High Negation in Subjunctive Conditionals and Polar Questions[*]

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Abstract. In certain environments, negation does not anti-license Positive Polarity Items in English and can precede definite noun phrases in German. Instances of negation with these characteristics are labeled 'high' negation. There are two environments where high negation –as opposed to regular, 'low' negation– has been argued to correlate with an additional meaning effect: mandatory counterfactuality in subjunctive conditionals and obligatory epistemic bias in polar questions. Analyses of high negation in the literature have targeted one construction or the other, but not both. The present paper provides an unified analysis of high negation that derives its interpretive effects in both environments.

Keywords: negation, high negation, subjunctive conditional, polar question, VERUM, counterfactuality, epistemic bias

1. Introduction

It is known that negation anti-licenses Positive Polarity Items (PPIs) in its immediate scope in English (Ladusaw 1979) and that it cannot precede definites (and other expressions) in German (Schwarz 2004). For example, to convey the scopal reading $\neg > \exists$ in English, we can use (1a) but not (1b) (unless the latter is used as a denial, as we will later see). Similarly, in German, the normal way to express the proposition "It is not the case that Fritz answered question 3" is (2a); (2b) is inappropriate (again, unless used as a denial). Instances of negation with these properties will be referred to as 'low negation' in this paper.

(1)   a. John did**n't**$_{Low}$ call anyone.
      b. John didn't call someone. $* \neg > \exists$ (unless as denial)

(2)   a. Fritz hat <u>Frage 3</u>   **nicht**$_{Low}$ beantwortet.
         Fritz has question 3 not   answered
         'Fritz didn't answer question 3.'
      b. # Fritz hat nicht Frage 3   beantwortet.   (# unless as denial)
          Fritz hat not   question 3 answered

However, in certain environments, negation does not anti-license PPIs in English and can precede definites in German: (3)-(4) (Schwarz 2004, Szabolcsi 2004).[1] Instances of negation with these properties will be referred to as 'high negation'.

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[1] The versions of (3) and (4) with low negation and NPIs are grammatical too.

(3)   a. I am surprised that John did**n't**_{High} call <u>someone</u>_{PPI}.   (Szabolcsi 2004)
        b. Every boy that did**n't**_{High} call <u>someone</u>_{PPI} was doomed.
        c. If we do**n't**_{High} call <u>someone</u>_{PPI}, we are doomed.

(4)   a. Wir waren überrascht, dass Fritz **nicht**_{High} <u>Frage 3</u>   beantwortet hat. (Schwarz
2004)

           We were surprised   that Fritz not   questions 3 answered   has
           'We were surprised that Fritz didn't answer question 3.'
        b. Wir haben jeden   abgelehnt, der **nicht**_{High} <u>Frage 3</u>   beantwortet hat.
           We have everyone rejected   who not   question 3 answered   has
           'We rejected everyone that didn't answer question 3.'
        c. Wenn Hans **nicht**_{High} <u>Frage 3</u>   beantwortet, wird   er abgelehnt.
           If   Hans not   question 3 answers,   is.PASS he rejected
           'If Hans doesn't answer question 3, he will be rejected.'

It has been proposed that what characterizes the environments allowing for high negation is downward monotonicity (or, more generally, whatever property of a context is responsible for licensing the occurrence of NPIs) (Krifka 1992, Szabolsci 2004): (5).

(5)   High negation is allowed iff it appears in a downward entailing context.

However, there are two constructions where downward monotonicity does not suffice to license high negation. That is, there are two constructions where, though they are downward entailing (in the broader sense), high negation correlates with the presence of a strong additional effect. These constructions are subjunctive conditionals and polar questions. We will see them in turn.[2,3]

We start with **subjunctive conditionals**. High (as well as low) negation is felicitous in counterfactually used subjunctive conditionals like (6) and (7). However, it is known that the message of antecedent falsity is not an entailment or a presupposition of subjunctive conditionals, but a cancellable implicature, being absent in examples like Anderson's (1951) (8). What happens when we use negation in an Anderson-style example? While low negation is licit in Anderson-style examples, high negation is not, as shown by the contrast between the (a) and (b) versions in (9)-(10) (Meibauer 1990, Schwarz 2004, Schwarz and Bhatt 2006, Ippolito and Su 2009). Based on this observation, antecedent falsity in subjunctive conditionals has been argued to be uncancellable in the presence of high negation, as stated in (11).

(6)   Good that there was oil in the tank! If there had**n't**_{High} been <u>some</u>_{PPI} oil in the tank, the
        furnace would have exploded.

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[2] Subjunctive conditionals are Strawson-downward entailing under a strict conditional semantic analysis (von Fintel 1999). As for polar questions, van Rooij (2003) generalizes the notion of strength underlying downward monotonicity into that of maximal entropy, providing a unified account of NPI licensing in assertions and questions.

[3] Schwarz and Bhatt (2006:§4.2) note that low and high negation are not fully interchangeable in (4b) either. They speculate that high negation must, but low negation need not, introduce a new non-accidental generalization.

(7)   (Good that Fritz answered question 3! …)
        Wenn er **nicht**High Frage 3   beantwortet hätte, wäre   er durchgefallen.
        If   he not   question 3 answered   had, would-be he failed
        'If he hadn't answered question 3, her would have failed.'

(8)   If Jones had taken arsenic, he would have shown the symptons that he indeed showed.
        So, it is likely that he took arsenic.   (Anderson 1951)

(9)   a. If there had**n't**Low been any / had been **no**Low oil in the tank, the furnace would have
           made exactly the noise that it in fact did. So, it's likely that the tank was empty.
        b. # If there had**n't**High been some_PPI oil in the tank, the furnace would have made exactly
           the noise that it in fact did. So, it's likely that the tank was empty.

(10)   A: Why, you think, has Fritz failed?
        B: I'm not sure, but …
        a. … wenn Fritz Frage 3   **nicht**Low beantwortet hätte, wäre   er durchgefallen.
           ... if   Fritz question 3 not   answered   had, would-be he failed
           '... if Fritz hadn't answered question 3, he would have failed.'
        b. # … wenn Fritz **nicht**High Frage 3   beantwortet hätte, wäre   er durchgefallen.
             ... if   Fritz not   question 3 answered   had, would-be he failed

(11)   [If_SUBJ [NEG_HIGH p], q] is acceptable only if interpreted counterfactually, i.e., only if p is
        taken to be true.

Following a suggestion in Schwarz (2006), Ippolito and Su (2009) propose that NEG_HIGH in (11)
associates with a factive operator FACT presupposing that its complement (e.g. "there was some
oil in the tank" in (9b)) is true. The structure is shown in (12). FACT shields the PPI from the anti-
licensor NEG_HIGH.[4,5]

(12)

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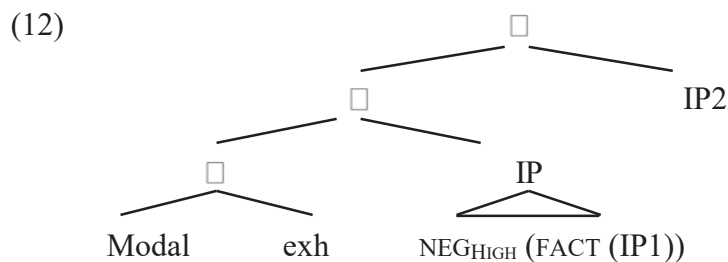
[4] Ippolito and Su (2009) also argue that high negation correlates with non-cancellable conditional strengthening, a
correlation that they capture by introducing the operator *exh* (i) into the structure (12). Though we will not pursue
this point, Ippolito and Su's *exh* can be incorporated into the analysis to be developed in the present paper.
(i)   ⟦exh⟧   = $\lambda Q_{<st,<st,t>>}.\lambda p.\lambda q. Q(p)(q)=1 \wedge \forall(q)(p)=1$
[5] After the research for the present paper was completed, a modified version of the original analysis by Ippolito and
Su (2009) appeared in Ippolito and Su (2014). While their new analysis merges exh and NEG_HIGH in one single
L(ight) N(egation) operator, the features and predictions of their analysis that are crucial for us remain the same.

We turn now to **polar questions**. Polar questions, while being information-seeking, can be used in an unbiased way, as in (13), or in a biased fashion, as in (14S), which conveys a speaker bias for the proposition "that Jane is not coming". What happens when we use negation in a polar question? Both low and high negation are acceptable in a biased context: (15S) with low negation and (15S') with high negation convey a speaker bias for the proposition "that Jane is coming".[6] But in an unbiased context like (16), the low negation question (16S) is appropriate while the high negation question is not. That is, while low negation can but need not convey an epistemic bias, high negation mandatorily conveys it (Ladd 1981, Romero and Han 2004). The same holds for the German versions in (17). The empirical generalization is summarized in (18).

(13)   Scenario: The speaker has no previous belief on whether Jane is coming or not.
         S: Is Jane coming?

(14)   A: We can't leave yet. We have to wait for Jane.   S: Is she really coming?

(15)   A: We are all here. Let's go!   S: Is Jane NOT coming?   S': Isn't Jane coming?

(16)   Scenario: The speaker is organizing rides after a party and is looking for people that
         didn't drink alcohol that night. The speaker is going through the list of guests. She has no
         previous belief or expectation about what they drank.
         A: Jane and Mary did not drink.
         S: OK. What about John? Did he **not**$_{Low}$ drink any alcohol?
         S': # OK. What about John? Did**n't**$_{High}$ he drink some$_{PPI}$ alcohol?

(17)   a. Hat Hans Maria **nicht**$_{Low}$ gesehen?
            Has Hans Maria not   seen   'Did Hans not see Maria?'
         b. Hat Hans **nicht**$_{High}$ Maria gesehen?"
            Has Hans not   Maria seen   'Didn't Hans see Maria?'

(18)   *[Q NEG$_{HIGH}$ p]* is acceptable only if interpreted as a biased question, i.e. only if interpreted
         as conveying the speaker's epistemic bias towards *p*.

Romero and Han (2004) derive the epistemic bias described in (18) from the presence of the operator VERUM, as shown in (19)-(20). VERUM shields the PPIs from the anti-licensor NEG$_{HIGH}$.

(19)

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                        CP
                       /  \
                      Q    IP
                          / \
              NEG_HIGH (VERUM (IP))
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NEG$_{HIGH}$ (VERUM (IP))

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[6] Throughout the paper, relevant instances of focus will be marked in capitals.

(20)　　$[\![VERUM]\!]$ = $\lambda p_{<s,t>}.\lambda w_s. \forall w' \in Epi_x(w) [\forall w'' \in Conv_x(w') [p \in CG_{w''}]]$

The **goal** of this paper is to provide an unified analysis of the special meaning effect associated with high negation in subjunctive conditionals and polar questions. The two obvious lines to explore are: (i) exporting the operator FACT from subjunctive conditionals to polar questions, and (ii) exporting VERUM from polar questions to subjunctive conditionals. Line (i) would yield the wrong result: (15S') and (17b), though biased towards *p*, are information-seeking questions and do not presuppose *p*. We will thus pursue the VERUM line. We will see that the empirical generalization (11) on subjunctive conditionals is too strong: rather than the factive presupposition that *p* is true, the correct generalization involves the weaker notion of epistemic bias towards *p*, thus leaving open the path to a unified analysis within the VERUM line.

The rest of the paper is organized as follows. In section 2, we will examine the behavior of so-called Common Ground (CG) management operators. Section 3 elaborates on previous analyses of high negation in polar questions. Section 4 presents a new proposal for high negation in subjunctive conditionals. Section 5 concludes.

2. CG-managing operators

Certain items, like the German discourse particle *ja* in (21), have been argued to indicate the C(ommon) G(round) status of the uttered proposition. We will call this information "CG-management content" (Repp 2013; see also Krifka 2008), remaining agnostic as to whether it is a conventional implicature (CI) (Kratzer 1999), a presupposition (Kaufmann 2010) or neither.

(21)　　Discourse particle *ja* :
　　　　a. At-issue content:　　$\lambda p_{<s,t>}.p$
　　　　b. CG-man. content:　　$\lambda p_{<s,t>}.$ speaker thinks that addresse might know that p

Key to our analysis will be the CG-managing operators VERUM and FALSUM. VERUM has as overt reflexes the particle *really* and focus stress (typically) on the finite verb, as exemplified in the declarative clauses in (22) (Höhle 1992, Romero and Han 2004). Intuitively, VERUM is used to communicate that the speaker is certain that the proposition *p* that it combines with should be added to the Common Ground (CG). VERUM is defined by Romero and Han (2004) in (20) and treated as a CG-managing operator in Repp (2013). We combine these ideas into the lexical entry (23). The CG-management content of [VERUM IP] will be abbreviated as FOR-SURE-IN-CG(*p*), where *p* is the proposition expressed by IP.

(22)　　a. John REAlly IS dead.　　　　　　　　b. John IS dead.

(23)　　VERUM:
　　　　a. At-issue content:　　$\lambda p_{<s,t>}. p$
　　　　b. CG-man. content:　　$\lambda p_{<s,t>}.\lambda w_s. \forall w' \in Epi_x(w) [\forall w'' \in Conv_x(w') [p \in CG_{w''}]]$
　　　　b'. Paraphrase: "x is sure that, in all the worlds satisfying x's conversational goals, p is added to the CG".
　　　　b''. Abbreviation: FOR-SURE-IN-CG(p)

FALSUM is the polar antonym of VERUM, conveying that the speaker is certain that the proposition *p* that it combines with should *not* be added to the Common Ground. In declarative clauses it appears e.g. in denials like (24B), which is analyzed as (24c) by Repp (2013). We propose the lexical entry for FALSUM in (25), where (25b) is from Repp (2013) and (25a) is our innovation. The CG-management content of [FALSUM IP] will be abbreviated as FOR-SURE-NOT-IN-CG(p). Note that negation in denials, i.e. FALSUM, does not anti-license PPIs, as shown in (24B).

(24)   A: He found something.   (Szabolcsi 2004)
        B: Wrong! He DIDn't find something. $\checkmark \neg > \exists$
        c. [ASSERT [FALSUM [he found something]]

(25)   FALSUM:
        a. At-issue content: $\lambda p_{<s,t>}. \neg p$
        b. CG-man. content: $\lambda p_{<s,t>}.\lambda w_s. \forall w' \in Epi_x(w) [\forall w'' \in Conv_x(w') [p \notin CG_{w''}]]$
        b'. Paraphrase: "x is sure that, in all the worlds satisfying x's conversational goals, p is not added to the CG".
        b''. Abbreviation: FOR-SURE-NOT-IN-CG(p)

Two important properties of CG-managing operators are the following. First, according to Repp (2013:8), CG-management content is semantically embeddable under illocutionary operators, e.g. ASSERT and the question morpheme Q. We propose that such semantic embedding takes place at the CG-management tier. We implement this idea by doubling the standard denotation of Q as at-issue and as CG-management content, as in (26), and letting the CG-management contents of VERUM/FALSUM and Q combine.[7]

(26)   Q-morpheme:
        a. At-issue content: $\lambda p_{<s,t>}. \{p, \neg p\}$
        b. CG-management content: $\lambda p_{<s,t>}. \{p, \neg p\}$

Second, GC-management content is not semantically embedded in the at-issue tier. Hence, if a CG-management item appears syntactically in a non-root environment, as in (27), its meaning contribution will not be part of the at-issue content of the *because*-clause. The same holds if the CG-management item appears in a polar question or in the antecedent of a conditional: it will not contribute to the at-issue content of either.

(27)   Karl hat seinen Job verloren, [CP weil   er **ja** in der Gewerkschaft war].
        Karl has his   job lost,   because he JA in the union   was
        'Karl lost his job [CP because <u>he was</u> JA <u>in the union</u>]'

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[7] This means that we depart from Potts' (2005) logic for conventional implicatures in two (independently attested) ways (McCready 2010): we treat Q as introducing both at-issue and CG-management content, comparably to *Kraut* in (i.a), and we let CG-management content be modified by CG-management content, comparably to (i.b).

(i)   a. He is a Kraut. (= 'He is German' plus pejorative flavor)   b. Totally ouch (, dude).

3. High negation in polar questions

In this section we modify the analysis of biased polar questions in Romero and Han (2004). Their original approach faces two problems. First, there is a mismatch between the propositions predicted to be in the question denotation and the meaning of the actual answers (**problem A**) (Romero 2006). Second, there is no independent motivation for the scopal configuration ¬VERUM they postulate (**problem B**) (AnderBois 2011). By adding two innovations from section 2 – namely, the operator FALSUM and the separation between at-issue and CG-management content – these two problems will be circumvented. We examine epistemic bias in positive polar questions in section 3.1 and epistemic in bias polar questions with high negation in section 3.2.

3.1. Positive polar questions with *really* and focus stress

Romero and Han (2004) assign the polar interrogative clauses in (29a,a'), with the particle *really* and focus on the finite verb, the Logical Form (LF) representation in (29b). Their original unidimensional lexical entry for VERUM is repeated in (28) (=(20)), contributing solely to the at-issue content. This produces the Hamblin-style question denotation in (30).

(28) $[\![\text{VERUM}]\!] = \lambda p_{<s,t>}.\lambda w_s. \forall w' \in \text{Epi}_x(w) [\ \forall w'' \in \text{Conv}_x(w') [\ p \in \text{CG}_{w''}]\ ]$
        (=(20))

(29)   a. Is Jane really coming?
        a'. IS Jane coming?
        b. LF: [Q [VERUM [Jane is coming]]]

(30)   At-issue content: { FOR-SURE-IN-CG(Jane is coming),
                                ¬FOR-SURE-IN-CG(Jane is coming) }

Now, assuming that the at-issue content (30) provides the cells of the partition the addressee is requested to choose from, the wrong answer meaning is derived. The answer 'yes' would correspond to the cell FOR-SURE-IN-CG(Jane is coming) and the answer 'No' to the cell ¬FOR-SURE-IN-CG(Jane is coming), as indicated in (31). While one could argue about the first result, the second prediction in clearly wrong. The answer 'No' to (29a) is predicted to convey that the addressee is not fully convinced about the appropriateness of adding *p* (= "Jane is coming") to the CG, while intuitively it conveys a stronger meaning, namely that the speaker endorses ¬*p*.

(31)   a. Yes = FOR-SURE-IN-CG(Jane is coming)
        b. No   = ¬FOR-SURE-IN-CG(Jane is coming)

By adopting the bidimensional lexical entry for VERUM in (32) (=(23a,b)), the answer pattern can be appropriately accounted for. From the LF in (29b), we obtain the at-issue question meaning in (33a) and the CG-management question meaning in (33b). The at-issue content (33a) provides

the cells of the partition to be chosen from, corresponding to the answers 'Yes' and 'No', as indicated in (34). This solves problem A: The 'Yes' answer corresponds to the cell (*Jane is coming*) and the 'No' answer to the cell ¬(*Jane is coming*).

(32) VERUM: (=(23))
     a. At-issue content: $\lambda p_{<s,t>}.$ p
     b. CG-man. content: $\lambda p_{<s,t>}.\lambda w_s.\ \forall w' \in Epi_x(w)\ [\ \forall w'' \in Conv_x(w')\ [\ p \in CG_{w''}\ ]\ ]$
                               Abbreviated: FOR-SURE-IN-CG(p)

(33) a. At-issue content: { Jane is coming, ¬(Jane is coming) }
     b. CG-man. content: { FOR-SURE-IN-CG(Jane is coming),
                            ¬FOR-SURE-IN-CG(Jane is coming) }

(34) a. Yes = Jane is coming   b. No = ¬ (Jane is coming)

Besides the at-issue partition in (33a), a second partition is carried out as part of the CG-management content.[8] This second partition is the one responsible for deriving the epistemic bias, à la Romero and Han (2004). In a nutshell, the speaker wonders – though does not ask – whether the addressee has fully convincing evidence for adding *p* to the CG, suggesting that the speaker is biased towards ¬*p* and would need strong evidence to be convinced that *p* should be added to CG.[9]

3.2. Negative polar questions with high negation and PPIs

Romero and Han (2004) argue that preposing of negation signals the presence of VERUM. Furthermore, when a PPI is present, negation scopes over the VERUM operator, producing the scopal relation ¬VERUM. This generates for (35a) the LF (35b). Applying their original

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[8] The status of this second, expressed but unasked question could be compared to that of German matrix verb-final questions, illustrated in (i.a). Such questions, often labeled 'deliberative' questions, convey the state of wondering of the speaker without positing a question to the addressee, in contrast to matrix V2 interrogatives like (i.b), which request an answer from the addressee (Truckenbrodt 2004). A related case is Japanese Speaker-Oriented Embedded Questions like (ii): (ii) asserts that the ground is wet and conveys that the speaker is wondering whether it rained, which is treated as a not-at-issue, conventionally implicated question (Tomioka 2014). A possible way to distinguish asked vs. conventionally implicated questions would be to distinguish between the common public QUD stack (for at-issue questions) and the speaker's public QUD stack (for conventionally implicated questions). See footnote 11.
(i)   a. Ob   sie morgen   kommt?   [German]
        If/whether she tomorrow comes   'Whether she'll come tomorrow, I wonder.'
      b. Kommt sie morgen?
        Comes she tomorrow?   'Will she come tomorrow?'
(ii)   [Ame-ga hut-ta-no-ka]   jimen-ga   nurete-iru.   [Japanese]
        rain-Nom fall-Past-NML-Q ground-Nom wet-Prog   '[Whether it rained], the ground is wet.'

[9] The existence of an epistemic bias is derived as an implicature from the Principle of Economy in (i), where a meta-conversational move is e.g. to question a move. See Romero and Han (2004) for details. To explain the uncancelability of this bias, Lauer (2014) treats it as a 'Need a Reason" implicature.
(i)   Do not use a meta-conversational move unless necessary (to resolve epistemic conflict or to ensure Quality).

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unidimensional lexical entry for VERUM, the at-issue question meaning in (36) is obtained.

(35)   a. Isn't Jane coming too?
        b. LF: [Q [¬ VERUM [Jane is coming]]]

(36)   At-issue content: { FOR-SURE-IN-CG(Jane is coming),
                                 ¬FOR-SURE-IN-CG(Jane is coming) }

The partition in (36) leads again to problem A. Assuming that the answer 'Yes' picks a positive proposition from the partition and the answer 'No' a negative one (Kramer & Rawlins 2010, Holmberg 2013), the wrong meaning is derived for the answers: (37). While the 'Yes' answer may be argued to correspond to the FOR-SURE-IN-CG(Jane is coming) cell, the 'No' answer is assigned too weak a meaning. It is predicted to express that the addressee is not fully convinced about the appropriateness of adding p (= "Jane is coming") to the CG. But, again, the 'No' answer intuitively communicates the stronger meaning that the speaker endorses $\neg p$.

(37)   a. Yes = FOR-SURE-IN-CG(Jane is coming)
        b. No   = ¬FOR-SURE-IN-CG(Jane is coming)

Furthermore, the analysis in (35) leads to problem B: the meaning ¬VERUM postulated for high negation in (35a) is not attested in other environments. Most evidently, high negation in a denial like (38B) does not have the reading (38d), which would arise if (38c) was a possible LF.

(38)   A: Jane is coming too.
        B: Jane ISN'T coming too.
        c. LF: [¬ VERUM [Jane is coming]]
        d. ¬FOR-SURE-IN-CG(Jane is coming)

Both problems are avoided if preposed negation followed by a PPI is treated as FALSUM under its bidimensional lexical entry (39) (=(25a,b)). This yields the LF representation (40b) for sentence (40a), and the corresponding bidimensional meaning contribution in (41).

(39)   FALSUM: (=(25a,b))
        a. At-issue content: $\lambda p_{<s,t>}. \neg p$
        b. CG-man. content: $\lambda p_{<s,t>}.\lambda w_s. \forall w' \in Epi_x(w) [\forall w'' \in Conv_x(w') [p \notin CG_{w''}]]$
                                Abbreviated: FOR-SURE-NOT-IN-CG(p)

(40)   a. Isn't Jane coming (too)?
        b. LF: [Q [FALSUM [Jane is coming]]]

(41)   a. At-issue content: { ¬(Jane is coming), ¬¬(Jane is coming) }
                                That is: { Jane is coming, ¬(Jane is coming) }
        b. CG-man. content: { FOR-SURE-NOT-IN-CG(Jane is coming),

¬FOR-SURE-NOT-IN-CG(Jane is coming) }

This move circumvents the problems A and B above. With respect to problem A, the right meaning of answers is derived from the at-issue content: the 'Yes' answer corresponds to the positive proposition from the at-issue partition (41a) and the 'No' answer to the negative one, as indicated in (42). With regard to problem B, interpreting high negation with a PPI not as negation scoping over VERUM but as a single, bidimensional operator FALSUM allows for a unified treatment of high negation in polar questions and declaratives. Parallel to the polar question (40), the denial in (43) receives the LF representation in (43c). The resulting at-issue content communicates the speaker's endorsement of $\neg p$ (with p = "Jane is coming") and the CG-management content conveys that the speaker is sure that p should not be added to the CG.

(42)   a. Yes = Jane is coming   b. No = ¬(Jane is coming)

(43)   A: Jane is coming too.
        B: Jane ISN'T coming too.
        c. LF: [FALSUM [Jane is coming]]
        d. At-issue content: ¬(Jane is coming)
        e. CG-management content: FOR-SURE-NOT-IN-CG(Jane is coming)

Finally, the CG-management content (41b) derives the epistemic bias in a way parallel to the previous case: the speaker wonders – though does not ask – whether the addressee has fully convincing evidence for not adding p to the CG, suggesting that the speaker is biased towards p and would need strong evidence to be convinced that p should not be added to CG.

3.3. Negative polar questions with low negation

Recall that polar questions with low negation, like (44), can be used without original epistemic bias on the speaker's side. Here we simply maintain the analysis in Romero and Han (2004), where low negation is assigned the at-issue content $[\lambda p_{<s,t>}.\neg p]$. This derives the meaning in (45), which corresponds to an epistemically unbiased question.

(44)   a. (OK. What about John?...) Did he **not**_{Low} drink any alcohol?   (=(16S))
        b. LF: :   [Q [not [John drank alcohol]]]

(45)   At-issue content: { ¬(John drank alcohol), ¬¬(John drank alcohol) }
                               That is: { John drank alcohol, ¬(John drank alcohol) }

To sum up section 3, by adding Repp's (2013) FALSUM and by assigning the operators VERUM and FALSUM a bidimensional meaning contribution, the account by Romero and Han (2004) has been modified to derive epistemic bias while avoiding previous problems. The at-issue content of the interrogative delivers an information-seeking question, which the answers match; the CG-management content of the interrogative derives the speaker epistemic bias.

4. High negation in subjunctive conditionals

4.1. Conditional antecedents and questions

It has been noted that there is a connection between questions and conditional antecedents, in that clauses that have the internal syntax of an interrogative clause can semantically serve as antecedents of several types of conditionals sentences (Rawlins 2008, Onea and Steinbach 2011). This is exemplified with the *whether*-clause in (46), which functions as an unconditional.

(46)   Whether Mary comes or not, the party will be fun.

We argue that a connection in the opposite direction exists as well: conditional syntax – more concretely, an antecedent clause *[if α]* – signals that there is an open issue as to whether or not α is the case in the relevant domain of worlds. More formally, it signals that the domain D of worlds provided by the Modal Base and the Ordering Source that the conditional quantifies over can be partitioned into $\{\alpha, \neg\alpha\}$. In the case of indicative conditionals like (47), the domain D is a subset of the context set (CS), while, in the case of subjunctive conditionals like (48), the domain (may) reach outside of the CS (von Fintel 1997, Leahy 2011). When a subjunctive conditional *[if α]* is used counterfactually, there are only $\neg\alpha$-worlds in the CS. When it is used in Anderson-style contexts, there are α-worlds and $\neg\alpha$-worlds in the CS.

(47)   Indicative conditional:
        If Mary went to the party yesterday, it was fun. $D \subseteq CS$

(48)   Subjunctive conditional:
        If Mary had gone to the party yesterday, it would have been fun.   ~~$D \subseteq CS$~~
        a. Interpreted as counterfactual: only $\neg p$-worlds in CS
        b. Interpreted as in Anderson (1951)'s example: p-worlds and $\neg p$-worlds in CS

We cast this idea in a Questions under Discussion (QUD) framework (Roberts 1996), as in (49):

(49)   A conditional antecedent *[if_D α]* conveys that the question $[\![Q]\!]([\![\alpha]\!]^{\text{at-issue-content}})$ partitioning domain D is – truly or hypothetically – a question in the QUD stack.[10]

This applies to the conditional sentences above as follows. In the case of the indicative conditional (47), the question {*Mary went to party*, ¬(*Mary went to party*)} partitions the domain

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[10] Starr (2014) develops a semantics for conditionals of the form *[if p then q]* within Inquisitive Semantics involving the following steps: (i) hypothetically adding the question *p?* to the issues under consideration while highlighting the positive answer, and (ii) concluding that q follows from adding the highlighted answer to the contextual information (Starr 2014:10). For a formalization of hypothetical additions, see Starr (2014:2.4). I leave a concrete implementation of hypothetical QUD stacks in the QUD framework for future research. Also, we remain agnostic as to whether the effect described in (49) is a presupposition, a conventional implicature or some other related effect.

of worlds D. Given that D ⊆ CS, the question {*Mary went to party*, ¬(*Mary went to party*)} is truly an open question in the QUD stack. In the case of the subjunctive conditional (48) under an Anderson-style interpretation, the domain of worlds D includes (and possibly goes beyond) the CS. Given that there are *p*-worlds and ¬*p*-worlds in CS, partitioning D leads to partitioning the current CS, which means that the question {*Mary went to party*, ¬(*Mary went to party*)} truly is an open question in the QUD stack. Finally, under the counterfactual interpretation of (48), the question {*Mary went to party*, ¬(*Mary went to party*)} establishes a partition in the domain D but not in the current CS, where ¬(*Mary went to party*) is already settled. Hence, the question is an open question in a hypothetical QUD stack.

Furthermore, we propose that, besides a question being raised out of the at-issue content of the *if*-clause, as in (47) and (48), a polar question is raised out of the CG-management content of the antecedent clause as well. This is stated in (50).[11]

(50)   A conditional antecedent *[if*$_D$ *α]* conveys that the question $[\![Q]\!]([\![α]\!]^{\text{CG-man-content}})$ partitioning domain D is – truly or hypothetically – a question in the QUD stack.

With these ingredients in place, we are ready to turn to high negation in subjunctive conditionals.

4.2. Deriving the infelicity of high negation in Anderson-style subjunctive conditionals

As we saw in section 1, while both low and high negation are appropriate in counterfactually used subjunctive conditionals like (51), low negation is felicitous but high negation is infelicitous in an Anderson-style examples like (52).

(51)   a. Good that there was oil in the tank! If there had**n't**$_{\text{Low}}$ been any / had been **no**$_{\text{Low}}$ oil in the tank, the furnace would have exploded.
        b. Good that there was oil in the tank! If there had**n't**$_{\text{High}}$ been <u>some</u>$_{\text{PPI}}$ oil in the tank, the furnace would have exploded.

(52)   a. If there had**n't**$_{\text{Low}}$ been any / had been **no**$_{\text{Low}}$ oil in the tank, the furnace would have made exactly the noise that it in fact did. So, it's likely that the tank was empty.
        b. # If there had**n't**$_{\text{High}}$ been <u>some</u>$_{\text{PPI}}$ oil in the tank, the furnace would have made exactly the noise that it in fact did. So, it's likely that the tank was empty.

To capture this contrast, we extend the analysis of low and high negation in polar questions to low and high negation in subjunctive conditionals, respectively. Just like low negation simply has the at-issue content $[\lambda p_{<s,t>}.\neg p]$ in polar interrogatives (and in declaratives), it does so in subjunctive conditionals as well. Just as high negation is the overt realization of the CG-

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[11] In the same way that we distinguish between common public beliefs shared by the conversationalists and e.g. the speaker's public beliefs (Gunlogson (2003) a.o.), we may want to distinguish between the common public QUD stack and the speaker's public QUD stack. Then, (49) would concern the former QUD stack and (50) the latter.

management operator FALSUM in polar interrogatives (and in declaratives), it denotes bidimensional FALSUM (39) in subjunctive conditionals as well. Let us see the two cases in turn.

In the case of low negation, our analysis assigns to the antecedent clause of sentence (53) the LF (54) and the content in (55). At the at-issue level, the conditional sentence quantifies over worlds where there was not oil in the tank, i.e., the worlds in (55a). Furthermore, it is conveyed that the question in (55b) is – truly or hypothetically – a question in the QUD stack: truly in an Anderson-style context and hypothetically in a counterfactual use. The raised QUD $\{p, \neg p\}$ is unbiased and does not clash with the speaker taking p for granted in the counterfactual cases or the speaker trying to argue for $\neg p$ in Anderson's examples.

(53)   If there had**n't**$_{Low}$ been any / had been **no**$_{Low}$ oil in the tank, the furnace would have exploded.

(54)   [$_{CP}$ If [$_{IP}$ not [$_{IP}$ there had been some oil in the tank]]]

(55)   a. At-issue content: $\lambda w.\ \neg$(there was oil in tank)
        b. Raised QUD: $\{\ \lambda w.\neg$(there was oil in tank), $\lambda w.$ there was oil in tank $\}$

In the case of high negation, the antecedent clause of sentence (56) is assigned the LF in (57) and the content in (58). At the at-issue level, the conditional sentence correctly quantifies simply over worlds where there wasn't oil in the tank, i.e., the worlds in (58a). Additionally, it is conveyed that the question in (58b) is – truly or hypothetically – a question in the QUD stack. Crucially, the raised question is now biased: the speaker wonders whether the addressee has fully convincing evidence against adding p ($p=$ 'there was oil in the tank') to the actual CG, which suggests that the speaker is biased towards p and would have to be convinced otherwise.

(56)   If there had**n't**$_{High}$ been <u>some</u>$_{PPI}$ oil in the tank, the furnace would have exploded.

(57)   [$_{CP}$ If [FALSUM [$_{IP}$ there had been some oil in the tank]]]

(58)   a. At-issue content: $\lambda w.\ \neg$(there was oil in tank)
        b. Raised QUD: $\{\ \lambda w.$ FOR-SURE-NOT-IN-CG$_w$(there was oil in tank),
                                $\lambda w.\ \neg$FOR-SURE-NOT-IN-CG$_w$(there was oil in tank) $\}$

How does this bias fit with the counterfactual and Anderson-style interpretations? Consider first the counterfactual use. The speaker bias towards p (= 'there was oil in the tank') arising from the hypothetical QUD (58b) does not clash with counterfactuality, i.e. it does not clash with p being taken as true in the actual CS. Hence, no infelicity arises in (51b). But, in Anderson-style scenarios, the speaker bias towards p (= 'there was oil in the tank') arising form the true QUD (58b) clashes with the speaker's discourse towards the truth of $\neg p$ (= 'the tank was empty'). In other words, if the speaker is trying to argue for $\neg p$, as in (52b), or she is trying to suggest $\neg p$ as a likely answer to a previous question, as in (10b), and she is being truthful (Maxim of Quality),

then expressing an epistemic bias towards the complementary proposition *p* would render her epistemic state inconsistent. It is this clash between what the speaker is arguing for or suggesting at the at-issue level and what she is indicating at the CG-management content level that leads to the infelicity of high negation in Anderson-style examples.

4.3. Further predictions

The analysis just sketched derives the unacceptability of high negation in Anderson-style subjunctive conditionals not from the lack of counterfactual interpretation, but from an epistemic bias. This means that, if the proposed analysis is on the right track, the correct diagnosis concerning high negation in subjunctive conditionals is not (59) (=(11)), but (60).

(59)   *[If_{SUBJ} [NEG_{HIGH} p], q]* is acceptable only if interpreted counterfactually, i.e., only if *p* is taken to be true.   (=(11))

(60)   *[If_{SUBJ} [NEG_{HIGH} p], q]* is acceptable only if the context is consistent with the speaker's epistemic bias towards *p*.

Both generalizations make the correct predictions for counterfactual and Anderson-style examples. To tease them apart, we need to test their predictions beyond such examples. We will use two further cases: (i) *Modus Tollens* and (ii) subjunctive conditionals with VERUM. The former undermines diagnosis (59) and the corresponding analysis by Ippolito and Su (2009). The latter adds further support to the generalization (60) and to the analysis in the present paper.

First, *Modus Tollens* examples like (61) also show that subjunctive conditionals can be used without entailing or presupposing counterfactuality: antecedent falsity does not follow from the subjunctive conditional in (61), since, if it did, the conclusion in (61) would feel redundant.

(61)   If John had killed the victim, he would have used a knife. But the victim was killed with a stiletto. Thus, it wasn't John who killed the victim.

Interestingly, high negation in *Modus Tollens* examples is perfectly felicitous:[12]

(62)   If there had**n't**_{High} been some_{PPI} oil in the tank, the furnace would not have lit. But it did light. Thus, there was some oil in the tank.

(63)   Wenn Fritz **nicht**_{High} Frage 3 beantwortet hätte, wäre er durchgefallen. Aber er ist nicht durchgefallen. Also hat er Frage 3 beantwortet.
         'If Fritz hadn't_{High} answered question 3, he would have failed. But he didn't fail. Thus, he answered question 3.

How do the two lines of analysis fare on this case? The factive analysis predicts high negation to

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[12] This empirical observation arose in conversations between Brian Leahy and myself.

lead to infelicity. Sentences (62)-(63) are analyzed as presupposing the truth of p (= 'there was oil in the tank' / 'Hans answered Q3') and, thus, they are wrongly predicted to make the conclusion p redundant and to lead to the same infelicity as (64). In contrast, the FALSUM-based analysis correctly predicts (62)-(63) to be felicitous, since having an epistemic bias for p and making a logical argument to convince the addressee of p are two compatible goals.

(64)   # If it hadn't been for the fact that there was some oil in the tank, the furnace would not have lit. But it did light. Thus, there was some oil in the tank.

Second, we saw in section 3 that *really*/VERUM behaves parallel to high negation/FALSUM in polar interrogatives in that both give rise to an epistemic bias. Since the proposed analysis uses the bias arising form FALSUM as key to analyze certain interpretive effects in subjunctive conditionals, parallel effects are predicted to arise in subjunctive conditionals with VERUM. This prediction is borne out: adding *really* to an Anderson-style example leads to infelicity, as in (65), and adding it to a *Modus Tollens* example preserves felicity, as shown in (66).

(65)   Anderson-style context:
      a. # If there **really** had been sand in the tank, the furnace would have made exactly the noise that it in fact did. So, it's likely that there was sand in the tank.
      b. # Wenn **wirklich** Sand im Tank gewesen wäre, hätte der Ofen genau das Geräusch gemacht, das er tatsächlich gemacht hat. Also war Sand im Tank.

(66)   Modus Tollens:
      a. If there **really** had been oil in the tank, the furnace would have lit. But it didn't light. Thus, there was no oil in the tank.
      b. Wenn **wirklich** Öl im Tank gewesen wäre, hätte der Ofen sich entzündet. Aber er hat sich nicht entzündet. Also war kein Öl im Tank.

To sum up section 4, we have analyzed high negation in subjunctive conditional antecedents *[if not$_{HighNeg}$ p]* not as triggering the factive presupposition p, but as denoting FALSUM and ultimately conveying a bias towards p. Signaling a bias towards p clashes with the speaker's attempt to argue or suggest $\neg p$ in Anderson-style examples. In contrast, a bias towards p is perfectly compatible with the speaker's taking p for granted in counterfactual uses and with the speaker's trying to logically argue for p in *Modus Tollens* examples.

5. Conclusions and open issues

By building on Romero and Han's (2004) and Repp's (2013) analysis of high negation in polar interrogatives and extending it to subjunctive conditionals, we have developed a unified analysis of high negation in the two environments, with FALSUM as the key ingredient:

(67)   High negation in polar questions and in subjunctive conditional antecedents (and in declaratives) expresses the operator FALSUM.

The proposed analysis correctly derives the following effects. First, polar questions of shape *[Q not_High p?]* convey an epistemic speaker bias towards *p*. Second, polar questions of shape *[Q really p?]* convey an epistemic speaker bias towards ¬*p*. Third, subjunctive conditionals of shape *[If not_High p, q]* convey an epistemic speaker bias towards *p* that makes the conditional infelicitous in Anderson-style scenarios (where the speaker argues for the antecedent, ¬*p*) and felicitous in *Modus Tollens* examples (where speaker argues for the negation of the antecedent, *p*). Fourth and finally, subjunctive conditionals of shape *[If really p, q]* convey an epistemic speaker bias towards ¬*p* that makes the conditional infelicitous in Anderson-style scenarios (where the speaker argues for the antecedent, *p*) and felicitous in *Modus Tollens* examples (where speaker argues for the negation of the antecedent, ¬*p*).

Neither Ippolito and Su (2009) nor the present proposal say anything about high negation in the environments in (3)-(4), which we saw fall under the empirical generalization (5). Putting (5) and the new generalization (67) together leads to the disjunctive generalization (68). We leave for future research the issue of whether, and, if so, how (68) can be reduced to a unitary concept. We also leave for future research examples of high negation where downward monotonicity is not required to begin with, such as the consequent of the conditionals in (69)-(70).

(68)   High negation is allowed iff it appears in a downward entailing context or it stands for FALSUM.

(69)   If John had been in good company, he would**n't_High** have called <u>someone_PPI</u>.

(70)   Wenn Fritz dumm wäre, hätte er **nicht_High** <u>Frage 3</u> beantwortet.
        If   Fritz dumm were, would-have he not question 3 answered
        'If Fritz was dumm, he would not have answered question 3.'

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