The Meaning of the Additive *Too*: Presupposition and Discourse Similarity

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Abstract. This paper studies the general meaning of the additive particle *too*. It is argued that besides its well-known presuppositional content, *too* also conveys an information regarding the similarity of its host and the antecedent of its presupposition in the discourse. We couch our proposal in an argumentative framework. This proposal is then articulated with recent accounts of the obligatoriness of *too*.

Keywords: Additive Particles, Presupposition, Argumentation, Redundancy.

Semantic analyses of the additive particle *too* (e.g. [Krifka, 1999]) usually deal with three aspects of its meaning. These are summarized below and exemplified on (1), along with a handful of definitions that will prove useful for our work.

(1) John came and [**Mary** did too].

Presupposition: The core-meaning of *too* lies in its presupposition. In (1), the presupposition of *too* is that someone different from Mary came.

Focus sensitivity: To build its presupposition *too* is said to *associate* with a constituent of the sentence it belongs to (we call this sentence the *host* of *too*[1]). The presupposition is built by abstracting the host over the associate. The associate is often prosodically marked. Krifka argues that the associate of *too* plays the role of *contrastive topic*. In (1), the associate of *too* is *Mary*.

Anaphoricity: The presupposition of *too* cannot be entirely accommodated (see [Kripke, 2009], [van der Sandt and Geurts, 2001]). The use of *too* requires a salient *antecedent* in the discourse that satisfies the presupposition. This explains why (2) is deviant (in isolation), even though it is obvious that many people besides Sam must be having dinner in New-York.

(2) #Sam is having dinner in New-York tonight too.

More precisely, the anaphoricity of *too* concerns what we will call the *alternative* of the associate, i.e. an element of the previous discourse whose

[1] By analogy we also define the *host* of an inference (presupposition, implicature, entailment) as the utterance that is the basis for deriving the inference (e.g. because it contains the relevant presuppositional trigger).

N. Bezhanishvili et al. (Eds.): TbiLLC 2009, LNAI 6618, pp. 322–341, 2011.

> denotation must be comparable to and distinct from the denotation of the associate and which is subject to the same predication as the associate. The alternative is a constituent of the antecedent of the presupposition. Without a salient alternative, the use of *too* is infelicitous. In (1), the alternative is *John*, and the whole antecedent is *John came*. When the context is clear, we will also call *antecedent* the propositional content that matches the content of the presupposition.

A further well-known consideration, going back to [Green, 1968], is that if *too* can be used, it needs to be used. Thus, (3) is infelicitous because of the absence of *too* in the second conjunct.

(3) #John came and Mary did.

Recent accounts treat this in terms of obligatory presupposition (e.g. [Percus, 2006], [Sauerland, 2008], [Amsili and Beyssade, 2009]).

All these approaches consider that besides its presupposed contribution, *too* does not add anything to the meaning of its host. Most of the semantic descriptions focus on building a proper characterization of the presupposition and finding the right constraints for finding a proper antecedent for it.

We will argue that the presence of a semantically compatible antecedent for the presupposition of *too* is not a sufficient condition for licensing its use: its acceptability also depends upon the segments being similar in the discourse (Sect. 1), a proposal we couch in an argumentative framework (Sect. 2). Our proposal is then articulated with recent accounts of the obligatoriness of *too* (Sect. 3).

1 Looking at Antecedents

In this section we show that the existence of an antecedent for the presupposition of *too* is only a necessary, but not a sufficient, condition for the felicitous use of *too*. First, we show that the antecedent for the presupposition of *too* can be found in various layers of meaning: asserted, presupposed, or implicated. Then we look at discourses such that even though an antecedent for the presupposition of *too* is accessible, it is not licensed.

1.1 Accessible Material

We will say that an antecedent for the presupposition of *too* is accessible, if the use of *too* is licensed in a context such that there is a linguistic element from which we can infer a proposition that satisfies the presupposition of *too*. Usually, the antecedent of a presupposition is presented as an assertion, as in (1), where the assertion *John came* is the antecedent of the presupposition of *too*.

However, the antecedent does not have to be asserted to be accessible. It appears that as long as the proper proposition has been conveyed, it can function as an antecedent for the presupposition of *too*. In each of the examples in

(4)-(6), a non-asserted part of meaning (given in (a.)) felicitously satisfies the presupposition of *too* (given in (b.))[2].

(4) **Presupposition:** Lemmy is proud to be a bass player. Roberto plays bass too [although he's not that proud of it].
   a. *Presupposed meaning of the first sentence:* Lemmy is a bass player.
   b. *Presupposed meaning of* 'too' *in the second sentence:* Someone different from Roberto is a bass player.

(5) **Conventional Implicature:** Lemmy, that idiot, came to the party. Ritchie is an idiot too, [he arrived completely drunk.]
   a. *Conventionally implicated meaning in the first sentence:* Lemmy is an idiot.
   b. *Presupposed meaning of* 'too' *in the second sentence:* Someone different from Ritchie is an idiot.

(6) **Conversational Implicature:** For his breakfast, Lemmy had an apple. Ritchie only had a fruit too.
   a. *Conversationally implicated meaning in the first sentence:* Lemmy had nothing apart from his apple.
   b. *Presupposed meaning of* 'too' *in the second sentence:* Someone different from Ritchie had nothing apart from a fruit.

None of these observations is particularly surprising. The projection algorithm in [Gazdar, 1979] actually makes these predictions, albeit not in an explicit manner. More generally, these observations also stand for any type of anaphoric binding. However, since we will heavily rely on non-asserted antecedents in the forthcoming examples, and since this property has never been (to our knowledge) explicitly stated in these terms in the literature, we felt it useful to underline the accessibility of all conveyed material for satisfying presuppositions (or at the very least the presupposition of *too*).

1.2 Compatible and Inaccessible Antecedents

We now show that the presence of an antecedent for the presupposition of *too* is not a sufficient condition for its felicitous use. We build our central example by relying on quantifiers and negation.

(7) a. Did Lemmy and Ritchie do well at the maths exam?
   b. Lemmy did not solve all problems, Ritchie solved some of them (# too).

[2] It is of course possible to find counter-examples such as (i), suggested by a reviewer.

(i) ??The king of France is bald. The king of Spain exists, too.

These are not problematic since I claim that there is more to the licensing of *too* than its presupposition. (i) is thus a case in point: the presupposition of *too* is satisfied but not its other conditions of use.

As shown in Sect. 1.1 with (6), a quantity implicature can be the antecedent of the presupposition of *too*. In (7-b), the first segment carries the implicature that Lemmy answered some problems which matches the requirement of *too* in the second segment. Yet the use of *too* strongly degrades the whole sequence. Therefore the infelicity of *too* in (7-b) cannot be attributed to the conversationnally implicated nature of its potential antecedent. We will argue that in this case what is at stake is the discourse similarity of the segments in play (see Sect. 2).

Similar observations can be made with the adverb *only* in the first segment:

(8) Lemmy solved only some of the problems and Ritchie solved some of them (# too).

In (8), the presupposed part of *only* should be available to satisfy the presupposition of *too* (cf. the classical analysis of the meaning of *only* that dates back to [Horn, 1969]). However, we will not rely on (8) in the remainder of this paper:

- There is an effect induced by the conjunction *and* which cannot be covered in this paper for reasons of space, but needs to be clarified to deal with (8). Experimental data shows that the french version of (8) is far worse with *too* than without it, thus showing that *too* has an effect by itself, but we lack data on the effect of *and* without which the paradigm is not complete.
- The effect of *only* itself needs clarification: it is later argued that *too* requires an argumentative parallelism between its host and antecedent. *Only* has been described to reverse the argumentative orientation of its host (e.g. by [Anscombre and Ducrot, 1983]), which would readily explain (8). However, the picture is actually more complex and sequences that combine *only* and *too* are possible, as attested by (9-b) (for which I thank one reviewer):

  (9) a. Was Peter drunk again at the party last night?
  b. No, he only had water. Mary had water too – which I found quite amazing, considering that she never leaves out an occasion to get drunk.

  As with *and*, space does not allow for a complete analysis of the combined effects of these two items.

These effects are addressed in [Winterstein, 2010] to which the reader is referred, should he be interested.

1.3 Incompatible and Accessible Antecedents

Now that we have shown that the presence of an antecedent for the presupposition of *too* is not sufficient to guarantee its felicitousness, we will argue that it is however a *necessary* condition for its use.

This part is motivated by the fact that *too* can relate two segments that are not semantically compatible. For example, (10-b) is felicitous even though the two predicates differ: solving *almost all the problems* implies that not all problems were solved, which is contradictory with solving *all of them*.

(10) a. Did Lemmy and Ritchie do well at the math exam?
b. Lemmy solved all the problems and Richie solved almost all of them too.

In (10-b), the intuition is that *solving all the problems* satisfies the presupposition of *too* because it counts as the same as *solving almost all the problems*, at least regarding the question (10-a) and even though the two predicates are truth-conditionally incompatible.

The data in (10-b) shows that if *too* indeed conveys a presupposition, then it cannot be constructed with the lexical material of its host. If it were the case, there could be no way that the presupposition is satisfied in (10-b).

A possible explanation is that there is no presupposition triggered by *too*, at least not in the sense considered so far. Rather, *too* presupposes that its host and antecedent are similar in a contextually given way, for example as in (10-b), where the question is made explicit.

Example (11) supports this hypothesis. There, predicates with close truth conditions do not license the use of *too*. Intuitively, the sentence is infelicitous because the two predicates cannot be understood as contextually similar. Out of the blue it is hard to come up with a question such that each conjunct of (11) answers it in the same way: the first conjunct presents the information about Lemmy in a positive light, whereas the second one is negative about Ritchie, even though the descriptive content of the two conjuncts is close.

(11) #Lemmy solved almost all the problems, and Ritchie only solved most of them too.

However, we will not take the route of a purely contextual presupposition for *too*. Rather, we will argue that there is a "semantic" presupposition of *too*, but not constructed with the lexical material of its host.

We first show that *too* conveys a presupposition that needs to be satisfied by a truth-conditional similar antecedent, i.e. that without a proper antecedent for its presupposition, *too* cannot be used. We then claim that this presupposition is built only with the asserted part of its host, so that even in (10-b) there is a satisfied presupposition, albeit not identical with the material of the host of *too*.

Truth-conditional Presupposition. Example (12) involves two predicates meant to convey a similar appreciation on the performance of Ritchie and Lemmy at their exam. Crucially, (12) is constructed so that there is no salient antecedent for the presupposition (12-a) (triggered by *too*). The example is not felicitous, whereas the same example with switched conjuncts (13) is felicitous.

(12) #Ritchie solved most problems, Lemmy solved all of them too.
a. *Presupposition of* too: Somebody different from Lemmy solved all the problems.

(13) Ritchie solved all the problems, Lemmy answered most of them too.
a. *Presupposition of* too: Somebody different from Lemmy solved most of the problems (entailed by the first conjunct)

If the presupposition of *too* only bore on discourse similarity then (12) should be felicitous just as (13) is. We take this to mean that *too* does convey a presupposition that needs to be satisfied by an antecedent truth-conditionally similar to its host and not just a presupposition about the discourse similarity of its host and antecedent. We will argue that this truth-condition similarity is based only on the asserted content of the host of *too*.

Building the Presupposition. To show the nature of the presupposition of *too*, we will construct examples in the following manner:

- we start with a sentence with an asserted and a non-asserted (i.e. presupposed, conventionally or conversationally implicated) component
- we add the additive adverb *too* to the sentence
- we test that an antecedent expressing only the asserted part of the host sentence of *too* satisfies the presupposition of *too*, i.e. that the use of *too* is licensed

Such examples will thus show that the presupposition for *too* is only built with the asserted part of its host.

The reader is invited to verify that the examples in (14-a)-(14-c), all constructed in the manner described above, confirm our claim.

(14) a. **Presupposition:** Ritchie didn't answer all the questions. Lemmy only answered some of them too.
b. **Conventional Implicature:** Lemmy came to the party, and Ritchie, that idiot, came to the party too.
c. **Conversational Implicature:** Yesterday, Lemmy slept with his wife Linda. Ritchie slept with a woman too.[3]

Example (10-b) is explained by assuming [Jayez and Tovena, 2008]'s analysis of *almost*. They describe the asserted content of *"Lemmy solved almost all the problems"*, as being *"Lemmy solved a quantity of problems indiscernible from all of them"*. Thus, the use of *too* in (10-b) yields the presupposition *"Someone different from Lemmy solved a quantity of problems indiscernible from all of them"* which is satisfied by the first conjunct.

1.4 Taking Stock

In this section we have examined in detail the nature of the presupposition of *too* to clarify some of its properties that will play a key-role in the rest of our analysis. Our three main observations are summed-up here:

1. The presupposition of *too* is built exclusively with the asserted (or at-hand) content of its host.
2. The presence of an antecedent satisfying the presupposition of *too* is not sufficient to license the use of *too*.

[3] Here the relevant implicature is that Ritchie did not sleep with his wife.

3. The presence of an antecedent is a necessary condition for licensing *too*. The antecedent can be accessed in any layer of meaning of the preceding discourse.

These observations are consistent with the large body of literature about *too*, and we can safely continue to use the vocabulary and analysis that have been given. What is however often lacking in these works is what we have called the discourse similarity requirement of *too*, a question which we will now turn to.

2 Discourse Similarity

As stated in the last section, *too* needs more than a satisfied presupposition to be felicitous. We proposed (in Sect. 1.2) that what is at stake is the discourse similarity of the host of *too* and the host of its presupposition.

We will show experimental data that support this hypothesis and show that this discourse similarity needs to be a gradable quantity rather than a boolean value. We will then propose that the notion of *argumentation* captures the desired property and give the precise content of *too* in these terms. An example of application follows.

2.1 Further Observations: Experimental Data

Example (7-b) (repeated in (15-b)) led us to postulate that besides purely truth-conditional effects, *too* also requires that its host and that of the antecedent of its presupposition make similar contributions to the discourse. Intuitively, in (7-b) the first sentence (and host of the antecedent) makes a negative appreciation of Lemmy's performance while the second one is positive towards Ritchie, i.e. they differ in terms of their *polarity* regarding the performances at the exam.

(15) a. Did Lemmy and Ritchie do well at the math exam?
b. #Lemmy solved did not solve all the problems, Ritchie solved some of them too. =(7-b)

The data in (16) shows that besides a similarity in polarity (as in (15-b)), *too* (=french *aussi*) also requires a similarity in terms of "distance" between its host and the antecedent of its presupposition. The data is also presented in French because we used it for experimental purposes.

(16) Ce soir Marseille et Bordeaux disputent chacun un match de Football à l'étranger. Ont-ils une chance de gagner?
Tonight, Marseille and Bordeaux will each play a soccer match abroad. Do they have a chance of winning?
a. La victoire de Marseille est certaine et celle de Bordeaux aussi est assurée.
The victory of Marseille is certain, and Bordeaux's is assured too.
b. %La victoire de Marseille est certaine et celle de Bordeaux aussi est très probable.

The victory of Marseille is certain, and Bordeaux's is very likely too.

c. ??La victoire de Marseille est certaine et celle de Bordeaux aussi est probable.
The victory of Marseille is certain, and Bordeaux's is likely too.

Each of the examples in (16) uses a modal in the second conjunct. These modals all express the possibility of Bordeaux's victory, albeit with a different strength. Our intuitive judgment is that the higher the probability (and thus, the closer to certainty), the more felicitous the use of *too/aussi*.

To back-up our own intuitions, we ran an experiment on the data in (16). We chose French because it is our native language and our intuitions are sharper, and because we had a lot of native speakers available to run experiments. We thus make the broad hypothesis that *too* and *aussi* have similar semantics. We tested a handful of native english speakers who confirm this; however the reader should keep in mind that all the experimental results of this section are strictly valid only for French.

In French, *aussi* non-ambiguously associates with the subject of the sentence if it is located in the pre-verbal domain. Thus, in all the sentences in (16), *aussi* necessarily associates with *Bordeaux* to generate the presuppositions in (17).

(17) a. The victory of a team different from Bordeaux is assured.
b. The victory of a team different from Bordeaux is very likely.
c. The victory of a team different from Bordeaux is likely.

Forty seven subjects accepted to participate in an online judgment task. They were asked to judge the naturality of the sentences in the context given in (16). The crucial sentences were presented together on the same screen, their order being randomized along with a control sentence (also on the same screen) that provides the baseline for infelicity:

(18) #La victoire de Marseille est certaine et Bordeaux aussi a peu de chances de gagner.
The victory of Marseille is certain, and Bordeaux doesn't have a big chance to win either.

Fillers were also presented on different screens. In total, the subjects were shown six screens with various items on it, only one of which was the targeted one. Naturality was judged by means of a scrolling bar without explicit graduation, except for the mentions *Mauvais* (Bad) at the far left side and *Naturel* (Natural) at the far right side. The score on the bar translated to a figure between 0 and 100. The sentences were presented after an introduction explaining the expected task, with examples to illustrate the task.

We present the data for the group in (16) on Fig. 1 along with the score of (18). The ordinate value is the average naturality score of the sentence indicated in the abscissa: it is not the percentage of subjects that accepted the sentence, but the mean of the scores attributed by each subject.

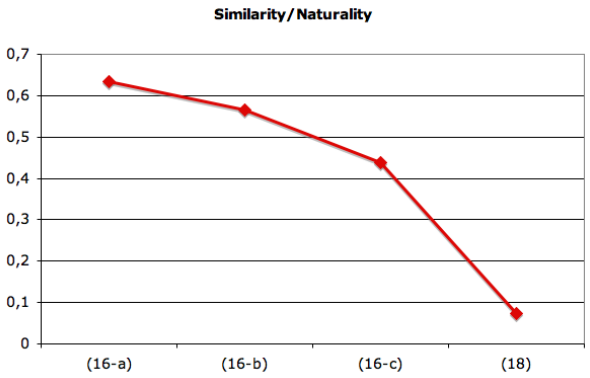

Fig. 1. Acceptance rates for the examples in (16)

As can be seen on Fig. 1, our intutions are partially confirmed: the naturality of the examples in (16) goes down as the intuitive distance between the modals goes up, although it never goes as low as (18)[4]. The score for (16-a) appears lower than expected, and it is certainly lower than the score attributed to "perfect" sentences in the survey (not represented on the figure, these scores are around 80 against the score of 62 for (16-a)). This somehow reflects the intuition that the sentence is less felicitous than (19) is.

(19) The victory of Marseille is certain, and that of Bordeaux too.

To sum-up, to capture the semantics of the discourse-sensitive part of *too*, we need a formalization that:

- is able to tell whether two discourse segments have the same polarity (to account for the contrast between (11) and (10-b)).
- offers a way to predict a gradable way to measure the appropriateness of *too* to account for the gradient of acceptability in (16). The differences between the scores are significant and not a random effect: a complete account of *too* needs to address this point. We propose to link this gradience of acceptability to the *similarity* of the conjuncts, a notion we will define below.

Our observations are close to what [Kaplan, 1984] says about the function of *too* in discourse:

> (That is), *too* is obligatory when we need to emphasize what is important about the content of a two-clause text, when what is important is that the same thing is predicated about two contrasting items.

[4] The differences in score are all statistically significant; the p-values are all under 5% for the Mann-Whitney Rank Sum test. The p-values are summarized here:

	(16-b)	(16-c)
(16-a)	0.03	0.0009
(16-b)		0.003

The similarity we mentioned echoes what Kaplan says about "predicating the same thing". However, unlike him, we intend to capture precisely what it is to "predicate the same thing" about two contrasting items. Contrary to what Kaplan's work might suggest, this identity of predication goes beyond mere lexical identity.

2.2 Argumentation

We propose to use *argumentation* (as defined in [Anscombre and Ducrot, 1983], [Merin, 1999]) as the notion to capture the observations we have made so far. Our choice is dictated by two properties of argumentation that we use as starting points to introduce the notion.

Argumentative Orientation. Argumentation is oriented. The argumentative orientation of an utterance is relative to a goal (quite often the topic of the discourse at hand) and can be positive or negative regarding this goal. Argumentation was introduced to deal with a variety of discourse phenomenons, such as those illustrated in (20)-(21).

(20) A: Is the dinner ready?
B: Yes, almost.

(21) a. #It's almost dark, do not use your headlamps.
b. It's barely dark, do not use your headlamps.

A purely truth-conditional approach to the semantics of the previous examples would predict that (20) is not felicitous whereas (21-a) should be felicitous. In (20), the B speaker utters a logically contradictory statement: *almost* means that the dinner is **not** ready, even though he just answered *yes* to A's question. Similarly, (21-a) should be felicitous: the fact that it is not entirely dark is a good reason to use only sidelights and not headlamps. Yet, the sentence is not felicitous. Even more puzzling: it gets better if the state of darkness is (objectively) more advanced by saying that it is barely dark which, contrary to *almost dark*, entails that it is dark already (21-b).

Argumentation comes into play by making a distinction between the goals of the speaker and the actual truth-conditional content of its utterance. Thus, the first part of (21-a) is described as having an argumentative orientation similar to *It's dark*, which does not license the succeeding continuation. On the other hand, in (20) the dinner being almost ready has the same argumentative properties as the dinner being ready, which ensures its compatibility with an affirmative answer.

To deal with argumentation, we use the notations introduced in [Merin, 1999]:

- $r_H(p)$ is the relevance of the proposition p to an argumentative goal H.
- If $r_H(p)$ is positive, p is said to argue for H, if it is negative it argues against it. A proposition p argues for a goal if asserting p raises the probability of H; relevance is thus a measure of the way p influences the probability of H. If the probability of H is lowered, then p is an argument for $\neg H$.

– $r_H(p)$ can be defined in various ways, based on probability theory (see [van Rooij, 2004] for rationale and examples)

Some lexical items are analyzed as being sensitive to argumentation. We give a brief illustrative list and introduce the ones we shall be using to build and test our proposal.

– The adversative conjunction *but* is considered to connect two argumentatively opposed propositions as in (22). There, the first conjunct of B's answer argues for marrying John, whereas the second one argues against it.

(22) A: Should I marry John ?
B: Well, he's rich, but he's stupid.

– Negation reverts the orientation of its host (cf. (21-a)).
– *Almost* conveys the negation but keeps the orientation of its host (as already exemplified in (20)).

Anscombre and Ducrot consider that these properties cannot be analyzed and belong to the core-semantics of these items. However, more recent approaches try to use the probabilistic interpretation of relevance to derive these argumentative properties from a more complex semantics of the same items, see for example [Jayez and Tovena, 2008] about *almost* and [Merin, 1999] for negation.

Argumentative Force. Besides being oriented, argumentation is gradable. The argumentative forces of two co-oriented utterances can be ordered, thus forming argumentative *scales* relative to a particular goal.

For example, quantifiers usually form argumentative scales: ⟨*all, most, some, a bit*⟩ and ⟨*none, few, not all*⟩ are often arguments for the same conclusion (the best arguments are on the right of the scale and the weakest on the left).

Unlike the argumentative properties of *but*, negation and *almost* presented above, the ranking of the quantifiers is not a lexical and conventional property. For example, it is possible to find contexts such that *all* and *some* have opposite argumentative orientations (see [Winterstein, 2010] for details).

2.3 Proposition

We formalize the meaning of *too* by using the higher-order unification framework formalization proposed in [Pulman, 1997]. This approach allows a clear presentation of the various elements of meaning in the semantics of *too*.

The classic contribution of *too* is described as follows by Pulman.

– *too* is an operator that has two arguments: its host S and its associate F (which is a constituent of S)
– the meaning of an utterance U of the form $too(F, S)$ is as follows:
$\text{Shared}(F) = S$
$\&\ \text{context}(C)$
$\&\ \text{Shared}(A) = C$
$\&\ A \approx F$

- where 'Shared' is the part that is common between the host of *too* and the antecedent of its presupposition; it is a variable that gets its value from the knowledge of S and F
- where 'context' is a function that determines whether a proposition belongs to the context of the discourse. As pointed out in Sect. 1.1, the availability of propositions in the context is not limited to asserted propositions but extends to any type of conveyed material.
- where $A \approx F$ means that A and F must be alternatives to each other.

Hence C, the antecedent of the presupposition, must be accessible and it must be such that it contains a constituent A which is an alternative to F and is an argument to 'Shared' in C.[5]

This formalization captures the properties of the presupposition of *too* we have listed above, but it is still lacking its argumentative side. To complete it properly we consider two new elements:

- Let C_{Host} be the linguistic host of C, i.e. the utterance from which C can be inferred. Often enough we have $C_{\text{Host}} = C$, but not in the cases where C is presupposed, implicated or entailed material.
- Let $C'_{\text{Host}} = C_{Host[F/A]}$, i.e. C_{Host} with F substituted for A.

We then supplement the previous description with the following two constraints:

Co-orientation Condition: $r_H(U)$ and $r_H(C'_{\text{Host}})$ must have the same sign.
Strength Similarity Condition: $r_H(U) = r_H(C'_{\text{Host}}) \pm \varepsilon$. The smaller ε the more felicitous the utterance.

For technical reasons, these conditions are formulated with the constructed proposition C'_{Host}. Argumentation is defined between propositions, not constituents of them. If we are to compare the argumentative forces of the elements in the host and the antecedent of the presupposition of *too*, we need to do it at the propositional level. In order to do this, we construct the "artificial" C'_{Host}. If we were to compare the argumentative properties of C_{Host} and U, the two conditions above would prove to be empty (as demonstrated in Sect. 2.4 below).

2.4 Applications

The two conditions postulated above do not make the same predictions. The co-orientation condition is binary: if $r_H(U)$ and $r_H(C'_{\text{Host}})$ have different signs U is predicted to be entirely infelicitous. The strength similarity condition offers a graded measure for the felicity of *too*. We detail a few examples to show that these predictions do indeed fit the data we have studied so far.

[5] Recall that this formalization is expressed in a unification based system of constraints. Here is an example of how the various elements are resolved for the utterance of *Joe laughed too*, in a context where it has been asserted that *Joe sneezed* (taken from [Pulman, 1997]).

$$\begin{aligned} &\text{Shared}(F) = S && \% \; S = \text{laugh}(joe) \\ \&\; &\text{context}(C) && \% \; C = \text{sneeze}(joe) \\ \&\; &\text{Shared}(A) = C && \% \; \text{Shared} = \lambda Q.Q(joe); A = \text{sneeze} \\ \&\; &A \approx F && \% \; \text{sneeze} \approx \text{laugh} \end{aligned}$$

Binary Judgments. It is easy to check that failure to meet the co-orientation condition yields infelicitous utterances. For example, (23) is infelicitous:

(23) #Lemmy did not solve all the problems, Ritchie solved some of them too. =(7-b)

In (23) the co-orientation condition spells out as follows:

- U = Shared(F) = "Ritchie solved some of the problems." where
  - F ="Ritchie"
  - Shared ="$\lambda x.x$ solved some of the problems"
- C = "Lemmy solved some of the problems" (implicated by C_{Host} = "Lemmy did not solve all the problems").
- C'_{Host} = "Ritchie did not solve all the problems"

As stated above, negation reverts the argumentative orientation of its prejacent, which means that in (23), U and C'_{Host} necessarily have opposite orientations. This contradicts the co-orientation condition and (23) is correctly predicted to be infelicitous.

It is worth noting here that if the co-orientation condition bore on U and C_{Host}, it would make no substantial prediction. The problem-solving skills of Lemmy and Ritchie do not entertain systematic relations, and it is possible to find a context such that U and C_{Host} are co-oriented.

What truly matters is the comparison between the two predicates: "$A = \lambda x.x$ solved some of the problems" and "$B = \lambda x.x$ solved only some of the problems". To determine whether A and B have similar or opposed argumentative effects, they must be compared when applied to the same argument. This is why we rely on U and C'_{Host}, which deal only with the skills of one individual, namely Lemmy. This allows us to predict the infelicitousness of (23) because of the systematic dis-orientation between the propositions.

Graded Judgments. Going back to the paradigm in (16), we can explain the drop in felicitousness through the strength similarity constraint. In those examples the relevant elements are:

- U = Shared(F) = "The victory of Bordeaux is X", where:
  - F ="Bordeaux"
  - Shared ="λy.The victory of y is X"
  - $X \in \{$*assured,very likely, likely*$\}$
- $\langle$*certain/assured, very likely, likely*$\rangle$ form an argumentative scale regarding the particular goal of the victory of a team
- C_{Host} ="The victory of Marseille is certain"$\rightarrow C$ ="The victory of Marseille is X"
- C'_{Host} ="The victory of Bordeaux is certain"

Since all the modal values that X can take and "being certain" belong to the same scale, the examples in (16) satisfy the co-orientation condition. However, the further down the scale of modals we go for X, the further away we go from

"being certain" in terms of argumentation, and the less the sentence is felicitous, as predicted by the strength similarity constraint. Note that the sentences in (16) are still better than sentences that flout the co-orientation condition (an observation confirmed by the experimental data). This is consistent with the different predictions of the two conditions.

***Too* and *But*.** In the argumentative perspective, *but* is described as marking the argumentative opposition between its conjuncts. It might thus seem surprising that it can combine with *too* if one considers that *too* marks argumentative co-orientation (24-b).

(24) a. Will Marseille win and Bordeaux lose the match?
b. The victory of Marseille is certain, but that of Bordeaux is possible, too.

The co-orientation condition applies to the host of *too* and a proposition reconstructed by taking the predication which applies to the alternative of *too*'s associate. As such, nothing prevents the use of *but* with *too*: *but* marks the opposition of its conjuncts, and its left conjunct is not necessarily equal to the proposition that enters the co-orientation condition.

Another interesting feature of (24-b) is that *but* improves the utterance when compared to a conjunction with *and* (cf. when compared with (16)). Again the subject is too broad to be addressed here. The gist of the explanation relies on the kind of question a *but* coordination can answer, as studied in [Umbach, 2005], and the link between this question and the argumentative goal of the speaker (roughly the argumentative goal induces a partition that matches the content of the question, see [Merin, 1999] for details). Thus, (24-b) is interpreted as follows:

- *But* marks that each conjunct answers the question differently:
  - The first one answers in a positive way: it confirms Marseille's victory.
  - The second one answers negatively: it denies that Bordeaux will lose.
- *Too* marks the fact that, for Bordeaux, a certain or possible victory is the same regarding the question at hand: both predications count as negative answers.

But is more appropriate than *and* in (24-b) since its conditions of use are met. Argumentation is here central to account for the fact that *being possible* denies the fact that Bordeaux will lose, i.e. that both answer the question in the same way. Again, further details are given in [Winterstein, 2010].

2.5 Other Approaches

In this section, we briefly look at alternative candidate approaches to explain the data presented so far. Ultimately we dismiss them on account of their inadequacy.

Monotonicity. We claimed that (7-b) (repeated in (25-b)) is infelicitous because the host and antecedent of *too* have opposite argumentative orientations.

(25) a. Did Lemmy and Ritchie do well at the math exam?
b. Lemmy did not solve all the problems, Ritchie solved some of them (# too). =(7-b)

Since (25-b) involves quantifiers, it could be hypothesized that it is the monotonicity properties of these quantifiers (cf. [Barwise and Cooper, 1981]) that interfers with *too*. The hypothesis would be that *too* can only link quantifiers with identical monotonicity (either non-monotonic or monotonic increasing or decreasing). Indeed, in (25-b), *not all* is monotonic decreasing on its scope, whereas *some of the problems* is monotonic increasing on its own scope. If we use a quantifier that is monotonic increasing on its scope in the first conjunct, we get a felicitous example:

(26) Lemmy solved a few problems and Ritchie solved some of them too.

Unfortunately, this explanation falls short if we try to generalize it. The examples (27-a) and (27-b) involve quantifiers with differing monotonicities and yet are felicitous (in (27-a) the first quantifier is decreasing on its restriction whereas the second is increasing; and in (27-b) the first is non-monotonic on its scope and the second is decreasing).

(27) a. Lemmy solved no problems and Ritchie did not solve all of them either.
b. Lemmy solved only a few problems and Ritchie solved few of them too.

Another problem faced by monotonicity is that it does not explain the gradience of judgements in (16). The hypothesis we can make about monotonicity are necessarily binary, and thus incomplete.

Local Implicatures. An interesting alternative explanation for the gradience in (16) is that the reluctance to use *too* is linked to the presence of locally derived scalar implicature (à la [Chierchia et al. 2008]). As the modals in (16) go down their scale, the implicature would become more and more accessible. Thus, the interpretation of the modal in (16-c) would be as in (28-a).

(28) a. The victory of Marseille is certain, and that of Bordeaux is possible but not certain (# too).
b. The victory of a team different from Bordeaux is possible but not certain.

Assuming that *too* access the locally derived scalar implicature to build its presupposition (contra our conclusion of Sect. 1.3), the presupposition should be as in (28-b) and therefore cannot be satisfied by the first conjunct, explaining the infelicitousness of *too*.

However, going back to (25-b), we see that, should there be a local scalar implicature associated with *some* in the second conjunct, *too* would be blind to it. Otherwise, it would predicted that the presupposed meaning of *too* is

Somebody different from Ritchie solved some, but not all, the problems, which is satisfied by the first conjunct.

So *too* should be banned in (16-c) because of its interference with an implicature, but in (25-b) *too* would not be licensed because it cannot access the same kind of implicature. Therefore, we conclude that, if there is such a thing as local scalar implicatures, *too* remains insensitive to it, and that another explanation is required for the licensing of *too*.

Discourse Relations. It could be argued that the data in (16) can be explained in terms of discourse relations (à la *SDRT*). *Too* could be analyzed as a cue marker for the discourse relation *Parallel*, and its felicitous use would then depend on the possibility to establish a *Parallel* relation between the host of *too* and its antecedent. But the proper conditions for *Parallel* still have to be detailed in a principled way. The argumentative analysis proposed above can be used to define the exact requirements on the relation, especially for the gradience effect we observe (which has no explanation in the actual version of *SDRT* or other discourse structure representation frameworks). The two approaches can then be considered complementary rather than opposed.

3 Obligatoriness

Now that we have given a more detailed semantics for *too*, we turn to the question of its obligatoriness. This problem has been given a lot of attention in recent litterature (see [Amsili and Beyssade, 2009], [Sauerland, 2008], and [Percus, 2006] and their numerous references). We begin by summarizing what these approaches have in common, and show that they make wrong predictions regarding the obligatory presence of *too* in some examples. We then propose an amendment to these approaches, based on the semantics we have detailed in the previous sections.

3.1 Classical Approaches

The previously cited approaches all have in common the idea that the obligatory presence of *too* is prompted by a Gricean-like mechanism that considers that any utterance q has $q' = too(q)$ as a (stronger) alternative to itself, the only difference between the two versions being the presupposition of *too*. The scale considered is thus a presuppositional scale. To justify the fact that q and q' are alternatives to each other, [Amsili and Beyssade, 2009] propose that *too* is considered for building an alternative because its only semantic contribution lies in its presupposition, i.e. it is semantically void. They detail a whole class of items that share this property and exhibit the same (apparent) obligatory nature as *too*.

We examplify this with (29-a) and (29-b) (repeated from (1)-(3)), which are alternatives differing only by the presence of *too*.

(29) a. John came and Mary did too.
b. #John came and Mary did.

The Gricean mechanism applies as follows to these sentences:

1. Let p = *John came.*
2. Let q = *Mary came.*
3. Let q' = *Mary came too.*
4. Let s = *Someone different from Mary came*= the presupposition of q' due to *too.*
5. Asserting q implicates $\neg s$, because $\langle q', q\rangle$ is a scale, and by usual Gricean reasoning asserting the weaker element entails the falsity of the stronger. Since the only difference lies in the presupposition s of q', s gets negated (creating what [Percus, 2006] calls an *antipresupposition*).
6. The inference $\neg s$ is trivially inconsistent with the previously asserted p, which triggers the preference of q', i.e. for the use of *too.*

I. Heim (quoted by [Sauerland, 2008]) dubbed this mechanism *Maximize Presupposition* since it can be paraphrased by saying that if a speaker has a choice between two forms q and q', differing only in terms of presupposition, and that these presuppositions are already met, then the presuppositionally-ladden form should be preferred.

This analysis predicts that *too* is either obligatory (if its presuppostion is met) or infelicitous (if the presupposition is not met). Unfortunately, it does not cover cases where *too* is optional. Based on our previous observations, we study (30-b), where *too* appears optional.

(30) a. How many questions answered Lemmy and Ritchie each?
b. Lemmy answered all the questions and Ritchie answered most of them (too).

The previous mechanism predicts that *too* should be obligatory in (30-b):

1. Let p = *"Lemmy answered all the questions"* $\rightarrow$ p' = *"Lemmy answered most questions".*
2. Let q = *"Ritchie answered most questions".*
3. Let q' = *"Ritchie answered most questions* **too***".*
4. Let s = *"Someone different from Ritchie answered most questions"*= the presupposition of q'.
5. The assertion of $q \rightsquigarrow \neg s$ = *"Nobody except Ritchie answered most questions".*
6. p' is true and contradicts $\neg s$, therefore *too* is (wrongly) predicted to be obligatory in (30).

Given the question (30-a) the associate of *too* in (30-a) should be "Ritchie" since *too* associates with contrastive topics in such contexts [Krifka, 1999]. A French translation confirms this: in it *aussi* would be placed in the preverbal domain and thus non-ambiguously associate with the subject while preserving the optionality of *too.* The intuitive feeling is that by adding *too*, the speaker conveys that both Ritchie and Lemmy did a good work; i.e. that he answers a covert question, something that cannot be captured by traditional accounts.

Finally, recall that an explanation based on exhaustivity cannot work: we have shown that *too* does not integrate implicated content in its presupposition.

3.2 Amendment

One explanation for the failure of the previous mechanism is that it considers that *too* creates alternatives that differ only in terms of the presupposition. However, as we have seen, *too* conveys more than just its presupposition. This gives us a starting point to refine the account of the obligatoriness of *too*.

Examples such that *too* is really obligatory are of two kinds:

1. Cases such that the antecedent is lexically identical to the host of *too*, minus the associate alternative. This is the case in (29-a), where the predicate *came* is repeated in the two conjuncts. This is also the case in (31) (=(4)), where the antecedent is lexically given by the complement of *being proud*.

   (31) Lemmy is proud to be a bass player. Roberto plays bass #(too).

2. Cases without lexical identity. What seems to be the key of such examples is an identity at the level of the argumentative goal. For example in (32-b), *too* is obligatory (in France, while in the U.S.A. it would be infelicitous, and the *B* speaker would probably use an adversative connective).

   (32) a. *A:* Can Lemmy and Ritchie buy whisky?
   b. *B:* Lemmy's eighteen and Ritchie is of legal drinking age too.

   What is at stake in this example is not the exact age of Lemmy and Ritchie, but whether they are over the majority threshold. All the ages over eighteen are argumentatively equivalent regarding the possibility of buying whisky.

The second case subsumes the first: lexical identity entails argumentative identity. We thus take it for the defining property of obligatory *too*. The examples with an optional *too* are characterized by a potential difference in argumentative strength between the relevant elements, as in (30-b). Thus, our proposal is that the aforementioned Gricean mechanism applies, but needs to take the argumentative component of *too* into account. The content of the antipresupposition is a bundle consisting of the negation of both the presupposition and the fact that the antecedent's host is argumentatively equivalent to the host of *too*.

Therefore, utterances like (30-b) offer an alternative to the speaker:

- the *too*-version enforces the argumentative identity of host and antecedent: in (30-b), it means that answering all or most of the questions is the same in the eye of the speaker regarding the goal he is arguing for (which does not necessarily corresponds to the question asked).
- choosing the *too*-less version indicates that the speaker remains neutral regarding this argumentative identity.

It is important to understand that by "optionality" we mean that the purely truth-conditional content of the conjuncts prove insufficient to trigger the obligatoriness of *too*. But in a given context and given a particular goal for the speaker, there is no more optionality: either the relevances are equivalent for a particular goal and *too* must be used, or they are not and *too* cannot be used.

4 Wrapping-Up

We have studied the semantics of *too* in detail. Our main points are that:

1. besides its presupposition, *too* conveys another information pertaining to the similarity of its host and the antecedent of its presupposition.
2. this property can be expressed by assuming that *too* is sensitive to the argumentative properties of its host and antecedent.
3. this argumentative sensitivity moderates the obligatory nature of *too*.

Acknowledgments. I thank my two anonymous reviewers, Pascal Amsili, Jacques Jayez, Henk Zeevat, Bart Geurts, Emmanuel Chemla, the audience of the Tbilisi Symposium and the audience of the L$\mathfrak{L}$C$_2$ in Lyon for their precious help and comments about this work. Yet, all errors and mistakes are still mine.

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