Weak and Strong Triggers

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Abstract The idea that presupposition triggers have different intrinsic properties has gradually made its way into the literature on presuppositions and become a current assumption in most approaches. The distinctions mentioned in the different works have been based on introspective data, which seem, indeed, very suggestive. In this paper, we take a different look at some of these distinctions by using a simple experimental approach based on judgment of naturalness about sentences in various contexts. We show that the alleged difference between *weak* (or *soft*) and *strong* (or *hard*) triggers is not as clear as one may wish and that the claim that they belong to different lexical classes of triggers is probably much too strong.

Keywords Presupposition projection · Weak/strong triggers · Accommodation · Context abduction · Discourse planing

1 Introduction

Presupposition triggers are often felt to presuppose more or less 'strongly'. For instance, whereas (1b) strongly gives rise to the inference that Paul has missed the point, (1a) does not. Verbs like *discover*, *realize* or *know* are generally considered to be 'weaker' than *regret*, in that they do not (always) give rise to an intuition of entailment.

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(1) a. If Paul realizes he has missed the point, he will probably reformulate his
        objection.
     b. If Paul regrets he has missed the point, he will probably reformulate his
        objection.

This kind of observation, originating with (Karttunen 1971), suggests that presupposition triggers might differ in their presuppositional strength. Parallel observations for adverbials like *too* or *again* or clefts, as opposed to aspectual verbs like *stop*, might be taken to reinforce this impression.

(2) a. If Paul missed the point again, this proves that he does not really understand
        the subject.
        ⤳ Paul has missed the point before
     b. Maybe Paul is quitting smoking or something. That would explain why he
        is so edgy.
        ⤳̸ Paul smokes

More recently, Abusch (2002, 2010) has argued for a distinction between *hard* and *soft* triggers on the basis of a simple test. The presupposition of soft triggers like *win* can be accommodated in the antecedent of a conditional although their truth is explicitly suspended, whereas that of hard triggers like *too* cannot.

(3) a. I don't know if Paul participated in the race, but, if he won, he must be very
        proud.
     b. I don't know if Paul participated in the race, but if Mary participated ??too
        they probably had a drink together just after.

In this paper we examine the distinction between weak (aka soft) and strong (aka hard) triggers from an experimental point of view. In Sect. 2 we examine the major recent works relevant to the weak/soft distinction. In Sect. 3, we present two experiments in French and discuss the results in Sect. 4. Although we do not reject the weak/strong distinction altogether, our findings lead us to adopt a more nuanced view. In view of the experimental results, the most plausible conclusion is that the distinction is not purely lexical but results from the combination of a number of independent factors.

2   Weak and Strong Triggers

It is a truism that the literature on presuppositions is potentially confusing. The interesting question is why. Why should presuppositions be more difficult to describe and categorize than other semantic or pragmatic phenomena? It seems that the main reason is an unresolved tension between two types of evidence.

On the one hand, there are the so-called *projection* tests. Putting a trigger in the scope of certain operators preserves the presupposition, although the very same operators cancel or suspend the main content. Negation, interrogation, *if*-clauses and modal verbs are well-known cases, see (Beaver and Geurts 2013; Chierchia and McConnell-Ginet 1990; Geurts 1999) for different surveys. For instance,

(4) suspends the truth of the main content (the event of Paul forgetting to lock his car) but keeps the presupposition that Paul has a car alive. In such cases, the presupposition is said to *project*.[1]

(4)   Maybe Paul forgot to lock his car.

On the other hand, it has been observed repeatedly that projection is not a stable property. From browsing through the literature, one might get the impression that non-projection concerns only a small subset of carefully chosen examples. However, it is not difficult to find less well-known cases. In (5a), where 'F' marks new information, it is possible that no one guessed the secret word, although *only* A normally presupposes that A. In (5b), it is possible that Paul arrived just before running out of power and had time to load his battery, thus preventing any breakdown.

(5)   a.   If only [Wilma]^F guessed the secret word, she has won € 100. (Geurts and Van der Sandt 2004, example 33b)
        b.   Paul arrived just before his car broke down.

So there is a potential conflict between two sets of observations. A straightforward way out would be to assume that (i) the projection behavior of presuppositions is only a default property and (ii) context can obviate projection more or less easily. Under that perspective, non-projection in a given context would be a matter of plausibility and, when sentences are given in isolation, the final perception would depend on the possibility of abducing reasonable contexts for precluding projection. In essence, this is Stalnaker's project. Stalnaker notes that "the constraints imposed by a statement on what is presupposed seem to be a matter of degree, and this is hard to explain on the semantic account." (Stalnaker 1974, p. 54). By 'semantic account' Stalnaker means any theory that attributes projection to a lexical item or linguistic construction, irrespective of contextual cues. He favors instead a pragmatic account, in which context and inference play a central role.

For instance, Stalnaker would explain the difference between (6a) and (6b) as follows. If the speaker presupposes that she has missed the point, she necessarily realizes that she did so. So, by contraposition, if she does not realize she has missed the point, she cannot presuppose that she did, hence the lack of projection with (6a). In contrast, in (6b), the speaker can perfectly well presuppose that she missed the point and consider the possibility of regretting that later.

(6)   a.   If I realize I have missed the point, I will probably reformulate my objection. $\not\leadsto$ I have missed the point.
        b.   If I regret I have missed the point, I will probably reformulate my objection. $\leadsto$ I have missed the point.

However, a simple pragmatic strategy does not work as smoothly in each and every case.

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[1] Although we are not fond of this terminology, which is heavily syntax-oriented, we will stick to it because it is established usage.

First, Stalnaker's analysis does not seem to extend to (1) very easily. The speaker of (1a) *can* presuppose that Paul missed the point without any contradiction (see Beaver (2004)). Yet, projection is not automatic. Second, when the presupposition does not project, it has to be accommodated in the local context of the trigger. For instance, in a pattern like *If* p, q, where p presupposes some p', if it happens that the truth of p' can be questioned, we have to reconstruct an interpretation corresponding to *If* $p' \& p$, q, where p' is accommodated in the local context, that is, the antecedent of the conditional. If we observe a variation in accommodation, the pragmatic strategy predicts that it is due either to a difference in contexts or to a difference in the possibility of abducing a favorable context. But consider (3) again.

(3)   a. I don't know if Paul participated in the race, but, if he won, he must be very proud.
       b. I don't know if Paul participated in the race, but if Mary participated ??too they probably had a drink together just after.

We do not need any extra context to tell us that, in *both* cases, we have to accommodate the proposition that Paul participated in the race. Should we argue that this proposition is more accessible, salient, plausible, etc., in the presence of *win* than in the presence of *too*? This is not unreasonable, given that *win* entails or implies very strongly participating, whereas *Mary participated too* does not entail that Paul participated. So, we might say that, in a sense, participating is more strongly associated with winning than x *did* y with z *did* y *too*. However, two new problems come up. First, one might argue that *someone did* y is strongly associated with z *did* y *too*.[2] Yet, substituting *someone* for *Paul* in (3b) does not produce a more felicitous text, see (7).

(7)   I don't know if someone participated, but, if Mary participated ??too . . .

Second, Abusch (2002, 2010) claims that clefts are strong triggers. Clefts have the property that their main content entails their presupposition. For instance, *It's Paul who solved the problem* asserts that Paul solved the problem (main content) and presupposes that someone did (presupposition), an obvious consequence of the main content. If Abusch is right about the status of clefts, we have a case where an entailed presupposition cannot be suspended, in contrast to *participate* with respect to *win*.

Third, the location of verbs like *regret* in the landscape of triggers is not clear. The experimental results reported in (Cummins et al. 2013; Cummins and Amaral 2014)[3] suggest that *regret* patterns with *weak* triggers, which apparently clashes with other taxonomies (Abbott 2006; Abusch 2010).

In view of the variation exhibited by the literature, we decided to investigate the difference between French weak and strong triggers in an experimental perspective, starting with basic experiments based on native speakers intuitions about French sentences. With respect to the introspective observations reported in the present

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[2] This is the standard hypothesis on the semantics of *too*, see van der Sandt and Geurts (2001) on *too*.

[3] We discuss some aspects of their work in Sect. 4.2.

section, there are three main differences: (i) We adopted Abusch's basic frame in order to keep the standard of comparison constant, (ii) we used only contextualized sentences in order to reduce as far as possible the effect of context abduction by the subjects, (iii) we systematically compared targets and controls, that is, sentences with and without suspension of the presupposition or sentences with and without the trigger. We did not compare triggers directly, for instance *regret* and clefts, because this amounted to comparing very different sentences. We focused on three French elements that are considered as very close to their English counterparts, *aussi* corresponding to *too*, *regretter* corresponding to *regret*, *qui*-clefts corresponding to subject clefts. In the rest of the paper we refer to these elements using their English counterparts for simplicity.

3   Experimental Findings

3.1   Experiment 1: Too (aussi)

The first experiment is based on an introspective difference illustrated in (8) vs. (9), which are English translations of the original French stimuli (see Appendix). It seems that (9b) is much better that (8b). The intuitive status of (8a) and (9a) is less clear.

(8)   **Context**: Paul has been invited to a party. He is on very bad terms with Mary and they would prefer not to come across each other. Paul thinks that Mary might have been invited too.

   a. I don't know whether Paul will go to the party but, if Mary goes, it will be embarrassing.
   b. I don't know whether Paul will go to the party but, if Mary goes *too*, it will be embarrassing.

(9)   Context: Paul has been invited to a party. He is on very bad terms with Mary and they would prefer not to come across each other. Paul thinks that Mary might have been invited too.

   a. I don't know whether Paul will go to the party because, if Mary goes, it will be embarrassing.
   b. I don't know whether Paul will go to the party because, if Mary goes *too*, it will be embarrassing.

The goal of the experiment was to take into account the possible effect of discourse structure on the strong trigger *too*. We used a contrast between *mais* (*but*) and *parce que* (*because*), in order to have two very different discourse structures, contrast/opposition and explanation/justification. Moreover, we compared texts with and without the trigger *too* in order to take into account the possibility that accommodating the proposition corresponding to the presupposition could be partly independent from the presence of *too*. If, for instance, the discourse structure is in

Table 1 Design of experiment 1

	because	but
Group 1 (19)	with *too*: 1–3	without *too*: 4–5
Group 2 (19)	without *too*: 1–3	with *too*: 4–5
Group 3 (18)	without *too*: 4–5	with *too*: 1–3
Group 4 (21)	with *too*: 4–5	without *too*: 1–3

itself a sufficient cue to help subjects accommodate, the effect of *too* in inducing an accommodation should be at best marginal.

The difference between *but/because* control stimuli where the presupposition was not suspended and target versions with the suspension in effect had already been tested in (Jayez and Mongelli 2013). *But* targets were significantly worse than their control. *Because* targets were not significantly different. We focus here on the comparison between *but* and *because* structures, as illustrated in examples (8) and (9).

3.1.1 Description of the Experiment

Participants Eighty-two subjects were recruited. Five were taken out because they were not native speakers or were bilingual. The remaining subjects (77) were undergraduate students and native speakers of French between 18 and 51 (mean 23.5).

Material and design We used five basic sentences in five contexts (see Appendix). Each final sentence had the form: *I don't know whether p because/but, if p′ too/ø, q*. where *p′ too*, but not *p′* alone, presupposes *p* and ø denotes the null string, alternating with *too*. So, there were 2×2 conditions: *because*/but $\times$ with *too* vs. without *too*. We also had eight fillers, common to all the participants.

Subjects were divided into four groups in a between-subject design shown in Table 1.

Each subject saw five experimental stimuli and the eight common fillers. No subject saw the *but* and *because* versions of the same text or the with and without *too* version of the same text.

Procedure The stimuli were pseudo-randomized and presented on a sheet. The participants were instructed to follow strictly the order of presentation and not to modify a previous answer. They had no time limit or speed indication. The task consisted in reading the context and the sentence and evaluating its comprehensibility on a seven point scale (1–7), where one was the worst and seven the best mark.

3.1.2 Results and Analysis

The basic results are shown in Table 2.

Table 2 Net results for the *aussi* experiment

	Sentence type	Nb. Obs.	Nb. subjects	Mean	Variance
1	bec.with.too	99	40	6.25	3.33
2	but.wo.too	100	40	5.08	3.85
3	bec.wo.too	93	37	5.73	4.24
4	but.with.too	92	37	5.68	3.62

Table 3 Contrasts for the *aussi* experiment

	Contrast	*p*-value	Null hypothesis
1	*because* with/without *too*	0.055	without-score $\geq$ with-score
2	*but* with/without *too*	0.021	without-score $\geq$ with-score
3	*because/but* with *too*	0.016	*but $\geq$ because*
4	*because/but* without *too*	0.0086	*but $\geq$ because*

Since the response is ordinal, we analyzed the data with a standard Mann–Whitney test for independent samples.[4] Table 3 reports the *p*-values. The last column indicates under which null hypothesis the *p*-value was estimated. We considered that it was *a priori* more likely to have high scores for a *because* sentence with *too* than with the same sentence without *too*, because the adverb was supposed to help derive the correct inference that the *simultaneous* presence of Paul and Mary may lead to tensions. We made a similar assumption for *but*. For the *but/because* contrast, we assumed that the *because*-versions were likely to get higher scores than the *but*-versions.

The results, shown in Table 3, show that the *because* and with *too* levels improve the scores, a fact which can be visualized through density plots (Fig. 1). The *p*-values suggest that:

1. *Because*-sentences are better with *too* (line 1).
2. *But*-sentences are better with *too* (line 2).
3. With *too*, *because*-sentences are better than *but*-sentences (line 3).
4. Without *too*, *because*-sentences are better than *but*-sentences (line 4).

The fact that *but* sentences with *too* are better than without *too* (line 2 of Table 3) is not surprising. In the *but* version without *too*, the conclusion of the *if* sentence bears no clear relation to its antecedent. For instance, in (8a), the dominant interpretation is that if Mary goes to the party, it will be embarrassing, no matter whether Paul goes to the party or not, which clashes with the context.

The main conclusion one can draw from these results is that there is no absolute or even strong prohibition of accommodation with *too* in the antecedent of a conditional. Clearly, the context can help subjects accommodate the missing presupposition, up to the point where the difference with a control where the presupposition is not suspended is no longer discernible (Jayez and Mongelli 2013). The processing of

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[4] The results were controlled with the *npar.t.test* function from the R package *nparcomp* (Konietschke 2012), in order to ensure that there was no parasitic effect of difference of variance in the comparisons.
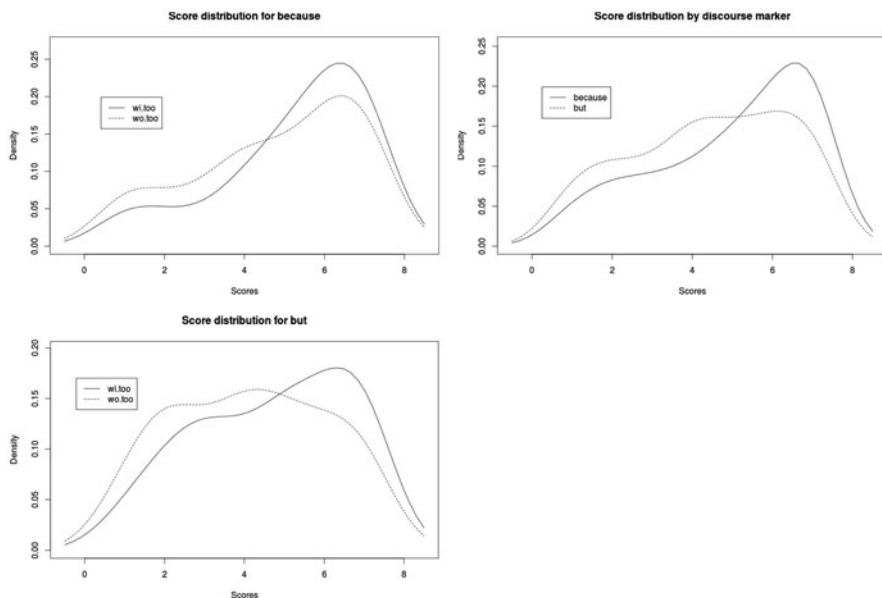
Fig. 1 Density plots for *because* and *but*

accommodation remains, however, unclear. We don't know at which point in the reading sequence subjects accommodate the missing presupposition and it is possible that the accommodation schedule is different across subjects or categories of subjects.

Given that there is no difference between the with/without *too* versions for *because*, it is tempting to assume that, at the moment *too* is read, the missing presupposition has already been made salient. We return to this point in Sect. 4.

3.2 Experiment 2: Regret and Clefts

Regret-sentences and clefts are considered to be strong triggers by Abusch. *Regret* is mentioned as a full factive by Karttunen, in contrast with semi-factives such as *discover*. We tested *regret*-sentences and clefts along the same lines as *too*. Subjects had to evaluate contextualized sentences like the following ones.

(10)   **Context**: Véronique is wondering whether she will change her current car for a bigger one.

   a. I think that Véronique bought a bigger model. If she regrets it later, it will be difficult to change again. [**control**]
   b. I wonder whether Véronique bought a bigger model, but, if she regrets it later, it will be difficult to change again. [**target**]

Table 4 Net results for the *regret*/cleft experiment

	Sentence type	Nb. Obs.	Nb. subjects	Mean	Variance
2	regret.target	52	33	4.87	3.45
3	cleft.target	52	33	5.92	2.23
4	cleft.control	47	33	6.11	2.05
5	regret.control	47	33	5.13	4.03

(11) **Context**: An employee cannot log in on his computer.

    a. I think that someone changed the password. If it was my colleague, I just have to wait to ask him. [**control**]

    b. I don't know whether someone changed the password but, if it was my colleague, I just have to wait to ask him. [**target**]

3.2.1 Description of the Experiment

Participants Forty undergraduate students were recruited. Seven were taken out because they were not native speakers of French or were bilingual. The 33 remaining subjects ranged over 18–26 years with a mean of 21. They had neither participated in the first experiment nor heard about it.

Material and design Six *regret*-sentences and six clefts were created together with eight fillers. Each subject saw three *regret* items and three clefts, one control and two targets or one target and two controls for each category (*regret*/cleft). No subject saw a target and its control. The design was between-subject in the sense that no two subjects evaluated exactly the same set of stimuli.

Procedure Subjects had to read 14 stimuli (6 experimental items and 8 fillers) and to evaluate the stimuli as in the first experiment.

3.2.2 Results and Analysis

The net results are shown in Table 4.

    Unlike in the case of *too*, it is not advisable to run non-parametric comparisons directly because the groups of subjects that would be compared are not independent. The first lines of the design matrix illustrate the problem.

	Subject	Group	Type 1	Cat 1	Type 2	Cat 2	Type 3	Cat 3	Type 4	Cat 4	Type 5	Cat 5	Type 6	Cat 6
1	1	1	regret1	C	regret2	T	regret3	T	cleft1	C	cleft2	T	cleft3	T
2	2	1	regret1	C	regret2	T	regret4	T	cleft1	C	cleft2	T	cleft4	T
3	3	1	regret1	C	regret2	T	regret5	T	cleft1	C	cleft2	T	cleft5	T
4	4	1	regret1	C	regret2	T	regret6	T	cleft1	C	cleft2	T	cleft6	T
5	5	1	regret1	C	regret3	T	regret4	T	cleft1	C	cleft3	T	cleft4	T
6	6	1	regret1	C	regret3	T	regret5	T	cleft1	C	cleft3	T	cleft5	T

Table 5 Distribution of contrasts between controls and targets by trigger

	Sentence type	Mean	≤ 0.01	$0.01 \leq 0.05$	$0.05 \leq 0.1$	$0.1 \leq 0.5$
1	*regret*	0.326	0.041	0.10	0.10	0.50
2	cleft	0.388	0.015	0.065	0.076	0.51

Suppose we want to study the contrast between controls and targets for *regret*. We have then to gather the results for controls and targets and run a non-parametric test. However, the experiment is such that subjects evaluate controls *and* targets. For instance subject 1 sees two targets—stimuli number 2 and 3—for *regret*, and one control—stimulus number 1—for *regret*, subject 2 sees stimuli number 2 and 4 as targets for *regret* and stimulus number 1 as control for *regret*, etc. We might consider a paired non-parametric test, typically a Wilcoxon test for paired samples. Unfortunately, this solution is far from optimal because it requires that we have enough data points to calculate two means—for controls and targets—for each subject and subjects see only *three* stimuli in the *regret* (or cleft) category.

A better option is to divide the set of subjects into two complementary sets and to compare the scores of controls for one of the sets with the scores of targets for the other. By doing this, we get more data points. E.g., we have 32 observations for *regret*-target and 16 observations for *regret*-control for the first 16 subjects. Of course, we have to repeat the non-parametric comparison many times to make it independent from any particular choice of subsets. We randomly divided the 33 subjects of the experiment into two groups of 16 and 17 subjects and compared their scores over 10,000 such samplings. The end result is a distribution of contrasts between controls and targets for 10,000 independent samples of 16 and 17 subjects. Table 5 reports the means and the proportions of *p*-values for various intervals. All the tests assumed that controls are better than targets as the null hypothesis.[5]

As can be expected from the net results in Table 4, the non-parametric comparisons revealed no difference between targets and controls, see Table 5. The distribution of *p*-values after sampling suggests that, overall, clefts are easier to interpret than *regret*, see Fig. 2.

The question arises whether clefts and *regret*-sentences are significantly different. Since the stimuli for the two categories are themselves extremely different, in order to avoid self-adjustment effects on the subjects, it is difficult to answer in a really convincing way. Two points are worth noting, however. First, comparing clefts and *regret*-sentences aggregating the target and control conditions suggests that there is a difference. The *p*-value mean is practically zero with a 10,000-sample test and the distribution of the *p*-values is Gaussian around the mean, which excludes a possible effect of extreme values. Second, comparing clefts and *regret*-sentences under each condition (control/target) with a 10,000 sample test suggests the existence of a difference. The *p*-value is 0.08 for controls and 0.04 for targets, which is compatible

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[5] The tests were carried out using the *npar.t.test* function of the *nparcomp* package with the method parameter set to *t.app*. The Mann–Whitney test is not reliable due the presence of ex-aequo.
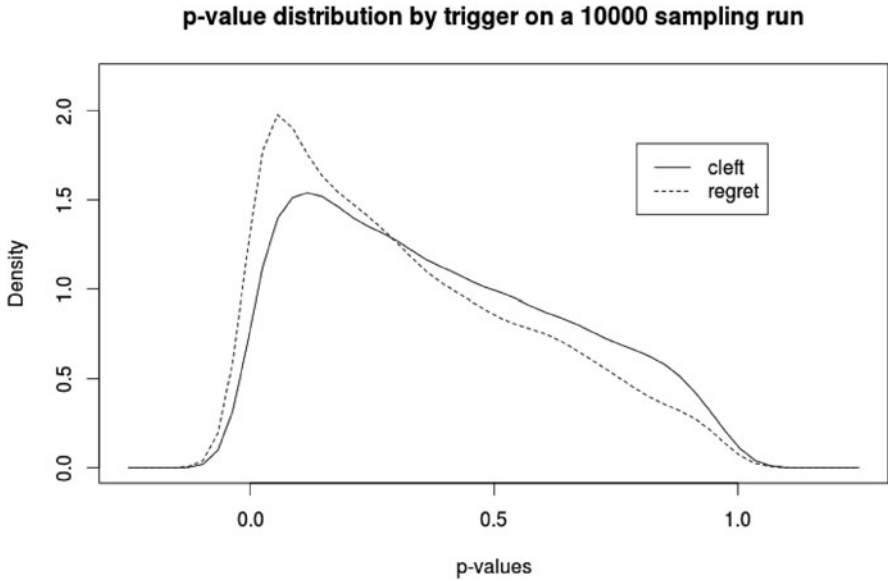
p-value distribution by trigger on a 10000 sampling run

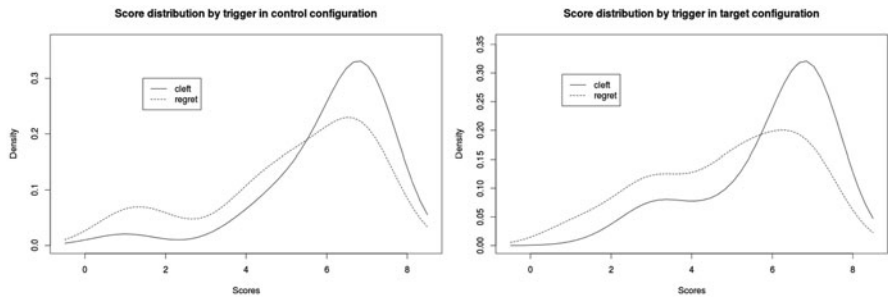**Fig. 2** *p*-value distribution

Fig. 3 Density plot by trigger under control and target conditions

with a global difference between clefts and *regret* and a slightly larger difference under the target condition.

It must be borne in mind that the stimuli for clefts and *regret*-sentences are different. In the absence of a comparison based on similar stimuli, there are at least two (mutually compatible) hypotheses: (i) clefts are easier to process because of their presuppositional profile, (ii) clefts are easier to process because the stimuli used in the experiment were more natural, simple, etc. If (i) was the main factor, we would expect to see the difference between clefts and *regret*-sentences decrease in the control condition. Figure 3 does not suggest that there is any difference.

Table 6 Logistic regression for condition and trigger

R pattern: *glm(Score~Condition*trigger, family = "binomial", data = D)*	
binarization 1	binarization 2
interaction: 0.59	interaction: 0.78

Moreover, if we assimilate the ordinal response to a continuous one, it is useful to note that a linear model with scores as the response variable failed to detect any interaction between control and target conditions.[6] More convincingly, two binarizations of the response produced a similar result. We divided the scores into TRUE (FALSE) according to whether they were superior to 4 ($\leq$ 4) (binarization 1) or whether they were superior ($\leq$) to 5 (binarization 2). A logistic regression model was fitted on the two binarizations with *glm*. The results are shown in Table 6. The results obtained by using *lmer* with subjects as random effect with respect to the intercept are practically identical.

Summarizing, the hypothesis that the difference between *regret*-sentences and clefts is due to the presuppositional profile of the two triggers is at best dubious. The alternative hypothesis that the difference is due to other factors is more plausible. Moreover, the two triggers give rise to accommodation in suitable contexts.

4 Discussion

4.1 General Discussion

The goal of the present work was to assess the robustness of the lexical weak/strong distinction based on Abusch's suspension test. The experimental results show that the distinction is not as robust as one may wish, since what is taken to be a characteristic of strong triggers, namely their resistance to accommodation under Abusch's configuration seems to evaporate in the presence of particular contexts. As noted by a reviewer, we did not compare directly strong and weak triggers, so we cannot conclude that the distinction is illusory, since there is always the possibility that some 'weak' triggers behave as strong triggers are predicted to behave. Our conclusion is, accordingly, more modest. We claim that there is at the moment no clear empirical evidence supporting the existence of a separate class of *lexically* or *conventionally* strong triggers and that it is not clear that triggers in general *encode* directly the strength/persistence/likelihood of projection. In contrast, it is possible that lexical information and context interact in certain ways that may produce the illusion of a

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[6] The *lm* function in R with scores as dependent variable and interaction between condition and stimulus type as independent object provides a *p*-value of 0.87 for the interaction. A linear model calculated by *lmer*, with subjects as random effect with respect to the intercept, gave a low *t*-value of -0.187. So, the two models are consistent.

purely lexical distinction. This makes room for various distinctions between triggers, including prototypical weak and strong profiles.

The present results support a more precise claim in line with (Jayez 2014). There are in fact three categories of triggers. With triggers like *discover* or clefts, the presupposition and the main content are not independent of each other. The main content of clefts entails their presupposition: *It's Mary who solved the problem* ⇒ Mary solved the problem (main content) ⇒ someone solved the problem. The situation is the same for *win*: winning ⇒ participating. Concerning *discover* and similar terms, the main content makes the presupposition more probable. It has been noted by Simons (2007) that verbs like *discover* or *realize* imply accessing some evidence that the presupposition is true. In this respect, the examples used by Karttunen and others are similar to examples like (12). In (12), we observe exactly the same behavior as with *discover* and its mates, namely: (i) in positive assertions (12a), the conveyed information strongly implies that Paul missed the point and it is not possible to cancel the latter proposition (12b) and (ii) in suspension environments, there is no longer an implication (12c). With a negation, we have a choice between two interpretations: either we deny the existence of a proof, which amounts to suspending the presupposition in the case of *discover* or we deny that Paul is aware of the truth, which amounts to preserving the presupposition.

(12) a. Paul has a proof/conclusive evidence that he missed the point.
      b. Paul has a proof/conclusive evidence that he missed the point but?? he didn't miss it.
      c. If Paul has a proof/conclusive evidence that he missed the point, . . .

When the main content entails the presupposition or makes it much probable, the very mention of the trigger is sufficient to activate the presupposition, which predicts that the Abusch suspension test will not cause an impression of anomaly, a prediction which was borne out by the results about clefts. It is also expected that triggers for which the main content does not entail the presupposition or make it significantly more probable could be harder to process *in general*. This is compatible with the fact that *regret* had overall a lower score than clefts in our experiment, although, at this stage, it is impossible to exclude a confound with other factors, for instance the semantic content of the stimuli.

Verbs like *regret* or *stop* can be parceled together. The main content is independent from the presupposition. The differences between the triggers come from the relative degree of difficulty they present when a plausible context has to be constructed. For example, one might feel that it is impossible to find a situation similar to that of (2b) for *regret*, but it is only a matter of degree in context abduction, as shown by (13), where no presupposition emerges and the interpretation is that of a vague speculation, in the manner of (2b).

(13) I don't know what is wrong with the guy. Maybe he regrets having the job he has, or the wife he has, or whatever.

Lastly, there is a class of triggers like *too* or *again* that carry only the presupposition, as noted by Abbott (2006). Jayez (2014) argues that what we observe with such

triggers is a side-effect of a very general discourse constraint, studied in (Ducrot 1972; Jayez 2010; Simons et al. 2011). Non-main content information, including presupposition and implicatures is in general not involved in the normal, that is, non-metalinguistic, flow of discourse. For instance, non-main content information is not 'seen' by discourse markers and cannot be used naturally to answer a question. Operators like negation, *if*, question, etc., contradict or suspend the main content. They tend to ignore the non-main content and this what has been called 'projection'. Projection is stronger when the part of the message that carries the main content is distinct from the part that carries the non-main content. This is clearly the case with conventional implicatures, wich are, in general, separate from the main content (Gutzmann 2013; Potts 2005). For instance, expressives like *the stupid* N do not allow for suspension (14). Examples like (14) exhibit the same mechanism as Karttunen's example (6a). Since expressives are endorsed by the speaker, it is impossible for the same speaker to suspend in the ignorance sentence what he endorses in the rest of the discourse.

(14)   I don't know whether Paul is stupid, but, if ??the stupid Paul . . .

Should we then expect that strong triggers behave basically like expressives or similar conventional implicature triggers? There are two sides to the answer. Since the suspension operators target primarily those parts of the message that convey main content information, they tend to ignore other parts, including pure presupposition triggers. This accounts for the fact that we have an impression of automatic ('strong') projection. However, because they are anaphoric,[7] triggers like *too* or *again*, are open to accommodation processes whenever the context provides enough 'independent' cues to make this accommodation plausible, where 'independent' means 'independent from the presence of the trigger itself'. Let us return to the *too* experiment to gain an intuitive understanding of how that would be possible.

When presented with the segment *I don't know whether Paul will go the party because* —, one can expect to find a reason why the speaker is ignorant about Paul's decision or why Paul might not go to the party. Concerning the latter interpretation, it is unlikely that one finds a reason why Paul might go to the party, as evidenced by the contrast in (15).

(15)   a. I don't know whether Paul will go to the party because he does not like
            parties.
        b. ?? I don't know whether Paul will go to the party because he likes parties.

As to the reason why Paul might no go to the party, there are two possibilities. First, Paul might run into some unexpected objective obstacle. For instance, he has missed his train or is sick, etc. Second, Paul might plan not to go although he has the possibility to go. In the first case, there is an independent cause that prevents Paul from going. In the second case, Paul has a reason not to go. Summarizing, we have the following possibilities (Fig. 4).

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[7] This remark does not commit us to the view that every presupposition is anaphoric.

$$\textit{I don't know whether Paul will go to the party because} - \begin{cases} \text{CAUSE OF IGNORANCE of the speaker} \\ \text{CAUSE of Paul not going} \\ \text{REASON for Paul not to go} \end{cases}$$

Fig. 4 Possible families of interpretations after *because*

$$\overbrace{\underbrace{}_{S_1} \qquad \underbrace{}_{S_2} \underbrace{}_{S_3} \underbrace{}_{S_4}}^{S}$$

I don't know whether Paul will go to the party because if Mary goes too it will be embarrassing

Fig. 5 Possible regions of interest in the sentence

Suppose that we divide the sentence into the regions of interest of Fig. 5. In terms of conditional probability, the three possibilities of Fig. 4 are mutually exclusive and can be represented as the probability of a certain interpretation given the region of interest (linguistic segment) that has just been processed. The interpretation proceeds by capitalizing on a growing chain of successive regions of interest (S_1, $S_1 + S_2$, etc.)

At $S_1 + S_2$, the CAUSE OF IGNORANCE interpretation becomes unlikely, since there is no clear relationship between Mary possibly going to the party and the speaker's state of ignorance. So, the CAUSE and REASON interpretations (Paul might hesitate because . . .) are both better candidates. Given that the explicit part of the antecedent in the conditional is the hypothetical proposition that Mary goes to the party, we have two possibilities. Either the conclusion of the antecedent (the situation will be embarrassing) plays a role in allowing subjects to accommodate the missing hypothetical presupposition (Paul goes to the party), or this accommodation is already set at the moment the explicit antecedent (Mary goes to the party) has been processed. Both strategies are *a priori* possible and it is also possible that different subjects apply different strategies. The evaluation experiment does not allow one to tease apart the different processing scenarios. However, it is clear that subjects develop a sort of counterfactual reasoning, which amounts to inferring a reason for Paul for not going to the party from the consequence of two simultaneous events of Paul going and Mary going. How is that possible? Is it a property of the specific sentences we used in the experiment or something more general? Providing a reason for a non-action—here, not going to the party—involves in general a counterfactual reasoning about the possible negative consequences of the suspended action. Suppose for instance that Paul deliberately refrained from signing a document in order to block a project. Paul's non-action does not make much sense if we do not assume that signing the document would have increased the probability that the project is accepted, that is, if we do not take into consideration the effect of the contrary proposition. In the case of (8) and (9), the context makes it clear that one of Paul's goals is to avoid Mary as far as possible. Therefore, one can expect that, for some subjects at least, a counterfactual reasoning is on its way at $S_1 + S_2$ or $S_1 + S_2 + S_3$. So, although it is not possible to be more specific on processing issues (see Jayez and Mongelli (2013) for perspectives on this point), it is very likely that subjects engage at some point in a counterfactual reasoning which helps them abduce the missing presupposition.

4.2   Comparison to Other Work

Recent work by Cummins and colleagues (Cummins et al. 2013; Amaral and Cummins 2014) suggest a partly different picture than the findings reported above. (Jayez 2014) discusses (Cummins et al. 2013) at some length and the remarks made there extend to (Amaral and Cummins 2014) to a large extent. The main goal of these two papers is to investigate experimentally the difference posited by Zeevat (1992) between *resolution* and *lexical* presupposition triggers. Resolution triggers behave like anaphors. They look for a referent already introduced in the context or in the discourse. Lexical triggers refer to a concept whose applicability conditions correspond in part to the presupposition. For instance, the presence of *too*—a resolution trigger—invites one to find a suitable antecedent (an individual or an event), whereas *stop* refers to a transition between two states. The main intuition of Cummins and colleagues is that the negation of the presupposition does not affect a sentence containing a resolution trigger and a lexical trigger in the same way. For resolution triggers, the presupposition is not easily accommodated because it remains 'ambiguous', in Amaral and Cummins 2014 terminology. In contrast, lexical triggers provide more information as to the identity of the presupposition, which makes it more recoverable. Excluding a presupposition with a lexical trigger will affect (negatively) the asserted content, whereas, with a resolution trigger, the relation to the asserted content will remain weak. Accordingly, Cummins and colleagues predict that there are differences in acceptability between the sentence types illustrated in (16) and (17). B's answer in (16) amounts to endorsing the asserted content and refuting the presupposition, whereas C's answer amounts to refuting both. (17) has a similar structure, with a resolution trigger. Since negating the presupposition has more effect with lexical triggers than with resolution triggers, it is expected that C's answer in (16) will be perceived as better than in (17).

(16)   A − Did Mary stop smoking?
        B − Yes, although she never smoked before.
        C − No, because she never smoked before.

(17)   A − Did Mary watch the movie again?
        B − Yes, although she never watched it before.
        C − No, because she never watched it before.

This is indeed what Cummins and colleagues observe on a set of English triggers (Cummins et al. 2013) and their Spanish counterparts (Amaral and Cummins 2014). By and large, their observations and those reported in the present paper are consonant. For instance, in both approaches, *regret* is classified as lexical/weak. It seems that there are three main differences. The first is empirical. Since the experimental settings and the triggers under consideration are different, it is difficult to compare the observations.

The second one has to do with the pre-classification of triggers. the reason why *again* and *still* would be different remains unclear. Intuitively it seems that the presupposition can be very easily accommodated in both cases.[8] For instance, in (17), we accommodate immediately the proposition that Mary has watched the movie before. One might argue that this presupposition is too vague and that we need to know *when* Mary watched the movie (before). But, this would be asking for too much, since a sentence like *I know Mary watched the movie before and watched it again yesterday* is perfectly natural, although the temporal antecedent of *again* is very vague. The results provided by Amaral and Cummins (2014) are of two types. There are means on a five point Likert scale and there are differences between ratings for *Yes, although* and *No, because* patterns. The differences are significant for *lamentar* (*regret*), *seguir* (*continue*), *dejar de* (*stop*) and *todavía* (*still*), whereas they are not for *otra vez* (*again*) and *tambíen* (*too*). However, when we focus on the *Yes, although* pattern, we see that (i) *todavía* gets practically the same score than *otra vez* and *tambíen* and that *lamentar* and *dejar de* do not pattern with *seguir* and *todavía*. In our opinion, this calls for clarification and makes it perhaps difficult to interpret what is going on.

The third difference is a variant of the second. In the Abusch pattern, the content to be accommodated is in general transparent. For instance, in a sentence like *? I don't know whether Mary hit the target before, but if she hit it again, she is really gifted*, it is rather obvious that the proposition to accommodate in the antecedent of the conditional is 'Mary hit the target before'. In this respect, it does not seem possible to explain the difficulties of accommodation with strong triggers in terms of ambiguity or vagueness. The problem is rather with the possibility of the accommodation process itself, given its interaction with discourse coherence.

5   Conclusion

In this paper, we have shown that context plays a crucial role in the perception of the 'projection strength' of triggers, and that, as a result, projection strength can hardly be interpreted as an intrinsic lexical property of the various triggers mentioned in the literature. This is clear with allegedly strong triggers like *regret* or clefts. The situation of *too* is more complex since it is most probably a consequence of several properties, including the fact that it does not carry any main content information, as noted by Abbott, and the facilitation of accommodation under a counterfactual interpretation. Obviously, much work remains to be done, in particular extending the behavioral experiments to other triggers (e.g. factives), exploring the time course of accommodation, and extending the experimental coverage to other languages, as done in (Amaral and Cummins 2014) for Spanish.

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[8] *Too* is a different case, see Jayez (2014).

Appendix

Experimental Items with too for Experiment 1

The context is in boldface

because
Paul et Marie se sont disputés et ne tiennent pas à se retrouver ensemble. Paul est invité à une soirée, où il pense qu'il est possible que Marie ait été invitée.
Je ne sais pas si Paul ira à la soirée parce que, si Marie y va aussi, ce sera très embarrassant.
Julien veut offrir un tee shirt à son neveu pour son anniversaire, mais il a peur que quelqu'un ait eu la même idée.
Je ne sais pas si Julien offrira un tee shirt parce que, si quelqu'un en offre un aussi, ça sera décevant pour son neveu.
Nadine envisage de faire couper le sapin de son jardin, mais il ne resterait plus que celui de son voisin.
Je ne sais pas si Nadine fera couper son arbre, parce que, si son voisin fait aussi couper le sien, il y aura trop de soleil l'été.
La Chine et la Russie veulent éviter une opération militaire contre la Syrie. Il faut que les deux pays donnent leur accord pour que l'intervention ait lieu mais aucun des deux n'est trop sûr du choix que ferait l'autre en cas de crise vraiment grave.
Je ne sais pas si la Chine acceptera une intervention proposée par l'ONU, parce que, si la Russie l'accepte aussi, une opération sera lancée contre la Syrie.
Après la tempête de la veille, Louise est inquiète pour son petit bateau et descend au port avec son chien. Le bateau a l'air plein d'eau et Louise aimerait bien le vider. Le bateau supporterait certainement que Louise ou son chien montent, mais pas les deux.
Je ne sais pas si Louise va monter dans le bateau parce que, si le chien monte aussi, le bateau risque de chavirer.

For *but*, the stimuli are the same, except that *mais* replaces *parce que*. The contexts are strictly identical. For instance, the first stimulus becomes: *Je ne sais pas si Paul ira à la soirée mais, si Marie y va aussi, ce sera très embarrassant*.

Experimental Items for Experiment 2

The context is in boldface

regret

Paul hésite à resigner dans son club parce que ça ne se passe pas très bien avec son président.

Je crois que Paul a resigné dans son club. S'il le regrette plus tard, il ne pourra s'en prendre qu'à lui-même. [control]

Je ne sais pas si Paul a resigné dans son club mais, s'il le regrette plus tard, il ne pourra s'en prendre qu'à lui-même. [target]

Véronique se demande si elle va acheter une voiture plus grosse que celle qu'elle a.

Je crois que Véronique a acheté un modèle plus gros. Si elle le regrette ensuite, ce sera difficile de changer de nouveau. [control]

J'ignore si Véronique a acheté un modèle plus gros mais, si elle le regrette ensuite, ce sera difficile de changer de nouveau. [target]

Céline se demande si elle va signer la pétition pour défendre une collègue de bureau.

Je suis sûr que Céline a signé la pétition. Si elle le regrette après coup, ce sera trop tard. [control]

Je ne sais pas si Céline a signé la pétition mais, si elle le regrette après coup, ce sera trop tard. [target]

Lucien ne sait pas s'il va voter pour le maire en place ou pour sa concurrente.

Je pense que Lucien a voté pour le maire actuel. S'il le regrette par la suite, il ne pourra plus rien y faire. [control]

Je ne sais pas si Lucien a voté pour le maire actuel mais, s'il le regrette par la suite, il ne pourra plus rien y faire. [target]

Ariane s'interroge sur l'utilité de faire couper la haie de son jardin.

Je suis certain qu'Ariane a fait couper la haie. Si elle le regrette dans quelque temps, elle ne pourra pas revenir en arrière. [control]

J'ignore si Ariane a fait couper la haie mais, si elle le regrette dans quelque temps, elle ne pourra pas revenir en arrière. [target]

Nathan ignore s'il va remplacer son gros ordinateur par un portable.

Je pense que Nathan a acheté un portable. S'il le regrette, ce sera trop tard et il devra garder son portable. [control]

Je ne sais pas si Nathan a acheté un portable mais, s'il le regrette, ce sera trop tard et il devra garder son portable. [target]

clefts

Jules est très vaniteux et ne peut s'empêcher de se vanter dès qu'il réussit quelque chose.

Je pense que quelqu'un a trouvé la solution du problème. Si c'est Jules, on n'a pas fini d'en entendre parler. [control]

Je ne sais pas si quelqu'un a trouvé la solution du problème mais si c'est Jules, on n'a pas fini d'en entendre parler. [target]

Une société craint d'avoir été espionnée par ses concurrents. Marie est particulièrement compétente sur les nouveaux projets secrets.

Je suis sûr que quelqu'un nous a trahi. Si c'est Marie, nos concurrents seront très bien informés. [control]

J'ignore si quelqu'un nous a trahi mais, si c'est Marie, nos concurrents seront très bien informés. [target]

Le village a été victime d'un incendie, peut-être dû à un simple court-circuit, après que le village voisin ait été victime d'un pyromane quelques semaines auparavant.

Je crois que quelqu'un a mis le feu. Si c'est le même pyromane que le village voisin, il faudra faire une enquête approfondie. [control]

Je ne sais pas si quelqu'un a mis le feu mais, si c'est le même pyromane que le village voisin, il faudra faire une enquête approfondie. [target]

Un père de famille ne retrouve plus son portable, qu'il doit mettre à jour, et se demande si un membre de la famille l'a emprunté.

Je suis certain que quelqu'un a pris mon portable. Si c'est Emma, il faudra attendre qu'elle rentre du lycée pour que je le mette à jour. [control]

J'ignore si quelqu'un a pris mon portable mais, si c'est Emma, il faudra attendre qu'elle rentre du lycée pour que je le mette à jour. [target]

Un policier se demande quelles sont ses chances de trouver des témoins après une agression.

Je suis convaincu que quelqu'un a été témoin de l'agression. Si c'est la voisine, on va pouvoir l'interroger tout de suite. [control]

Je ne sais pas si quelqu'un a été témoin de l'agression mais, si c'est la voisine, on va pouvoir l'interroger tout de suite. [target]

Un employé n'arrive plus à se connecter à son compte informatique.

Je pense que quelqu'un a changé le mot de passe. Si c'est mon collègue, il n'y a plus qu'à attendre qu'il arrive pour lui demander. [control]

J'ignore si quelqu'un a changé le mot de passe mais, si c'est mon collègue, il n'y a plus qu'à attendre qu'il arrive pour lui demander. [target]

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