Obligatory Triggers under Negation[1]

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Abstract. In this paper, we present two experimental studies which test the different predictions of two theories for the obligatory occurrence of the presupposition triggers "again" and "too" (German "auch" and "wieder") under negation. One theory assumes that "again" and "too" are inserted to avoid a mandatory exhaustivity implicature that contradicts the context. A second theory assumes that the insertion of "again" and "too" follows from a principle *Maximize Presupposition* (Heim 1991). We provide experimental evidence that shows that both triggers are not obligatory under negation. This supports an approach which works with obligatory exhaustivity implicatures and speaks against an analysis using *Maximize Presupposition*.

Keywords: presupposition, implicatures, negation.

1. Introduction

The aim of this paper is to shed new light on the phenomenon of the obligatory use of presupposition triggers. The structure of the paper is as follows. Section 2 provides a theoretical background and outlines two theories on the obligatory insertion of presupposition triggers: *Maximize Presupposition* in section 2.2., and *Obligatory Implicatures* in section 2.3.. In section 3, two experimental studies will be discussed, which tested the obligatoriness of two presupposition triggers under negation. Section 3.1. reports an off-line study on the insertion of the German additive "auch" under negation. Section 3.2. summarizes a study on the insertion of the German iterative "wieder" under negation. Section 4 discusses the results of the two studies. Based on the empirical findings, we suggest that the insertion of "wieder" and "auch" follows from *Obligatory Implicatures*. Furthermore, we argue that presupposition triggers should not be considered a homogeneous class when it comes to their obligatory insertion, given the observations for the insertion of the definite determiner.

2. Theoretical Background

2.1. Obligatory Presupposition Triggers

Presupposition triggers are obligatory when their presupposition is fulfilled in the context, see (1).

(1) a. #A sun is shining.
b. #All of John's eyes are open.

[1]We would like to thank our research assistant Daniel Oesterle for conducting the study on German "auch" under negation.

c. John knows/ #believes that Paris is in France.
d. Bill did, #(too).
e. Today she went ice skating, #(again).

Two different types of approaches to this phenomenon are discussed in the literature. One approach makes use of the maxim *Maximize Presupposition* (Heim 1991). The focus has first been on obligatory definites, as in examples in (1-a) and (1-b). In recent times, the principle has been extended to obligatory occurrences of other triggers as well, as shown by examples in (1-c.) to (1-e.) (Percus 2006, Chemla 2008, Sauerland 2008).
The second type of approach was first introduced to account for the obligatory insertion of additives, as exemplified by (1-d). It makes use of the fact that sentences without "too" yield contrastive/exhaustivity implicatures (Kaplan 1984, Krifka 1999, Saeboe 2004), which can be blocked by inserting "too". This analysis of obligatory additives has been extended to iteratives and factive verbs recently (Bade 2016). This last theory will be taken as a background for the subsequent discussion. The next two (sub)chapters introduce the different mechanisms these two approaches assume behind the obligatory insertion of presupposition triggers.

2.2. Maximize Presupposition

The principle *Maximize Presupposition* was first introduced to account for the contrast in (2). The definite determiner has to be used when its presupposition is fulfilled, the indefinite determiner will result in infelicity.

(2) a. #A father of the victim arrived at the crime scene.
b. The father of the victim arrived at the crime scene.

Heim (1991) observes that (2-a.) and (2-b.) are identical on the level of assertion. Both assert the existence of an individual who is the father of the victim and arrived at the crime scene, see (3).

(3) $\exists x[\text{father-of-victim}(x) \,\&\, \text{arrived-cs}(x)]$

The sentences in (2) only differ with respect to their presuppositions. Whereas (2-b) presupposes that there is one unique father of the victim, see (4) (Heim 2012), (2-a) does not have this presupposition.

(4) $\exists x[\forall y[\text{father-of-victim}(y)] \rightarrow x{=}y]$

The contrast in felicity between the two sentences in (2) cannot be distinguished based on how informative they are. To still account for the contrast, Heim (1991) introduced the following principle:

Maximize Presupposition Make your contribution presuppose as much as possible!

The principle accounts for why (2-b) is preferred over (2-a), it presupposes more. The inference of the indefinite is also explained, via pragmatic reasoning the hearer deduces that the presupposition of the definite does not hold when the indefinite is used. The oddness of (2-a) arises due to the fact that the hearer draws the inference that there is not one unique father of the victim ("antiuniqueness", Heim 1991) which is contradictory to common knowledge.
Recently, the principle has been modified and extended to other presupposition triggers (Schlenker 2012, Sauerland 2008, Percus 2006, Chemla 2008, Singh 2011). More focus was put on the inferences that the sentence without the presuppositional item has. These inferences have been argued to be special since they have characteristics which make them distinct from both implicatures and presuppositions. They have a weak epistemic status but they do also project.
Sauerland (2008) proposes a formulation of the principle *Maximize Presupposition* that there is global pragmatic competition of sentences with regard to their presuppositionality. The account is an extension of his theory on scalar implicatures (Sauerland 2004). Global competition is defined via the set of lexical scales in (5) (Sauerland 2008).

(5) Scales: {the, every, a, both} , {believe, know} , {SG, PL} , {SPEAKER, HEARER} , {PRES, PAST}

The set of alternative sentences is defined in (6).

(6) Alt(S) = {S' | the only difference between S and S' are replacements of one member of one of the sets in *Scales* with another element of the same set}

An alternative sentence must satisfy three conditions to block a sentence with the same assertion: its presupposition must be satisfied (7-a.), it must be true (7-b.) and it must have more presuppositions (7-c.). This is spelled out in his formulation of *Maximize Presupposition* in (7) below.

(7) **Maximize Presupposition** (Sauerland 2008)
Do not use S in context c if there is an S' such that:
a. c $\subset$ domain ($[\![$ S' $]\!]$)
b. you believe S' to be true

c. domain(⟦ S' ⟧) ⊂ domain(⟦ S ⟧)

Not taking the sentence with the strongest presupposition leads to what Sauerland calls an "implicated presupposition", the inference that the presupposition of the competitor is false. Percus (2006), Sauerland (2008) himself and later Singh (2011) and Schlenker (2012) note that complex sentences are a problem for a global version of *Maximize Presupposition*. It cannot account for why triggers are obligatory when their presupposition is locally satisfied, as in (8) and (9) below.

(8) a. If it was raining, John would know it.
b. #If it was raining, John would believe it.

(9) a. Everyone with exactly two students assigned the same exercise to both of his students.
b. #Everyone with exactly two students assigned the same exercise to all of his students.

Alternative proposals have been made which assume that *Maximize Presupposition* applies locally (Percus 2006, Chemla 2008, Singh 2011) and works with lexical scales, where items are ordered with regard to their presuppositional strength.

(10) {the, a} , {know, believe} , {too, ∅}, {again, ∅} , {both, all}

A formulation of the principle *Maximize Presupposition* which makes use of these ordered sets is given in (11).

(11) **Maximize Presupposition (Percus 2006)**
a. Alternatives are only defined for lexical items. For any lexical item, the alternatives consist of all "presuppositionally stronger" items of the same syntactic category.
b. Do not use ϕ if a member of its Alternative Family is felicitous and contextually equivalent to ψ (ϕ is contextually equivalent to ψ iff for all w in the common ground, $\phi(w) = \psi(w)$).

This formulation of the principle accounts for why the presuppositionally stronger item on a scale has to be chosen. The inference arising from using the weaker item ("antipresuppositions", Percus 2006) also arise due to pragmatic reasoning. These new types of inferences have been argued to be distinct from presuppositions and implicatures since they share properties with both, they are epistemically weak but they do project (Sauerland 2008). The latter characteristic is important for the predictions of *Maimize Presupposition* theories regarding the insertion of the trigger under negation.

2.3. Obligatory Implicatures

An alternative proposal was made by Bade (2016), which is based on a grammatical approach to scalar implicatures (Fox 2007, Fox and Hackl 2006, Chierchia et al. 2011). The insertion of the trigger is assumed to be triggered by the fact that sentences are sometimes mandatorily interpreted exhaustively with respect to the Question Under Discussion (QUD) (Roberts 1996). Focus is taken to mark what that QUD is and activates a covert exhaustivity operator with a meaning given in (12) (Fox 2007).

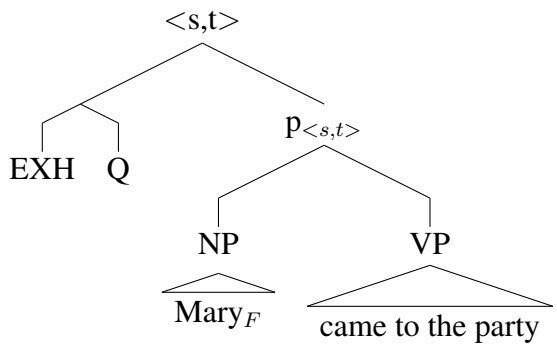
(12) a. $[\![\text{EXH}]\!](A_{<<s,t>,t>})(p_{<s,t>})(w) \Leftrightarrow p(w) \,\&\, \forall q \in NW(p, A): \neg q(w)$
b. $NW(p,A) = \{q \in A: \text{p does not entail q}\}$

The operator takes a proposition and a set of alternative propositions and excludes all alternatives which are not entailed by the proposition as false. The exhaustivity operator is assumed to be responsible for the arising of scalar implicatures (Fox 2007, Chierchia et al. 2011). The present account makes use of the operator to derive particularized conversational implicatures, which are argued to be the driving factor for the insertion of the trigger.
The proposal is motivated by observations of Saeboe (2004) and Krifka (1999) who explain the insertion of additive particles by making use of contrastive focus and contrastive topic. Bade (2016) argues that the mechanism is more general and accounts as well for the insertion of ”again” and ”know”. Inferences arising from not using additives, iteratives and ”know” occur due to the fact that people sometimes interpret sentences exhaustively with respect to the implicit Question Under Discussion (QUD, (Roberts 1996)) according to this view. A background assumption made is that focus marks the QUD (Beaver and Clark 2008). The alternatives the exhaustivity operator works with are defined via the question set, the set of propositions that are possible answers to the QUD (Hamblin 1973, Karttunen 1977). The EXH operator identifies a proposition p as the most informative answer to the QUD, see (13).

(13) $[\![\text{EXH}]\!](Q_{<s,<<s,t>,t>})(p_{<s,t>})(w) \Leftrightarrow p(w) \,\&\,$
$\forall q[q \in Q(w) \,\&\, \text{p does not entail q} \rightarrow \neg q(w)]$

The relevant question is modeled as a covert variable Q that receives its value from the context through the variable assignment function g_c (Heim & Kratzer 1998). The assignment comes with the restriction that the assigned value must be the QUD, see (15-a.). Furthermore there is a restriction that the question set, i.e. the set of possible answers to the QUD, must be a subset of the focus value of the proposition it combines with, see (15-b.) (see Roberts 1996, Rooth 1992).

(14)



(15) a. $[\![\text{Q}]\!]^g = g_C(\text{Q}) = \text{QUD}$
b. $[\![\text{Q}]\!]^o \subseteq [\![\text{p}]\!]^F$

For example, the proposition in (16-a.) will be interpreted as the exhaustive answer to the implicit QUD "Who was at the party?" since the question set of this QUD is a subset of the focus alternatives generated by the sentence, see (16-b.). The result of this exhaustification is given in (16-b.).

(16) Mary$_F$ was at the party.
a. $([\![\text{Who was at the party}]\!])^o \subseteq [\![\text{Mary}_F \text{ was at the party}]\!]^F$
b. $[\![\text{EXH}]\!]([\![\text{Who was at the party}]\!])([\![\text{Mary was at the party}]\!])$ (w)
$\Leftrightarrow$ [Mary was at the party](w) & $\forall$q $\in$ [λp.$\exists$x.p = λw.person(x)(w) & at-the-party(x)(w)]
& Mary was at the party does not entail q $\rightarrow$ $\neg$q(w)]

The principle can explain the obligatory insertion of "too" in the third sentence in (17) straightforwardly.

(17) Peter was at the party. He was enjoying himself. Mary was at the party # (too).

If "too" is left out in the third sentence, it is interpreted exhaustively with respect to the QUD "Who was at the party?" due to the mandatory focus on "Mary". This focus marking and exhaustification is obligatory since "Mary" is the only discourse new information. The result of exhaustification that Mary was the only person at the party is contradictory to the context which establishes that Peter came.
A parallel explanation applies to examples containing "again". "This year" carries obligatory focus in the third sentence in (18). It is thus interpreted exhaustively with regard to the question "When was Peter in Norway". The result of this exhaustification is given in (19).

(18) Peter was in Norway last year. It rained a lot. Peter was in Norway #(again) this year$_F$.

(19) ⟦EXH⟧(⟦When was Peter in Norway⟧)(⟦Peter was in Norway this year⟧) (w)
⇔ [Peter was in Norway this year](w) & ∀q ∈ [λp.∃t.p= λw [time(t)(w) & Peter was in Norway at t in w] & Peter was in Norway this year does not entail q → ¬q(w)]

As before, exhaustification results in a contradiction with the context which yields the oddness of the discourse in (18).
The insertion of a presupposition trigger will prevent this contradiction from arising since it blocks exhaustification. To see this one needs to look at the truth conditions of the third sentence in (18) with "again", see (20) (see Beck 2007).

(20) ⟦ Peter was in Norway $again_{t_1}$ this year ⟧^{w} = is defined only if Peter was in Norway at g(1) and g(1) < this year. If defined, it is true iff Peter was in Norway this year.

In the sentence in (20), g(1) will be mapped onto "last year" since it is the closest antecedent. The definedness conditions of the sentence are only fulfilled when exhaustification is blocked, since the alternative which would be excluded is now presupposed to be true.
A parallel effect is yielded by the insertion of "too" in (21-b.) below.

(21) a. Peter came to the party.
b. Mary came to the party, too.

"Too" also uses the alternatives given in the context, see the interpretation of (21-b.) is given in (22).

(22) ⟦ Mary came to the party, too$_C$ ⟧ = is defined only if ∃p ∈ C & p(w) & p≠ λw. Mary came to the party in w. If defined, it is true iff Mary came to the party in w.

Since the only salient alternative in C in this context is "Peter came to the party", it is presupposed to be true. Hence, the exhaustivity operator does not have to be activated to make use of this alternative and a contradiction does not arise.

3. Experiments

The idea behind the two experiments which will be reported is to test the different predictions of *Maximize Presupposition* and *Obligatory Implicatures* regarding the obligatory insertion of the

German triggers ”wieder” (”again”) and ”auch” (”also”).

3.1. ”Auch” under negation

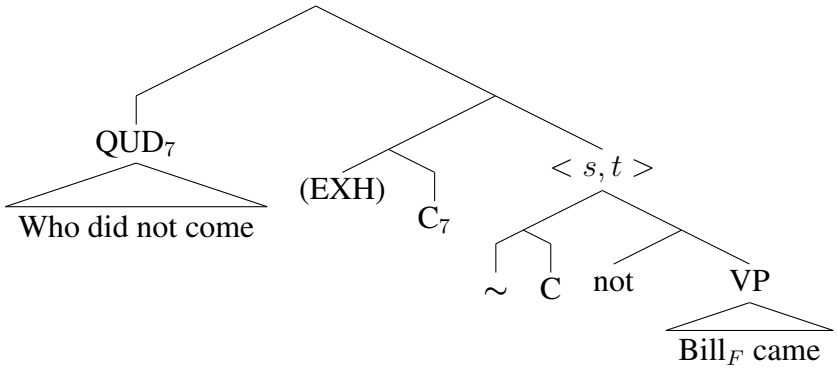
3.1.1. Predictions

According to *Maximize Presupposition* the trigger ”too” is obligatory in (23-c.) since its presupposition if fulfilled by (23-a.). The negated sentence without the trigger (23-b.) violates *Maximize Presupposition* and thus (23-c.) should be preferred. The meaning of (23-c.) is given in (23-d.). The inference arising from using (23-b.) is given in (23-e.). It says that the presupposition of (23-d.) is false.

(23)
a. Mary came to the party.
b. Bill did not come to the party.
c. Bill did not come to the party, too.
d. $[\![$[not [too C] [Bill$_F$ come to the party]] $]\!]$) = λw: $\exists$p [p $\in$ C & p(w) = 1 & p $\neq$ λw.Bill came to the party in w]. Bill did not come to the party in w
e. $\Rightarrow \neg\exists$p [p $\in$ C & p(w) & p $\neq$ λw.Bill came to the party in w]

According to *Obligatory Implicatures* ”too” should be inserted if the sentence in (23-b.) yields an exhaustivity implicature which is contradictory to (23-a.). There are two possible attachment sites for the exhaustivity operator in (23-b.), above and below negation. If the operators is above negation and focus remains on ”Bill”, the QUD must change to ”Who did not come?” to satisfy question-answer-congruence, see (24).

(24)

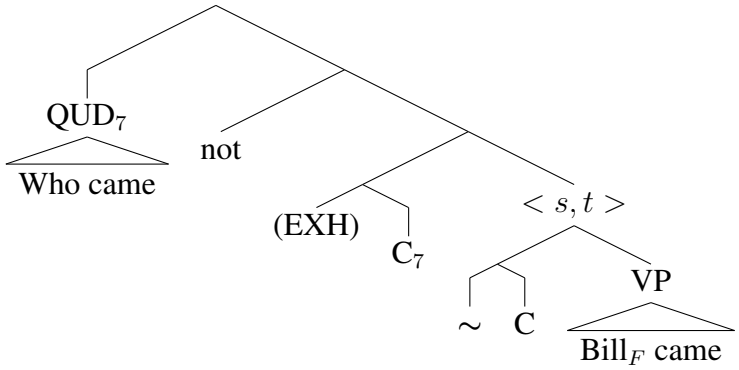


This configuration does not yield an implicature which is contradictory to the fact that Mary came. The result of exhaustification is given in (25), it says that Bill is the only person who did not come.

(25) ⟦ EXH ⟧(⟦ Who did not come to the party ⟧)(⟦ Bill did not come to the party ⟧) (w)
⇔ [Bill did not come to the party](w) & ∀q [q ∈ [λp.∃x.p = λw.person(x)(w) & ¬ at-the-party(x)(w)] & Bill did not come to the party does not entail q] → ¬q(w)]
'Only Bill did not come to the party.'

The second option is that the exhaustivity operator attaches below negation, see (26).

(26)



If focus remains on "Bill", the QUD has to be "Who came to the party?". The corresponding exhaustivity implicature is the one in (27).

(27) ⟦ not ⟧(⟦ EXH ⟧ (⟦ Who came to the party ⟧)(w)(⟦ Bill came to the party ⟧)) ⇔ ¬ [[Bill came to the party](w) & ∀q ∈ [λp.∃x.p = λw.person(x)(w) & at-the-party(x)(w)] & Bill came to the party does not entail q → ¬q(w)]
"It is not the case that Bill was the only person at the party."

For scalar implicatures it has been argued that this reading exists, but that it is limited in its availability and involves meta-linguistic negation (Horn 1989, Chierchia et al. 2011), see (28).

(28) John didn't see Mary or Sue, he saw both. (Chierchia et al. 2011)

For particularized conversational implicatures like (27) this reading seems to be impossible altogether, compare (29).

(29) ??John didn't come to the party, Mary and John came.

Interestingly, inserting the exhaustivity operator below negation should thus be ruled out for par-

ticularized conversational implicatures since it yields an unattested reading. The operator can be inserted above negation but exhaustification does not yield a contradiction with the context. Since the contradiction is the reason for the insertion of the trigger under *Obligatory Implicatures*, the trigger is not expected to be obligatory in (23-b)[2].
In sum, *Maximize Presuppositions* predicts a main effect of leaving out the trigger in both affirmative and negated sentences. In both cases, the version without the trigger should be significantly worse than the version with the trigger. In both cases *Maximize Presupposition* is violated.
For *Obligatory Implicatures*, the predictions are that there is an interaction between having to insert the trigger and polarity of the sentence the trigger could occur in. In negated sentences, leaving out the trigger should be as acceptable as inserting it. In affirmative sentence, inserting the trigger should be significantly more acceptable than leaving it out.

3.1.2. Material and design

Creating the material for an acceptability rating study testing the insertion of "too" under negation is complicated by the fact that "too" and negation are ungrammatical when appearing in one sentence, both in German and in English due to an intervention effect (see Beck 2006, 2016), see (30-a.) and (30-b.) (Oesterle 2015).

(30) Peter came to the party. / Peter ist zur Party gekommen.
   a. #John did not come to the party, too.
   b. #Johannes ist nicht auch zur Party gekommen.

This confounding factor for testing the acceptability of sentences with "too" under negation can be avoided by using high negation like in (31-b.), which is why it was used for the material of the study reported.

(31) a. Peter came to the party.
   b. It is not the case that John came to the party, (too).
   c. It is the case that John came to the party (too).

For the design of the study, the two factors TOO and NEGATION were crossed. The first factor TOO appeared in the conditions "with too" and "without too". The second factor NEGATION appeared in the conditions "with negation" and "without negation". The target thus appeared in four conditions.

[2]There is a third possibility which is not discussed here where negation itself is focused and the question must be a polar one. Exhaustification is not contradictory to the context in this case, either, and thus this datum does not change the predictions of *Obligatory Implicatures*.

A sample item in all four conditions is given below (Oesterle 2015: p.17-18).

(32) Context: Lukas und Melanie sind beide passionierte Kinogänger. Sie haben vereinbart, am Freitag gemeinsam ins Kino zu gehen, wenn sie beide Zeit haben. Lukas hat am Freitag Zeit.
'Lukas and Melanie like to go to the cinema together. They agreed to go to the cinema on Friday, if both have time. Lukas has time to go on Friday.'

a. Es ist nun so, dass auch Melanie am Freitag Zeit hat. Deswegen reservieren die beiden Karten für die Spätvorstellung.
'It is the case that Melanie has time to go on Friday, too. This is why they order tickets for the late show.' (-NEG, +TOO)

b. Es ist nun so, dass Melanie am Freitag Zeit hat. Deswegen reservieren die beiden Karten für die Spätvorstellung.
'It is the case that Melanie has time to go on Friday This is why they order tickets for the late show.' (-NEG, -TOO)

c. Es ist nun nicht so, dass auch Melanie am Freitag Zeit hat. Deswegen überlegen sie sich einen anderen Termin.
'It is not the case that Melanie has time to go on Friday, too. This is why they are trying to find another time.' (+NEG, -TOO)

d. Es ist nun nicht so, dass auch Melanie am Freitag Zeit hat. Deswegen überlegen sie sich einen anderen Termin.
It is not the case that Melanie has time to go on Friday, too. This is why they are trying to find another time.' (+NEG, +TOO)

Participants saw both the context and target on a computer screen and were asked to read the context carefully. They were then presented with the target sentence in one of the conditions in a grey box. They were asked to rate the acceptability of the target within the context on a scale from 1 to 7, where 7 meant "completely acceptable" (Oesterle 2015). They were advised that "acceptable" meant that the sentence made sense in the context and could be uttered by a native speaker.

3.1.3. Results

Oesterle (2015) found a significant interaction between the factors TOO and NEGATION. Without negation, the sentences with "too" were judged significantly better ($p<.01$, M = 5 with "too", M= 3,9 without "too"). With negation, the sentences without "too" were judged better (M = 3,6 without "too", M = 3,5 with "too"). There were significant main effects for both TOO and NEGATION, but in opposite directions. The presence of the trigger generally increased the acceptability of the sentences ($p<.01$), the presence of negation generally decreased the acceptability of sentences

($p<.01$). There was a significant simple effect for negation in the conditions -TOO and +TOO. The +NEGATION condition was significantly worse than -NEGATION both with the trigger ($p<.01$) and without the trigger ($p<.05$). There was no simple effect of TOO for +NEGATION. For +NEGATION there was a significant simple effect, the sentences with the trigger were judged significantly better than without the trigger ($p<.01$).
The results are summarized in the table in 1 below (see Oesterle 2015: p.21-22).

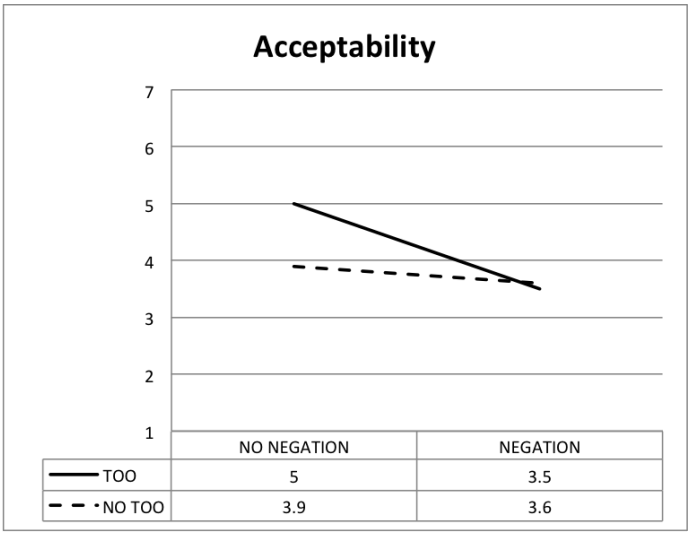


Figure 1: Mean average acceptability for sentences with or without "too" in sentences with or without negation

3.2. "Again" under negation

3.2.1. Idea and predictions

The two theories introduced differ in their empirical predictions for the obligatoriness of "again" in a sentence with negation, see (33-b.). *Maximize Presupposition* predicts the sentence in (33-b.) to be as degraded as (32-b.). *Obligatory Implicatures* predicts (33-b.) to be acceptable as opposed to (32-b).

(33) a. John went to Norway last year.
b. He did not go to Norway this year.

The explanation for this difference in predictions is parallel for the one for "too" discussed above. For *Maximize Presupposition* (33-b.) should be degraded since it has a presuppositionally stronger

competitor with "again" which has not been used, see (34). The speaker via deductive reasoning assumes the presupposition of (33-b.) (given in (34-a.)) to be false, see (34-b.). As for the affirmative case, this should yield a contradiction with (33-a.).

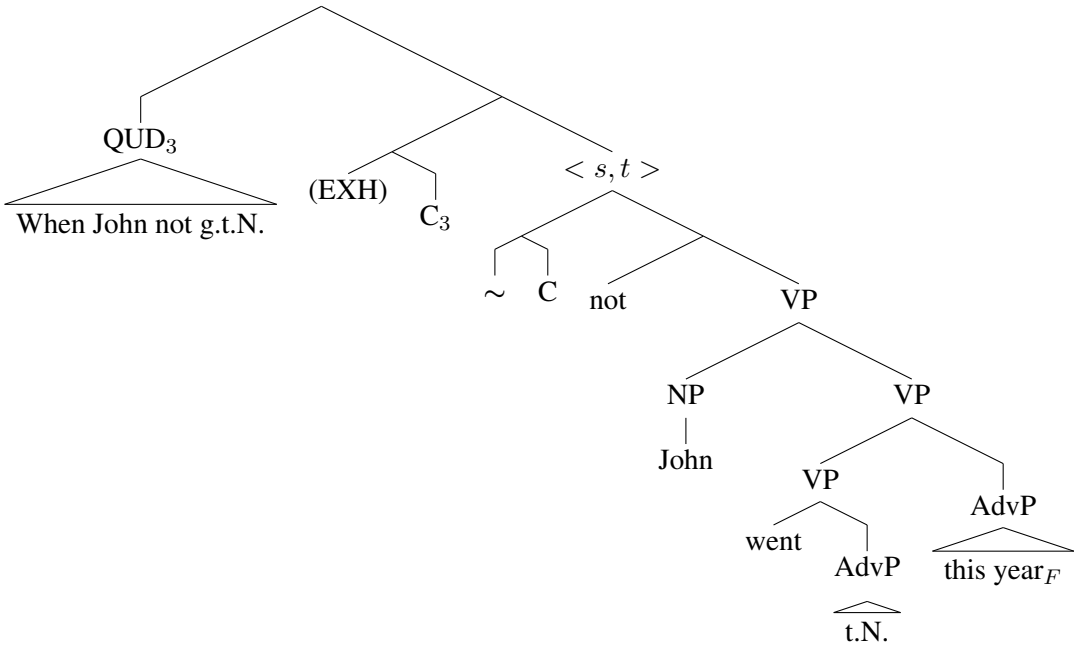
(34) He did not go to Norway this year, again.

a. ⟦ not [[John did go to Norway again$_{t_1}$] this year] ⟧ = λw: John went to Norway in w last year. Joe did not go to Norway this year in w.

b. ¬ John went to Norway in w last year.

Obligatory Implicatures does not predict "again" to be obligatory in (33-b) since the implicature resulting from exhaustifying the QUD does not yield a contradiction. As was discussed for "too" in the last section, there are two syntactic positions for the exhaustivity operator, below and above negation. When the operator has scope over negation, exhaustification does not result in a contradiction, see (35) and its interpretation in (36).

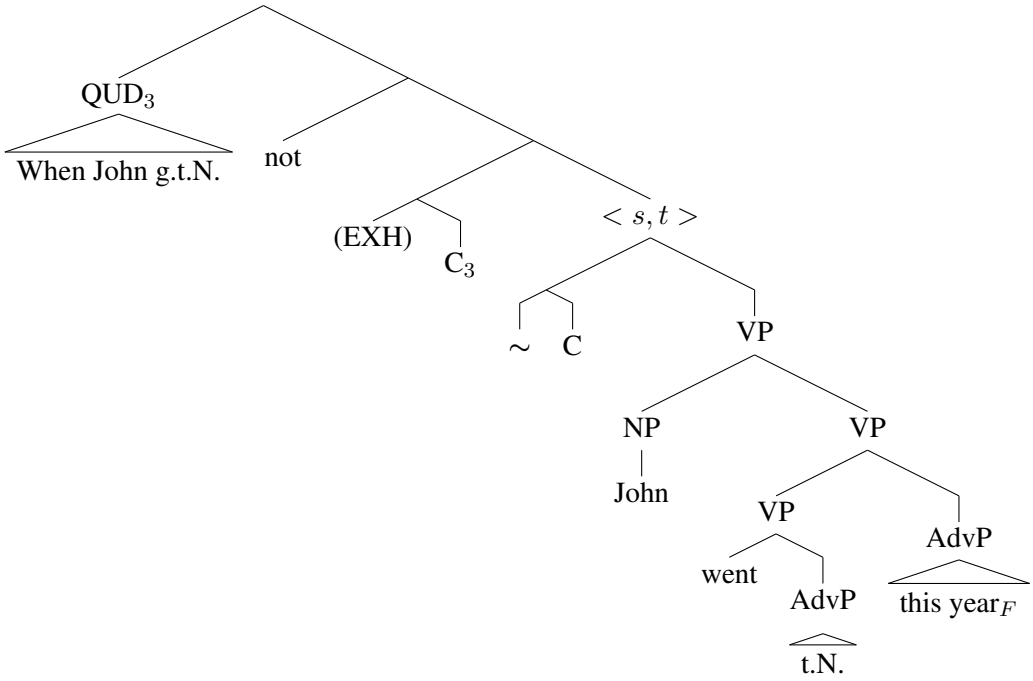
(35)



(36) ⟦ EXH ⟧(⟦When was John not in Norway⟧^{w})(⟦John was not in Norway this year ⟧)(w) ⇔ [John was not in Norway this year](w) = 1
& ∀q [q ∈ [λp.∃t.p = λw [time(t)(w) & John was not in Norway at t in w]] & John was not in Norway this year does not entail q] → ¬q
'This year was the only time John did not go to Norway.'

The LF where EXH has scope below negation should be ruled out for independent reasons since it yields an unattested reading for the sentence with negation, see (37) and the interpretation in (38).

(37)



(38) ⟦ NOT ⟧ (⟦ EXH ⟧(⟦When was John in Norway⟧^{w})(⟦John was in Norway this year ⟧)(w)) ⇔ ¬ [[John was in Norway this year](w) & ∀q [q ∈ [λp.∃t.p = λw [time(t)(w) & John was in Norway at t in w]] & John was in Norway this year does not entail q] → ¬q(w)] # 'It is not the case that only this year John went to Norway.'

Obligatory Implicatures does not predict "again" to be obligatory under negation since its insertion either does not yield a contradiction or is ruled out for independent reasons. Even if the reading was not ruled out, it would not be contradictory to a context where the presupposition of "again" is fulfilled either.

3.2.2. Design and material

For the material, contexts were created that introduced the general setting and two protagonists. One of the protagonists uttered a sentence, see (40). This first utterance always satisfied the presupposition of again. The second target appeared in four different conditions, see (40-a.-d.).

(39) Sonja und Nadine sind Kollegen. Sie unterhalten sich über Freizeitaktivitäten, die sie letzte Woche gemeinsam unternommen haben. Sonja sagt:
'Sonja and Nadine are colleagues. They are talking about activities they did together last week. Sonja says:'

(40) Wir waren am Dienstag schwimmen.
'We went swimming on Tuesday.'

a. Am Freitag waren wir wieder schwimmen.
'We went swimming on Friday, again.' (-negation, +again)

b. Am Freitag waren wir schwimmen.
'We went swimming on Friday.' (-negation, -again)

c. Am Freitag war wir nicht wieder schwimmen.
'We did not go swimming on Friday, again.' (+negation, +again)

d. Am Freitag waren wir nicht schwimmen.
'We did not go swimming on Friday.' (+negation, -again)

A 2x2 design was used for the study which crossed the two factors AGAIN and NEGATION. The second target sentence thus appeared in one of the following four conditions: with "again" and without negation (40-a.), without "again" and without negation (40-b.), with "again" and with negation (40-c.), or with negation and without "again" (40-d.). Six items were created for each condition, making for 24 experimental items in total. In addition the study contained 48 filler items (Bade 2016).

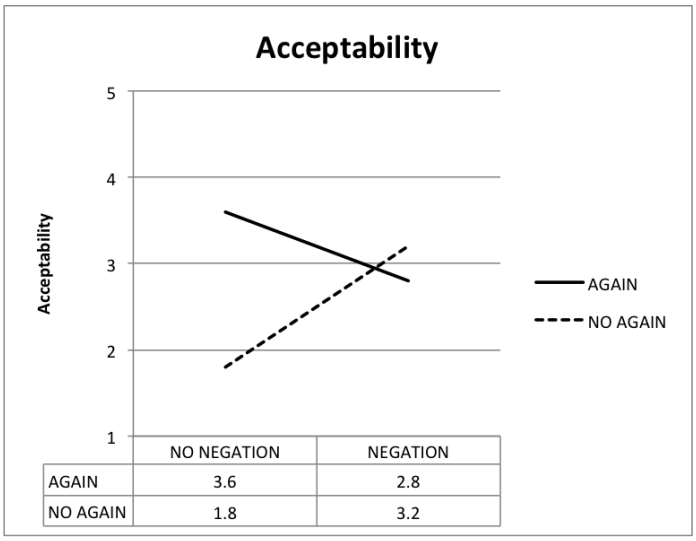
3.2.3. Procedure

The experiment was created using the free software OnExp (Onea Onea). 28 native speakers of German participated in the experiment. They did the experiment on-line (using their own web browser on their home computer), after receiving a link to the experiment. People were asked to read the context carefully and then read the two target sentences, always uttered by a person appearing in the context. The target sentences were presented separately in a gray box on the computer screen. Participants were then instructed to judge the second target sentence in the given context on an acceptability rating scale ranging from 1 to 5 (5 meant completely acceptable).

3.2.4. Results

Analyses were carried out using the R programming language (R Development Core Team) as linear mixed effect models (Baayen et al. 2008), using the program *lmer* (Bates 2005). The fixed factors were AGAIN (present/absent) and NEGATION (present/absent). Random factors were subjects

and items. Additionally, models with random slopes for both subjects and items were calculated. When an ANOVA revealed a significant difference between the models, the more complex one was chosen.
A significant interaction was found between the factors AGAIN and NEGATION ($p<.01$). Furthermore, highly significant simple and main effects were found for both factors (all $p<.01$). Whereas without negation the acceptability of the sentence significantly increased with the insertion of again (M=1,76 without "again" and M=3,64 with "again"), it decreased the acceptability of sentences with negation (M=3,18 without "again" and M=2,8 with "again"). The results are summarized in 2 below (Bade 2016).



	NO NEGATION	NEGATION
AGAIN	3.6	2.8
NO AGAIN	1.8	3.2

Figure 2: Mean acceptability of sentences with "again" and with negation, with "again" and without negation, without "again" and without negation, without "again" and with negation

4. Discussion

The findings overall support the view of *Obligatory Implicatures* on the obligatory insertion of the triggers "again" and "too". According to *Maximize Presupposition*, sentences should be worse without the triggers, regardless of negation. Even though there was the predicted main effect of the insertion of the trigger, there was also a significant interaction which is unexplained by *Maximize Presupposition*. With negation, the acceptability of sentences did not improve with the insertion of "too" whereas in affirmative sentence the acceptability significantly increased with inserting the trigger. For "again", the acceptability of sentences with "again" even decreased in the presence of negation. Following *Obligatory Implicatures*, this could be due to the fact that both "again" and negation give contradicting signals as to what is at issue. Whereas "again" seems to suggest a QUD of the form "When did something happen", negation suggests that a polar question needs to be answered.
The fact that "again" and "too" are not obligatory under negation speaks in favor of *Obligatory*

Implicatures. However, what about presuppositional determiners? Without further empirical evidence, it is clear that definites are obligatory, irrespective of whether the sentence is negated, see (41).

(41) a. #A father of the victim did not arrive at the crime scene.
b. The father of the victim did not arrive at the crime scene.

Inserting the trigger in (41-b.) does not seem to be a result of an obligatory implicature of (41-b.) (see Bade (2016) for extensive discussion), it is thus not in the range of phenomena to be explained based on *Obligatory Implicatures*. A possible conclusion is that *Maximize Presupposition* is a principle that applies to morphological features (including definiteness) which require one or the other setting. It thereby necessarily applies locally which makes a distinction between local and global versions of *Maximize Presupposition* superfluous. Triggers thus fall into two classes with regard to their obligatory insertion. The obligatory insertion of the triggers "too" and "again" is a global pragmatic mechanism based on *Obligatory Implicatures*. The obligatory insertion of definite determiners and other features is a local mechanism based on the principle *Maximize Presupposition*. Both principles should remain in the inventory of mechanisms grammar has to offer.

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