got in no more than 1.6% of cases.

Replications provide robust statistical tests (see discussion in Sect. 4.3 of Sprouse and Almeida (2010) and numerous references therein). Hence, it is worth mentioning at this point that two earlier experiments were run. They contained some flaws or delivered fragile statistical outcomes when assessed on their own (see Schlenker 2008b for a brief description). Crucially, however, the argument of the toy meta-analysis above can be extended to these additional experimental data: almost all tests that try to show that presuppositional sentences in inverse order are better than appropriate controls lead to an effect in the expected direction, even if not all of these effects individually meet the standards of statistical significance (these experiments involved controls different from local accommodation).

4   Conclusions

4.1   Summary

The debate between Incremental and Mixed Theories of presupposition projection is of some foundational interest; in particular, if the mixed approach is correct, one might want to conclude that the left-right asymmetries found in presupposition projection should not be encoded in the lexical entries of operators, but should be seen as a processing bias which can be overcome at some cost. While theoreticians have reported conflicting judgments, up to now this debate has not been subjected to experimental scrutiny. We have started to do so.

In order to achieve our goal, we had to appeal to specific properties of *anaphoric* presupposition triggers such as *too*. To account for their behavior, we developed some specific hypotheses which proved useful in our experimental enterprise; we hope that these hypotheses might be of independent interest in future research. We then described two possible methods to test incremental and mixed approaches to presupposition projection, based on (i) inferential judgments and (ii) acceptability judgments. Our main finding concerns inferential data: on the basis of the hypotheses we made about anaphoric triggers, these data suggest that linguistic material following *too* can play a role in the presupposition that *too* triggers; in other words, presuppositions can be satisfied symmetrically. Our acceptability data do not decide the issue of how acceptable/unacceptable such readings are relative to the most important baseline. Still, they do suggest that the sentences we used to obtain inferential data are not too degraded — and in particular that they are as acceptable as (possibly suboptimal) disjunctive sentences in which a presupposition is satisfied in the canonical order.[27]

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[26]If there is a 1-in-2 chance to find the result in the predicted direction for one test, there is a $(1/2)^9$ chance to get a result in the right direction 9 times in a row.

[27]Tangentially, our data happen to bear on another debate: relative to the canonical order, some theoreticians have *denied* that *bona fide* conditional presuppositions are ever triggered (see Gazdar 1979; van der Sandt 1992; Geurts 1999). Our simplest inferential data, which involve conditionals and disjunctions in canonical order, could be used to argue for the reality of the conditional presuppositions. We leave this topic for future research.

4.2   Future research

We end with three questions for future research.

1. Restricting attention to anaphoric triggers, can we decide between Incremental and Mixed Theories based on *acceptability judgments alone*? We have not done so in the present paper. Rather, all we could infer from the acceptability judgments was that the sentences in inverse order were not too degraded, and thus were unlikely not to have been understood — which lent further support to the conclusions we drew from the inferential task. But one could wish for acceptability data that are fine-grained enough to conclude that symmetric satisfaction is indeed a possibility. To achieve this result, we would need to compare our target sentences (with symmetric satisfaction) to two baselines: (i) cases in which local accommodation is forced, while the other conditions (and in particular the anaphoric condition, i.e. Property 1) are matched with the target sentences (an example was given in (38) above); and (ii) cases in which global accommodation is forced, while the other conditions are also matched with the target sentences (see footnote 16 for a schematic example). If our target sentences are indeed more acceptable than these baselines, an argument for symmetric satisfaction might be constructed on the basis of acceptability judgments alone.

2. As we noted at the outset, the *inferential part* of our experiment is also incomplete: it does not control for the possibility that (i) local accommodation of the presupposition triggered by *too is* in fact possible (despite the unanimous opinion expressed in the literature), and (ii) the inferential judgments we obtain are thus solely due to the anaphoric constraint that requires that the propositional antecedent of *too* should contextually entail an alternative to the focused proposition (condition (ii.a-b) in (27)). To be concrete, consider again (42), repeated below:

(61)   Ann too$_i$ will make a stupid decision, or Ann's brother won't decide to study abroad.

On our analysis, the propositional antecedent of *too* is the negation of the second disjunct.[28] The presupposition that this antecedent is true is satisfied symmetrically by projection mechanisms that take into account the second disjunct, and no local accommodation is necessary. On the alternative view with local accommodation, the propositional antecedent remains the same, but now the presupposition that this antecedent is true is locally accommodated — and the second disjunct plays no role in presupposition satisfaction.[29] In other words, on this alternative view, anaphora resolution (of the propositional index of *too*) must take place symmetrically; but there is simply no need for a process of symmetric presupposition satisfaction. In order for this view to be confirmed or refuted, we would need to test proper cases of local accommodation such as (38); the controls we did in fact use fail to address this theoretical point.

3. All our data are based on the anaphoric trigger *too*. Can our conclusions be reached on the basis of other anaphoric triggers, such as *again*? More importantly, can they be replicated with

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[28] As discussed in footnote 8, this result could be obtained in two ways: by way of coindexation of *i* with the sister of the negation that appears in the second disjunct; or by way of coindexation with the local context of the first disjunct. Crucially, on this alternative view the local context in question should be the '*symmetric* local context' defined in Schlenker (2009a, 2010).

[29] On this alternative view, it makes no sense to assume that *too* is coindexed with the *symmetric* local context of the first disjunct (as in Schlenker 2009a, 2010), as symmetric local contexts shouldn't exist in the first place. Thus *too* must be coindexed with the sister of the negation that appears in the second disjunct (hence such a theory must rely on the availability of backwards anaphora). Importantly, it is also predicted that such a mechanism should become unavailable if the second disjunct were replaced with a contextually equivalent clause that does not contain a negation. We leave an investigation of this prediction for future research.

non-anaphoric triggers? These will probably be ill-suited to acceptability judgments (because they permit all sorts of accommodation processes). On the other hand, they might lend themselves to an inferential investigation. But as we mentioned at the outset, to the extent that these triggers also allow for local accommodation, they might require more sophisticated inferential techniques. Specifically, it will not be enough to show that conditional rather than unconditional inferences are obtained in the inverse order: in the examples we considered (*e.g. qq' or p*), a conditional inference could be the result of symmetric satisfaction, but just as well of local accommodation. Thus the test sentences will have to be embedded in more complex linguistic environments to show that the purported conditional inference really does project like a presupposition — which should not be the case if this inference is the result of local accommodation.[30]

While this enterprise is complex, it is important, for two reasons.

First, as we just discussed, there remains a theoretical possibility that *too* allows for local accommodation in the end — which would destroy the argumentation we presented. Second (and relatedly, maybe), there are well-known (and often ill-understood) idiosyncracies of anaphoric triggers which might conceivably explain on independent grounds why we obtained relatively weak inferences in our experiments (see van der Sandt and Geurts 2001; van der Sandt and Huitink 2003). For instance, the following example is problematic for all theories under discussion — including ours:

(62)   Haldeman is guilty if Nixon is guilty too. (Soames 1982)

Here it appears that a presupposition triggered in the antecedent of the conditional can somehow be justified on the basis of information contained in the consequent. This should come as a surprise given the theories we assumed. This sentence is of the form *q, if pp'*, with *q = Haldeman is guilty* and *pp' = Nixon is guilty too*; by the equivalence between *q, if pp'* and *if not q, not pp'*, we should expect that *not q* rather than *q* should serve to satisfy the presupposition triggered in the *if*-clause — but it is the opposite that we find. This might conceivably indicate that *too* is so idiosyncratic that it cannot be a good test of presupposition projection in general.

Similarly, there are cases in which the presupposition triggered by *too* is weaker than expected, and can be satisfied on the basis of an earlier statement of the form *it is possible that p* rather than *p*. This is for instance seen in the dialogue in (63), which is discussed within a DRT framework by Zeevat (1992, 2002) and van der Sandt and Geurts (2001):

(63)   A. Harry may well have dinner in New York.
       B. John is having dinner in New York, too.

Here too, it must be asked whether the idiosyncracies of *too* might impinge on the logic of our argument.

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[30]In effect, this investigation would have to extend to the debate about symmetric projection an argument brought up by Beaver (e.g., Beaver 2001) against DRT (van der Sandt 1992; Geurts 1999). DRT sought to account for conditional inferences by way of local accommodation; Beaver argued that this failed to account for the fact that some of these conditional inferences *project* like presuppositions.

Appendices

A   Material for the inferential judgment task (Exp. 1 and 4)

We provide here the complete list of sentences used in the inferential judgment task. We provide the different conditions within each item in the following order: (a) conditionals in canonical order and (b) in inverse order; (c) disjunctions in canonical order and (d) in inverse order; (e) *unless-*sentences in inverse order. We provide the conditional and unconditional inferences for the (a) examples only, they were entirely similar in the other conditions.

Note: For ease of translation we use the word *too* to render French expressions with *aussi*. As noted in the body of the article (see (55)), the French construction systematically involved a strong pronoun which unambiguously associated with *aussi*.

(64)   a. Si Anne décide de faire ses études à l'étranger, son frère va lui aussi prendre une décision raisonnable.
→Décider de faire ses études à l'étranger serait raisonnable de la part d'Anne.
→Anne va prendre une décision raisonnable.

'If Anne decides to study abroad, her brother too will make a reasonable decision.'
→'Studying abroad would be reasonable of Anne.'
→'Anne will make a reasonable decision.'

   b. Si le frère d'Anne ne prend pas lui aussi une décision raisonnable, Anne ne décidera pas de faire ses études à l'étranger.

'If Anne's brother doesn't make a reasonable decision too, Anne will not decide to study abroad.'

   c. Jeanne ne décidera pas de faire ses études à l'étranger, ou alors son frère prendra lui aussi une décision stupide.

'Jeanne won't decide to study abroad, or her brother too will make a stupid decision.'

   d. Le frère de Jeanne prendra lui aussi une décision raisonnable, ou alors Jeanne ne décidera pas de faire ses études à l'étranger.

'Jeanne's brother too will make a reasonable decision, or Jeanne won't decide to study abroad.'

   e. A moins que le frère de Marie ne prenne lui aussi une décision stupide, Marie ne décidera pas de faire ses études à l'étranger.

'Unless Marie's brother makes a stupid decision too, Marie will not decide to study abroad.'

(65)   a. Si Apple installe un centre de production au Niger, ses concurrents vont eux aussi se mettre à exploiter l'Afrique.
→Un centre d'Apple au Niger serait de l'exploitation/l'aide de la part d'Apple.
→Apple va exploiter/aider l'Afrique.

'If Apple creates a production center in Niger, its competitors too will start to exploit Africa.'
→'An Apple center in Niger would be a form of exploitation/help from Apple.'
→'Apple is going to exploit/help Africa.'

   b. Si les concurrents d'Apple ne se mettent pas eux aussi à exploiter l'Afrique, Apple n'installera pas de centre de production au Niger.

'If Apple's competitors do not start to exploit Africa too, Apple won't create a production center in Niger.'

   c. IBM n'installera pas de centre de production en Angola ou alors les concurrents d'IBM vont eux aussi se mettre à aider l'Afrique.

'IBM won't create a production center in Angola, or IBM's competitors too will start to help Africa.'

   d. Les concurrents d'IBM vont eux aussi se mettre à exploiter l'Afrique, ou alors IBM n'installera pas de centre de production en Angola.

'IBM's competitors too will start to exploit Africa, or IBM won't create a production center in Angola.'

   e. A moins que les concurrents de Microsoft se mettent eux aussi à aider l'Afrique, Microsoft n'installera pas de centre de production en Côte d'Ivoire.

'Unless Microsoft's competitors start to help Africa too, Microsoft won't create a production center in Ivory Coast.'

(66)   a. Si Benjamin devient soldat, sa soeur se débrouillera elle aussi pour faire la fierté de ses parents.
→Les parents de Benjamin seraient fiers qu'il devienne soldat.
→Benjamin se débrouillera pour faire la fierté de ses parents.

'If Benjamin becomes a soldier, his sister too will manage to make her parents proud.'
→'Benjamin's parents would be proud if he becomes a soldier.'
→'Benjamin will manage to make his parents proud.'

   b. Si la soeur de Benjamin ne se débrouille pas elle aussi pour faire la fierté de ses parents, Benjamin ne deviendra pas soldat.

'If Benjamin's sister does not manage to make her parents proud too, Benjamin won't become a soldier.'

   c. Philippe ne deviendra pas soldat, ou alors sa soeur se débrouillera elle aussi pour faire le désespoir de ses parents.

'Philippe won't become a soldier, or his sister too will manage to make her parents desperate.'

   d. La soeur de Philippe se débrouillera elle aussi pour faire la fierté de ses parents, ou alors Philippe ne deviendra pas soldat.

'Philippe's sister too will manage to make her parents proud, or Philippe won't become a soldier.'

   e. A moins que la soeur de Paul ne se débrouille elle aussi pour faire le désespoir de ses parents, Paul ne deviendra pas soldat.

      'Unless Paul's sister does not manage to make her parents desperate too, Paul won't become a soldier.'

(67)   a.   Si la soeur d'Alfred devient vétérinaire, Alfred fera lui aussi un choix de carrière réaliste.
         →La soeur d'Alfred va faire un choix de carrière réaliste.
         →Devenir vétérinaire serait un choix de carrière réaliste pour la soeur d'Alfred.

         'If Alfred's sister becomes a vet, Alfred too will make a realistic career choice.'
         →'Alfred's sister will make a realistic choice for a career.'
         →'Becoming a vet would be a realistic career choice for Alfred's sister.'

   b.   Si Martin ne fait pas lui aussi un choix de carrière irréaliste, sa soeur ne deviendra pas vétérinaire.

       'If Martin does not make an unrealistic career choice too, his sister won't become a vet.'

   c.   La soeur d'Alfred ne deviendra pas vétérinaire, ou alors Alfred fera lui aussi un choix de carrière irréaliste.

       'Martin's sister won't become a vet, or Martin too will make an unrealistic career choice.'

   d.   Jacques va lui aussi faire un choix de carrière réaliste, ou alors sa soeur ne deviendra pas vétérinaire.

       'Jacques too will make a realistic career choice, or his sister won't become a vet.'

   e.   A moins que Jacques ne fasse lui aussi un choix de carrière réaliste, sa soeur ne deviendra pas vétérinaire.

       'Unless Jacques makes a realistic career choice too, his sister won't become a vet.'

B   Additional material for the acceptability judgment task (Experiments 2 and 3)

Experiments 2 and 3, which were concerned with acceptability judgments, contained all the test sentences from Experiments 1 and 5 (see appendix A) as well as control conditions that we report in the following order: (a) items involving local accommodation with *too*, (b) items with the presupposition satisfied, (c) items with no presupposition, (d) items involving local accommodation of a definite description.

(68)   a.   J'ai parlé à Mélanie. Il est impossible que Matthieu vienne lui aussi: Mélanie est à l'étranger.
         'I have talked to Melanie. It is impossible that Matthieu should come too: Melanie is abroad.'

   b.   Je vais avoir la visite d'Anne. Il est impossible que Jean vienne lui aussi: il est à l'étranger.
         'Anne is going to visit me. It is impossible that Jean should come too: he is abroad.'

   c.   J'ai parlé à Josette. Il est impossible qu'elle et Pierre viennent tous les deux: Josette est à l'étranger.
         'I have talked to Josette. It is impossible that she and Pierre should both come: Josette is abroad.'

   d.   J'ai parlé à Christine. Il est impossible que Nicolas vienne avec la voiture de Christine: elle n'a qu'une mobylette.
         'I have talked to Christine. It is impossible that Nicolas should come with Christine's car: she only has a motorbike.'

(69)   a.   J'ai eu un mail de Lucie. Il est impossible que Charles m'appelle lui aussi: Lucie n'a aucun accès à un téléphone.
         'I had an email from Lucie. It is impossible that Charles should call me too: Lucie doesn't have any access to a telephone.'

   b.   Je vais avoir un coup de fil de Lise. Il est impossible que Bernard m'appelle lui aussi: il n'a aucun accès à un téléphone.
         'I am going to get a phone call from Lise. It is impossible that Bernard should call me too: he doesn't have any access to a telephone.'

   c.   J'ai eu un mail de Sophie. Il est impossible qu'elle et François m'appellent tous les deux: Sophie n'a aucun accès à un téléphone.
         'I had an email from Sophie. It is impossible that she and François should both call me: Sophie doesn't have any access to a telephone.'

   d.   J'ai eu un mail d'Aurélie. Il est impossible que Robert m'appelle avec l'iPhone d'Aurélie: elle n'a pas de téléphone portable.
         'I had an email from Aurélie. It is impossible that Robert should call me with Aurélie's iPhone: she doesn't have a cellphone.'

(70)   a.   J'ai eu un coup de fil d'Estelle. Il est impossible qu'Eric me prenne lui aussi en photos demain: Estelle part en vacances.
         'I had a phone call from Estelle. It is impossible that Eric should take a picture of me tomorrow too: Estelle is going on vacation.'

   b.   Chantal va me photographier demain. Il est impossible que Daniel me prenne lui aussi en photos demain: il part en vacances.
         'Chantal is going to take a picture of me tomorrow. It is impossible that Daniel should take a picture of me tomorrow too: he is going on vacation.'

   c.   J'ai eu un coup de fil de Déborah. Il est impossible qu'elle et Alain me prennent tous les deux en photos demain: Déborah part en vacances.
         'I had a phone call from Déborah. It is impossible that she and Alain should both take a picture of me tomorrow: Déborah is going on vacation.'

   d.   J'ai eu un coup de fil d'Elsa. Il est impossible qu'Ilan me prenne en photos avec l'appareil d'Elsa: elle n'a jamais eu d'appareil photo.
         'I had a phone call from Elsa. It is impossible that Ilan should take a picture of me with Elsa's camera: she never had a camera.'

(71)   a.   J'ai parlé à Monique. Il est impossible que Serge me soutienne lui aussi: Monique désapprouve ma conduite.

    'I have talked to Monique. It is impossible that Serge should support me too: Monique dislikes my behavior.'

   b. Myriam va m'exprimer son soutien. Il est impossible que Sydney me soutienne lui aussi: il désapprouve ma conduite.

    'Myriam is going to support me. It is impossible that Sydney should support me too: he dislikes my behavior.'

   c. J'ai parlé à Martine. Il est impossible qu'elle et Jacques me soutiennent tous les deux: Martine désapprouve ma conduite.

    'I have talked to Martine. It is impossible that she and Jacques should both support me: Martine dislikes my behavior.'

   d. J'ai parlé à Sandra. Il est impossible que Nicolas me soutienne sur le blog de Sandra: elle n'a jamais eu de blog.

    'I have talked to Sandra. It is impossible that Nicolas should support me on Sandra's blog: she never had a blog.'

(72) a. J'ai parlé à Amélie. Paul ne pourra pas me soutenir lui aussi: Amélie désapprouve ma conduite.

    'I have talked to Amélie. Paul won't be able to support me too: Amélie dislikes my behavior.'

   b. Sharon va m'exprimer son soutien. Franck ne pourra pas me soutenir lui aussi: il désapprouve ma conduite.

    'Sharon will support me. Franck won't be able to support me too: he dislikes my behavior.'

   c. J'ai parlé à Lisa. Elle et Benjamin ne pourront pas me soutenir tous les deux: Lisa désapprouve ma conduite.

    'I have talked to Lisa. She and Benjamin won't be able to both support me: Lisa dislikes my behavior.'

   d. J'ai parlé à Géraldine. Albert ne pourra pas me soutenir sur le blog de Géraldine: elle n'a jamais eu de blog.

    'I have talked to Géraldine. Albert won't be able to support me on Géraldine's blog: she never had a blog.'

C   Additional (complex) fillers for the acceptability judgment task of Experiment 5

Experiment 5 contained the same items as Experiments 2 and 3 (see Appendix B) as well as the following filler items containing the quantifier *Each* (73), the quantifier *No* (74), a disjunction (76), or a conditional (77). They were chosen mostly on an intuitive basis for their relative length and complexity.

(73) a. Chaque ministre qui fera en sorte que son attaché parlementaire soit maintenu en fonctions ne gardera pas son directeur de cabinet.

    'Each minister who will ensure that his parliamentary assistant is kept will not keep his chief of staff.'

   b. Chaque attaché de presse qui fera en sorte que les caméras soient exclues n'interdira pas l'usage des appareils photos.

    'No press attaché who will ensure that video cameras are excluded will not forbid the use of cameras.'

   c. Chaque préfet qui fera en sorte que les petits délinquants soient laissés en paix ne laissera pas les sans-papiers tranquilles.

    'Each préfet who will ensure that the delinquents are left in peace will not leave the illegal immigrants alone.'

   d. Chaque entreprise qui fera en sorte que la rémunération du DRH soit bloquée ne laissera pas stagner le salaire du PDG.

    'Each company which will ensure that the salary of the HR director is blocked will not leave the income of the boss constant.'

(74) a. Aucun ministre qui ne gardera pas son directeur de cabinet ne fera en sorte que son attaché parlementaire soit remplacé.

    'No minister who will not keep the chief of his cabinet will ensure that his parliamentary assistant is replaced.'

   b. Aucun attaché de presse qui n'interdira pas l'usage des appareils photos ne fera en sorte que les caméras soient tolérées.

    'No press attaché who doesn't forbid the use of cameras will ensure that video cameras are tolerated.'

   c. Aucun préfet qui ne laissera pas les sans-papiers tranquilles ne fera en sorte que les petits délinquants soient inquiétés.

    'No préfet who will not leave the illegal immigrants in peace will ensure that the delinquents are harassed.'

   d. Aucune entreprise qui ne laissera pas stagner le salaire du PDG ne fera en sorte que la rémunération du DRH soit augmentée.

    'No company which will not leave the income of the boss constant will ensure that the salary of the HR director is increased.'

(75) *Same as above except that scopes and restrictors are exchanged (roughly):*

   a. Aucun ministre qui ne fera pas en sorte que son attaché parlementaire soit remplacé ne gardera de directeur de cabinet.

   b. Aucun attaché de presse qui ne fera pas en sorte que les caméras soient tolérées n'interdira l'usage des appareils photos.

   c. Aucun préfet qui ne fera pas en sorte que les petits délinquants soient inquiétés ne laissera les sans-papiers tranquilles.

   d. Aucune entreprise qui ne fera pas en sorte que la rémunération du DRH soit augmentée ne laissera stagner le salaire du PDG.

(76) a. Le ministère de l'Education verra son budget diminuer, ou alors le ministère de la Recherche n'obtiendra pas d'augmentation budgétaire.

    'The Ministry of Education will see its budget decrease, or else the Ministry of Research will not get any budget increase.

   b. L'armée de terre va échouer à obtenir des équipements, ou alors la marine ne recevra pas de navires.

    'The army will fail to obtain equipments, or else the Navy will not receive boats.'

   c. La France va se voir refuser des privilèges, ou alors la Pologne n'obtiendra pas de subventions.

    'France will be refused privileges, or else Poland will not obtain subsidies.'

   d. Les salaires des enseignants seront bloqués, ou alors les infirmières ne seront pas augmentées.

'The salary of the teachers will be frozen, or else the nurses will not be given a raise.'

(77) *Similar to the disjunctions above, but in conditional version:*

    a. Si le ministère de l'Education ne voit pas son budget augmenter, le ministère de la Recherche n'obtiendra pas d'augmentation budgétaire.

    b. Si l'armée de Terre ne réussit pas à obtenir des équipements, la marine ne recevra pas de nouveaux navires.

    c. Si la France ne se voit pas accorder des privilèges, la Pologne n'obtiendra pas de subventions.

    d. Si les salaires des enseignants ne sont pas revalorisés, les infirmières ne seront pas augmentées.

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