COUNTERFACTUALS, NEGATION, AND POLARITY[*]

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Abstract

In this paper we look at one kind of counterfactual conditionals, which we call Negative Conditionals (NCs), from a cross-linguistic perspective. NCs have properties that set them aside from standard *would* conditionals: (i) they contain a negative element in the antecedent clause or in the complementizer domain; (ii) they are obligatorily counterfactual; (iii) the negation does not anti license PPIs; (iv) the negation does not license NPIs. Drawing on work by Schwarz (2006) and Schwarz and Bhatt (2006), we will call the negation that occurs in NCs light negation (LN) and will argue that (a) LN is a strengthening operator modifying the modal operator and forcing an *iff* interpretation; (b) for interpretability reasons, LN must move close to the modal and it can do that overtly (as in Chinese) or covertly (as in German and English); (c) LN is factive. This analysis will allow us to explain the facts above as well as other interesting properties of NCs such as their incompatibility with the pro form *then* in the consequent, the compatibility with *which is why*, as well as the impossibility of backtracking NCs.

1 Introduction

Baker (1970) and Schwarz (2006) observe that a positive polarity item (PPI) is surprisingly acceptable in the immediate scope of negation in the antecedent of a *would*-conditional, as shown in (1).

(1)   If there hadn't been <u>some</u> oil in the tank, the furnace would have exploded. (Schwarz 2006)

However, the PPI is acceptable only as long as the conditional is interpreted counterfactually. As (2) shows, when a PPI occurs in the scope of negation but the *would* conditional is not understood counterfactually, the sentence is deviant.

(2)   #If there hadn't been <u>some</u> oil in the tank, the furnace would have made just exactly the kind of noise that it in fact did. So, it's likely that the tank was indeed empty.

This is even more surprising since, as pointed out by Anderson (1951), *would* conditionals do not have to be interpreted counterfactually.

(3)   If the patient had had the measles, he would have shown exactly the symptoms he did in fact show. Therefore, it's likely that he had measles.

Similar facts hold when negation and the PPI occur in the consequent clause of the conditional, as shown in (4).

(4)   If there were no oil in the tank, the furnace wouldn't <u>already</u> be running.

In this paper, we will call conditionals with these properties (a PPI in the scope of negation and obligatory counterfactuality), *Negative Conditionals* (NC).

2   German Light Negation

As discussed in Schwarz and Bhatt (2006), German regular sentential negation normally cannot immediately precede a definite or indefinite noun phrase, as illustrated in (5) and (6).

(5)   Fritz hat Frage   3 nicht beantwoete.
         Fritz has question 3 not   answered
         'Fritz didn't answer question 3.'

(6)   *Fritz hat nicht Frage   3 beantwoete.
         Fritz   has not   question 3 answered
         'Fritz didn't answer question 3.'

(7)   Fritz kann   eine Fremdsprache.
         Fritz knows a   foreign.language
         'Fritz knows a foreign language.'

(8)   *Fritz kann   nicht eine Fremdsprache.
         Fritz knows not   a   foreign.language
         'Fritz doesn't know a foreign language.'

However, in some contexts, this positional constraint is lifted: in negative polar questions and the antecedent of subjunctive *would*-conditionals, negation can immediately precede an indefinite (Meibauer 1990, Büring and Gunlogson 2000, and Han and Romero 2004)

(9)   Hat Fritz nicht Frage   3 beantwortet?
         has Fritz not   question 3 answered
         'Didn't Fritz answer question 3?'

(10)   Wenn Fritz nicht Frage   3 beantwortet hätte, wäre   er durchgefallen.
          if   Fritz not   question 3 answered   had,   be.subj he failed
          'If Fritz had not answered question 3, he would have failed.'

In both (9) and (10), *nicht* occurs before the definite noun phrase *Frage 3* without ungrammaticality. Compare (10) to (11) where negation follows the definite object.

(11)   Wenn Fritz Frage   3 nicht beantwortet hätte, wäre   er durchgefallen.
        if   Fritz question 3 not   answered   had, be.subj he failed
        'If Fritz had not answered question 3, he would have failed.'

Schwarz and Bhatt (2006) observe that (10), unlike (11), needs to be interpreted counterfactually; that is (10) only allows for an interpretation in which the proposition 'Fritz answered question 3' is assumed to be true. Schwarz and Bhatt (2006) call this type of negation *light negation* (LN, henceforth). They also observe that LN is permitted in known PPI-rescuing environments, such as the restrictor of the determiner *kein* 'no' and the scope of adversative predicate *überrascht* 'surprised' (Krifka 1992, Szabolcsi 2004):

(12)   Wir haben keinen angenommen, der   nicht Frage   3 beantwortet hat.
        we have noone admitted   who not   question 3 answered   has
        'We admitted no one who did not answer question 3.'

(13)   Wir waren überrascht, dass Fritz nicht Frage   3 beantwortet hat.
        we   were surprised   that Fritz not   question 3 answered   has
        'We were surprised that Fritz didn't answer question 3.'

Moreover, unlike regular negation, LN does not anti-license PPIs. Consider the contrast between (14) and (15).

(14)   *Wenn Fritz schon   ein Fahrrad nicht hätte, würde er heute losgehen und eines kaufen.
        if   Fritz already a   bike   not   have, would he today go.off   and one   buy
        'If Fritz did not already have a bicycle, he would go and buy one today.'

(15)   Wenn Fritz nicht schon   ein Fahrrad haette, wuerde er heute losgehen und eines kaufen.
        if   Fritz not   already a   bike   have, would he today go.off   and one   buy
        'If Fritz did not already have a bicycle, he would go and buy one today.'

In (14) the regular negation anti-licenses the PPI *schon* 'already' and the sentence is ungrammatical. In (15), however, LN does not anti-license *schon*.).

2.1 Schwarz's hypothesis

Schwarz (2006) proposes to modify Szabolcsi (2004)'s generalization that PPI rescuing occurs in the same environments licensing weak NPIs by restricting clause (a) to occurrences of non-fake past tense and by adding clause (b).

(16)   a.   A PPI that is antilicensed in a clause whose finite verb is not a fake past tense, is
              rescued iff it appears in a context where weak NPIs are licensed.
        b.   A PPI that is antilicensed in a clause whose finite verb is a fake past tense, is rescued
              iff the containing sentence implies that this clause is false.

Clause (a) is intended to account for the cases where PPIs are rescued in the restrictor of *kein* 'no' and the scope of the adversative predicate *überrascht* 'surprise', while Clause (b) is added to account for the PPI rescuing under *wish* and *would-* conditionals. According to Schwarz's

generalization of (16-b), there are two elements necessary to license PPIs: fake past tense (in the sense of Iatridou (2000)), and counterfactuality. We know that these two elements do not have to occur together.[1] What ensures that we have counterfactuality (in addition to the fake past tense) in the German NCs is that, according to Schwarz and Bhatt (2006)'s proposal, LN is factive. In the next section we show that fake past tense is not a necessary element of PPI rescuing.

3   Chinese *yaobushi* conditionals

In this section, we are concerned with two types of conditional constructions, *yaoshi* 'if' and *yaobushi* 'if-not', the latter consisting of a negative infix *bu* 'not' and *yaoshi* 'if'. Both *yaoshi-* and *yaobushi*-conditionals do not show any tense/aspect/mood morphology marking the distinction between indicative and subjunctive *would*-conditionals; cf. (17) and (18).

(17)   yaoshi ta zuotian   you renhe wuqi,   haiguan jiu   hui kouliu ta.
       if   he yesterday have any   weapon Customs then will detain he
       'If he had any weapons yesterday, Customs detained him.'(IND)
       'If he had had any weapons yesterday, Customs would have detained him.'(CF)

(18)   yaobushi   ta qunian   qu jianada, ta jiu   hui geng ni   jiehuan.
       YAOBUSHI he last.year go Canada he then will with you get.married
       'If he had not gone to Canada last year, he would have married you.'

Despite the presence of the negation *bu* in the complementizer, the antecedent of *yaobushi*-conditionals does not license NPIs.

(19)   ta *(bu) xiangxin renheren.
       he not   believe   anyone
       'He does not believe anyone.'

(20)   *yaobushi   ta xiangxin renheren, ta jiu   bu hui shibai.
       YAOBUSHI he believe   anyone   he then not will fail
       Intended: 'If he didn't believe anyone, he would not fail.'

(21)   yaobushi   ta bu xiangxin renheren, ta jiu   bu hui shibai.
       YAOBUSHI he not believe   anyone,   he then not will fail
       'If he believed someone, he would not fail.'

(19) shows that *bu* licenses NPIs such as *renheren* 'anyone' in a declarative sentence. In (20) the negation embedded in the complementizer does not license NPIs. However, if a second *bu* occurs in the antecedent as shown in (21), then an NPI is licensed. Two things to note. First, *bu* in the complementizer is contentful: the antecedent-worlds in (21) are worlds where he believes

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[1]See (i) for fake past tense without counterfactuality and (ii) for counterfactuality without fake past tense:

(i)   If the patient had had the measles, he would have shown exactly the symptoms he did in fact show. Therefore, it's likely that he had measles.

(ii)   They pretend that they don't have a cat yet.

someone. Second, the failure of licensing NPIs in *yaobushi*-conditionals is particularly interesting since NPIs are generally permitted in the antecedent of a conditional as shown in (22).

(22) yaoshi ta xiangxin renheren, ta jiu bu hui shibai.
      if   he believe anyone   he then not will fail
      'If he believed anyone, he would not fail.' /'If he believes anyone, he will not fail.'

Just like English and German NCs, *yaobushi*-conditionals do not antilicense PPIs.

(23) yaobushi   ta he-le   yixie jiu, ta laopo bu hui zheme shengqi.
      YAOBUSHI he drink-Prf some wine he wife   not will this   be.mad
      'If he had not drunk some wine, his wife wouldn't have been this mad.'

The similarity with English and German NCs can be strengthened even more in that *yaobushi*-conditionals are also obligatorily counterfactual. Since the conditional implies that he has measles, the discourse in (24) is incoherent.

(24) ??yaobushi ta mei you fengzhen, tade pifu shang hui you bao. Qishi   yinwei
      YAOBUSHI he not have measles,   his   skin surface will have bump. Actually since
      tade pifu xianzai you zhei-yang de bao, ta haoxiang you fengzhen.
      his   skin now   have these-kind DE bump he appear.to have measles
      'If he had measles, he would have bumps on his skin. Actually since he does have these kinds of bumps on his skin now, he appears to have measles.'

Lastly, the consequent of *yaobushi*-conditionals must also be counterfactual, which explains the incompatibility of *yaobushi* with *haishi*, 'still'. Note that this is true in English and German NCs too as shown in (26) and (27).[2]

(25) #yaobushi   Mali mei tongquo kaoshi, ta mama haishi hui ma   ta.
      YAOBUSHI Mary not pass   test   her mother still   will scold her
      'If Mary had passed the test, her mother would still/nonetheless have scolded her.'

(26) ??(Even) if John hadn't received some help from his teachers, he would still have passed the exam.

(27) ??Wenn Fritz nicht Frage   3 beantwortet hätte, wäre   er immer noch/trotzdem
      If   Fritz not   question 3 answered   had, be.subj he always still/nevertheless
      durchgefallen.
      failed
      'If Fritz had not answered question 3, he would have still/nonetheless failed.'

Note that, just like in English and German, Chinese *yaoshi*-conditionals can be turned into NCs if a PPI occurs in the immediate scope of negation.

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[2]Note further that English NCs have counterfactual antecedents and consequents regardless of where negation occurs. In (i), *not* and the PPI *already* appear in the consequent clause; however, the sentence is judged as odd with the appositive clause which entails the proposition of the antecedent is true.

(i)   ??If John had had an alibi-which we all know he did-he would not have been already arrested.

(28)   yaoshi ta mei(you) xihuan yixieren,   ta yiding bu hui lai.
        if   he not.have like   some.people he must   not will come
        'If he did not like some people, he would not come for sure.'

In (28), the negation *meiyou* 'not.have' does not antilicense the PPI *yixieren* 'some.people', and the sentence must be interpreted counterfactually. To sum up, in *yaobushi*-conditionals, the negation *bu* appears to be incorporated in the complementizer, does not license NPIs and does not antilicense PPIs. Both the antecedent and the consequent of a *yaobushi*- conditional must be counterfactual. The same facts hold if negation and PPIs occur in either the antecedent or the consequent of a *yaoshi*-conditional. Based on the discussions in the previous sections, we conclude that Chinese *yaobushi*-conditionals are another instance of NCs. English, German and Chinese NCs all seem to share the same properties: they rescue antilicensed PPIs, and both the antecedent and the consequent must be understood counterfactually.

4   Proposal

English NCs, German NCs, and *yaobushi* conditionals all have the same underlying structure and the same semantics. In the rest of this section, we will address the issue of the strength of these conditionals (section 4.1) and the issue of their obligatory counterfactuality (section 4.3).

4.1   The strength of the conditional

Unlike regular *would* conditionals, the antecedent of NCs must be interpreted as both a necessary and sufficient condition for the truth of the consequent.

Unlike *only if* conditionals, the antecedent of NCs must be understood as being *sufficient* for the consequent. This is shown by the contrast between (29) and (30).

(29)   Only if he had received help from his teachers, he would have passed, and even then, he might have failed (since the test was very difficult).

(29) asserts that receiving help from his teachers was necessary for passing. The felicity of the continuation *and even then he might have failed* shows that receiving help is not sufficient for passing, since other conditions (such as the test being easy) were required to pass. Now consider (30).

(30)   ??If he hadn't received some help from his teachers, he would have failed, and even then, he might have passed (since the test was so easy).

If NCs were just like *only if*, then we would expect the discourse in (30) to be saying that even though not receiving help is a necessary condition for failing, other conditions are necessary for failing, for example that the test be difficult. The fact that the discourse in (30) is infelicitous shows that in NCs the antecedent is sufficient to entail the consequent.

NCs pattern differently from regular *if* conditionals as well in that the antecedent must be understood as being *necessary* for the consequent. Consider the infelicity of (31).

(31)   ??If John hadn't received some help from his teachers, he would still have passed the exam.

Normally, a concessive conditional of the form *if ϕ, would still ψ* implies that at least some ¬ϕ are ψ-worlds.[3] For example, the conditional in (32) implies that if John had received help he would have passed.

(32) (The test was so easy that) If John hadn't received help from his teachers, he would still have passed.

We claim that (31) is infelicitous because the contribution of the concessive particle *still* is incompatible with the requirement that the antecedent be necessary for the truth of the consequent. The conclusion is that all NCs must be understood as "strengthened" and, crucially, that neither the sufficiency not the necessity requirements can be suspended.

Recall that Schwarz (2006) proposes that (i) a PPI that is antilicensed in a clause whose finite verb is a fake past tense is rescued just in case the containing sentence implies that this clause is false; (ii) the counterfactuality of the antecedent in *ϕ would ψ* follows from the pragmatic process of "conditional strengthening", which generates the implicature that *ψ if and only if ϕ*. Because this strengthening is an implicature, it should be cancellable or suspendable (for example by adding *still* as we saw above).[4] However, the data above – for example, the infelicity of (31) – point towards the non-cancellability of NCs's strengthening.

Moreover, suppose that the PPI and negation occur in the antecedent of a *would* conditional. If what rescues the PPI is the counterfactuality of the clause in which the PPI occurs, then the PPI should be rescued and the conditional should be fine even if conditional strengthening does not happen. All that is required is that the clause containing the PPI, that is the antecedent clause, be false. Nothing requires that the consequent be false too. The problem is that NCs must be strengthened and no cancellation is possible. Therefore, Schwarz's prediction is incorrect.

In order to address the non-cancellability problem, Schwarz (2006) suggests that a PPI in NCs is licensed by the counterfactuality of the antecedent together with the strengthening implicature and that, consequently, the reason why the implicature cannot be cancelled is that PPI rescuing depends on it. In other words, if the implicature is not cancellable, there must be an antilicensed PPI. While plausible in English, the German and Chinese cases clearly illustrate that this cannot be right: in both German and Chinese NCs, conditional strengthening is obligatory, whether an antilicensed PPI occurs or not. Neither (33) nor (34) contain an antilicensed PPI; yet, the strengthened interpretation is not defeasible.

(33) yaobushi ta qunian qu-le jianada, ta jiu hui geng ni jiehuan.
YAOBUSHI he last-year go-Prf Canada he then would with you get.married
'If he had not gone to Canada last year, he would have married you'
implies: he went to Canada; he did not marry you

(34) Wenn Fritz <u>nicht</u> Frage 3 beantwortet hätte, wäre er durchgefallen.
if Fritz not question 3 answered had, had he failed
If Fritz had not answered question 3, he would have failed.
implies: Fritz answered question 3; he did not fail

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[3]See Ippolito (2007) for an analysis of concessive uses of *still*.
[4]See Geis and Zwicky (1971), Karttunen (1971), Fintel (2000), among others, for discussion of conditional strengthening.

4.2   Conditional strengthening as exhaustivity

The conclusion we drew from the preceeding discussion is that NCs are subject to non-cancellable conditional strengthening. We propose that, in addition to its negative meaning, LN has both an exhaustive and a factive component. Let us start with the exhaustive component, which NCs seem to share with exceptives constructions such as *every . . . but . . .* , or conditionals with *unless*. Take the following two sentences.

(35)   Everyone but John left.

(36)   John will pass the course unless he fails the final exam.

The exceptive construction in (35) was studied extensively in von Fintel (1993). Informally, this example implies that every person other than John left and that John did not leave. Similarly for *unless*: the sentence implies that if John does not fail the final exam he will pass the course, and that if he fails the final exam, he will not pass the course. Interestingly, both the exceptive phrase *but John* in (35) and the *unless*-clause in (36) do not behave just like negative phrases. In particular, (35) is not just synonymous with *everyone who is not John left* and, as observed in Geis (1973) and von Fintel (1992), (36) does not behave in the same way as *If he doesn't fail the final exam, he will pass*. Both (35) and (36) have stronger meanings: (35) implies that John did not leave, and (36) implies that if John fails the final exam, he will not pass the course.

Following Kratzer (1991) and much subsequent work, we take a conditional sentence to have a tripartite structure where the antecedent and consequent clauses provide the restriction and the nuclear scope of a (possibly covert) modal operator M (of type $< st < st, t >>$). What we are going to propose is that the LN in NCs is a modifier of the modal operator (its type being $<< st < st, t >>< st < st, t >>>$).

(37)

The meaning of LN is given in (38).

(38) $[\![\mathbf{LN}]\!] = \lambda Q_{<<st><<st>t>>}.\lambda p_{<st>}.\lambda q_{<st>}.Q(\neg p)(q) = 1 \wedge Q(q)(\neg p) = 1$

Given the meaning on LN in (38), the truth-conditions for a NCs with structure in (37) will be as shown in (39).

(39) $[\![\alpha]\!]^c = 1$ iff $\forall w : w \in Sim_{w_c}(\neg\phi), w \in \psi$ and $\forall w' : w' \in Sim_{w_c}(\psi), w' \in \neg\phi$

When applied to one of our initial examples, repeated in (40), we get the following truth-conditions.[5]

(40)   a.   If there hadn't been <u>some</u> oil in the tank, the furnace would have exploded.

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[5]We are disregarding issues having to do with the temporal interpretation of antecedent and consequent clauses. The past tense in both clauses is simply meant to capture the fact that both clauses are about the past.

    b.   **[[[[would LN][there was some oil in the tank]][there was an explosion]]]** $= 1$ iff $\forall w$ s.t. $w \in Sim_{w_c}(\{w' : \text{there was not some oil in the tank in } w'\}), w \in \{w' : \text{there was an explosion in } w'\}$ and $\forall w''$ s.t. $w'' \in Sim_{w_c}(\{w' : \text{there was an explosion in } w'\}), w'' \in \{w' : \text{there was no oil in the tank in } w'\}$

This analysis of NCs, with the meaning for LN given in (38), accounts straightforwardly for the non-cancellability of conditional strengthening, since strengthening is part of the meaning of the negative modal modifier LN.

    A piece of evidence supporting the proposal that LN is a strengthening operator acting semantically as the modal's modifier is provided by the observation that NCs are deviant with *only* and *even*. Consider the following example.

(41)   ??Only if John hadn't received some help from his teacher, he would have failed the test.

We suggest that the reason why (41) is deviant is that, assuming a presuppositional view of the prejacent in an *only* sentence, the strengthening component contributed by LN asserts what is already presupposed by *only*.

    As for *even*, consider the sentence in (42).

(42)   #Even if John hadn't received some help, he would have passed.

This sentence is odd and we suggest that this is because the meaning of LN is incompatible with the meaning of *even*. In particular, *even* rules out worlds where John received help and did not pass, whereas LN doesn't (in fact, these worlds are ruled in by the second conjunct in the meaning of LN).

    Last, the analysis we are proposing also offers the beginning of an explanation for the infelicity of the following discourse.

(43)   #If there hadn't been some oil in the tank, the furnace would have exploded, and the furnace would have exploded if there hadn't been some fire retardant in the tank.

Since the first conditional asserts that the only circumstances in which the furnace would explode are those in which there isn't oil in the tank, asserting that the only circumstances in which the furnace would explode are those where there is no fire retardant in the tank creates a contradiction. This property of NCs is shared by *unless* conditionals: Geis (1973), as reported by von Fintel (1992) and Leslie (2009), observed that, unlike *if ... not* clauses, *unless* clauses cannot be conjoined, as shown in the following example from Leslie (2009).

(44)   *John will succeed unless he goofs off and unless he sleeps through the final.

To summarize our discussion so far, NCs have both a negative and an exhaustive components. We have proposed that these two components follow from the "exceptive" nature of NCs, which they share with exceptive *but* and exceptive *unless*. We will go back to the comparison between NCs and *unless* conditionals at the end of next section, when we address the third component of the meaning of NCs, i.e. their obligatory counterfactuality.

    The analysis we have proposed also works for when LN occurs in the consequent as in (45), repeated here below.

(45)   If there were no oil in the tank, the furnace wouldn't <u>already</u> be running.

According to the meaning on LN in (38), the counterfactual in (45) asserts that all worlds in which there is oil in the tank are worlds where the furnace is running, and (and this is the strengthening part) all worlds where there is no oil in the tunk are worlds where the furnace does not run.

More complex is the case of those counterfactuals where LN occurs both in the antecedent and the consequent clauses, as in (46).

(46)   If you hadn't received <u>some</u> help from the teacher, you wouldn't <u>already</u> have a job.

To predict the right meaning, we need to assume that both LNs contribute to the meaning of the sentence by both raising to adjoin the modal, creating the basic structure in (47).

(47)
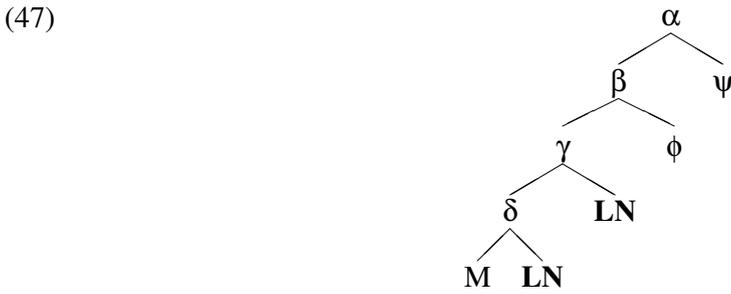
This structure is interpretable since the δ node will be of type $< st < st,t >>$, which is then the right type of argument for the higher LN. Crucially, the strengthening meaning we obtain at the end of this computation is the same as we would obtain if we only had one LN. However, the negative component of the two LN end up cancelling each other out. Here is a sketch of the semantic computation of the relevant nodes (I will assume here that the modal has a universal force).

(48) $[\![\delta]\!] = [\lambda Q_{<<st><<st>t>>}.\lambda p.\lambda q_{<st>}.Q(\neg p)(q) \wedge Q(q)(\neg p)] \, (\forall_w) =$
          $= \lambda p_{<st>}.\lambda q_{<st>}.\forall_w(\neg p)(q) \wedge \forall_w(q)(\neg p)]$

(49) $[\![\gamma]\!] = [\lambda Q_{<<st><<st>t>>}.\lambda p.\lambda q_{<st>}.Q(\neg p)(q) \wedge Q(q)(\neg p)](\lambda p_{<st>}.\lambda q_{<st>}.\forall_w(\neg p)(q) \wedge$
          $\forall_w(q)(\neg p)]) =$
          $= \qquad\quad [\lambda p.\lambda q_{<st>}.[\lambda p_{<st>}.\lambda q_{<st>}.\forall_w(\neg p)(q) \quad \wedge \quad \forall_w(q)(\neg p)]](\neg p)(q) \qquad =$
          $1 \wedge [\lambda p_{<st>}.\lambda q_{<st>}.\forall_w(\neg p)(q) \wedge \forall_w(q)(\neg p)]](q)(\neg p)] =$
          $= \lambda p_{<st>}.\lambda q_{<st>}.\forall_w(\neg\neg p)(q) \wedge \forall_w(q)(\neg\neg p) \wedge \forall_w(\neg\neg p)(q) \wedge \forall_w(q)(\neg\neg p)$
          $\lambda p_{<st>}.\lambda q_{<st>}.\forall_w(p)(q) \wedge \forall_w(q)(p) \wedge \forall_w(p)(q) \wedge \forall_w(q)(p)$

This generates the right meaning: in all the worlds where you received some help, you already have a job and in all the worlds where you did not receive help, you don't have a job yet.

4.3 Consequences

Let us focus on the English NC in (1) repeated below.

(50)   If there hadn't been <u>some</u> oil in the tank, the furnace would have exploded.

According to (37), LN must be as high as the modal operator in the structure at LF. Our proposal is that the operator we called LN is the negation that we see overtly in the antecedent in (50), raised at LF for interpretability reasons. This is not surprising since we already saw that (i) in Chinese *yaobushi* conditionals, the negation *bu* already appears higher in the complementizer domain and (ii) German light negation exhibits a syntactic behavior different from the one exhibited from regular negation. Our proposal is that all instances on LN must be at LF adjoined to the modal operator. In Chinese LN moves overtly to the right position, i.e. next to the modal operator *yao*, from one of the two positions it can originate from: the antecedent clause and the consequent clause. In English and German LN moves at LF. What drives this movement in English and German are interpretability reasons (type reasons).

There are some welcome consequences of this proposal. First, it offers an interesting way to account for the fact that the antecedent clause in NCs does not license *then* in the consequent clause. Compare (51) and (52).

(51)   If there hadn't been some oil in the tank, (*then) the furnace would have exploded.

(52)   If there hadn't been any oil in the tank, (then) the furnace would have exploded.

Regular subjunctive conditionals such as (52) are fine with *then* in their matrix clause (the consequent). Assuming that *then* is an instance of sentential anaphora, what the contrast above tells us is that, while the antecedent clause is available for anaphora in regular subjunctive conditionals, it is not in NCs. Why? Ignoring here any issue having to do with the tense and modality of these clauses, the antecedent for *then* in (52) is the negative sentence *there wasn't any oil in the tank*. Given the intended meaning of the sentence, the adverb *then* in (51) also needs as its antecedent a negative sentence. However, as illustrated in the schematic structure in (37) and in (53) below, there is no suitable negative antecedent for *then* since LN (the negation which appears overtly within the antecedent clause) has raised at LF and no longer forms a constituent with the rest of the antecedent clause.

(53)
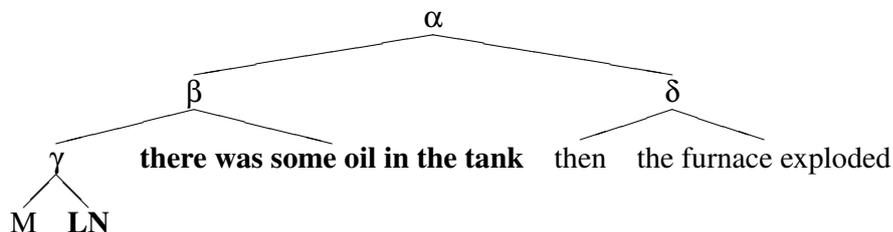
The impossibiltiy of referring back to a negative antecedent is shown by Chinese *yaobushi* conditionals, as well as by conditionals with the regular modal *yaoshi*+negation+PPI. Consider the *yaobushi* conditional in (54) and the *yaoshi* conditional, which we have argued above is an instance of NCs involving LN as shown by the fact that the PPI *yixie*, 'some', is not anti-licensed in the antecedent.

(54)   yaobushi   ta cuoguo na-ban huoche, (??name) ta laozao   yijing dao jia   le.
        YAOBUSHI he miss   that-CL train,   (??then) he way-early already arrive home Prf.
        'If he hadn't missed that train, then he would have already been home long ago.'

The Chinese adverb *name*, 'then', cannot occur in either conditional. Just like in the English example, *name* would need a negative sentence as its antecedent but, we claim, there is no such thing: after raising at LF, LN and the remaining antecedent no longer form a constituent.

Second, in NCs the *if*-clause can act as the antecedent of the phrase *which is why*, as shown in (55).
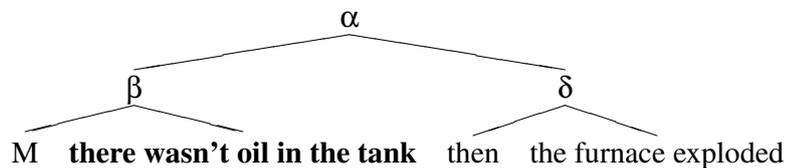
(55)   The furnace would have exploded if there hadn't been some oil in the tank, which is why it did not explode.

Notice that this is not true or regular negative conditionals, as shown in (56).

(56)   ??The furnace would have exploded if there hadn't been oil in the tank, which is why it did not explode.

The intended antecedent for the phrase *which is why* is the positive proposition that-there was oil in the tank. Crucially, this positive proposition is available in a NC, as shown by the tree in (53) but it is not available in a regular negative conditional as shown in the schema in (57).

(57)

```
                            α
                  ┌─────────┴─────────┐
                  β                   δ
            ┌─────┴─────┐       ┌──────┴──────┐
            M  there wasn't oil in the tank  then  the furnace exploded
```

Both consequences, the incompatibility with *then* (as anaphoric to a proposition) and the compatibility with *which is why*, have counterparts in *unless* conditionals. The pair in (58) shows that the negative proposition that-you don't call me, which is the intended antecedent for *then*, is only available in regular negative conditionals but not in *unless* conditonals.

(58)   a.   Unless you call me, (*then) I'll call you.
         b.   If you don't call me, (then) I'll call you.

The flip side of this is shown by the pair below.

(59)   a.   I'll leave unless Bill calls soon, in which case I won't leave.
         b.   ??I'll leave if Bill doesn't call soon, in which case I won't leave.

Just like the phrase *which is why*, the phrase *in which case* needs a positive antecedent, which is available in *unless* conditionals but not in regular negative conditionals.

A third consequence of the proposed structure is that it helps us explain the incompatibility of NCs with backtracking conditionals (BC). The conditional in (60) is an example of a backtracking conditional (from Arregui (2005)): this example would be felicitous in a context in which we know that Mary is allergic to gelatin and we are reasoning about what needed to be the case for Mary to eat pudding.

(60)   If Mary had eaten pudding, it would have to have been made without gelatin.

Henderson (2010) observed that *if not for*-conditionals cannot be backtracking conditonals, as shown in (61). Imagine a scenario where the car we are talking about alwyas start except when it rains: (61) cannot mean that the car did start and if it hadn't started would have to have rained.

(61)   #If not for the car starting, it would have to have rained.

The example below tells us that we can generalize this fact to the NCs that we have been considering: NCs cannot be backtracking conditionals. Imagine a context in which Mary loves pudding and will always eat it unless it is made with gelatin.

(62)   ??If Mary hadn't had some pudding, it would have to have been made with gelatin.

Following Arregui (2005), let us suppose that BCs involve two layers of modality, so that a conditional like (60) will have the structure in (63) and (64).

(63)   [Would$_{she\ ate\ pudding}$ [have-to$_{laws}$ [the pudding have been made without gelatin]]]

(64)
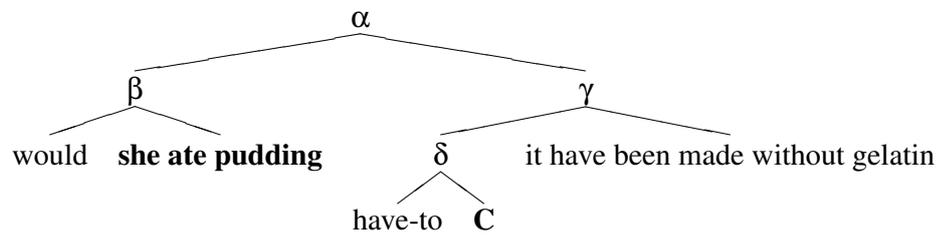
The feature of Arregui's analysis crucial for our purposes is that the restriction of the second modal is a variable **C**, whose value must coincide with the antecedent proposition that-she ate pudding. (We are not concerned here with the particular mechanism Arregui uses to ensure that this does happen.) The truth conditions proposed by Arregui are as folllows.

(65) $\lambda w. \forall w'[\text{SIM}(w)(w')(\lambda w''.$ she ate pudding in $w'') \rightarrow \forall w'''(\text{LAW}(w')(w''')(\lambda w''.$ she ate pudding in $w'') \rightarrow$ the pudding was made without gelatin in $w''')]$

If we construct a tree along these lines for (62), we get the structure in (66).

(66)
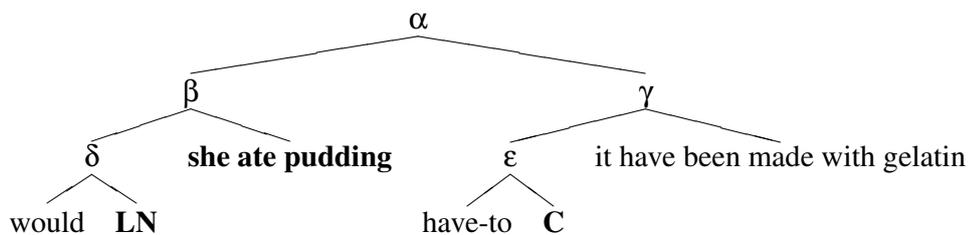
As we saw above, there is no negative antecedent available as the value for **C** since LN has moved up and no longer forms a constituent with the proposition that-she ate pudding. The only possible antecedent for **C** is the proposition that-she ate pudding, but combining this way

of resolving anaphora with the meaning of LN generates contradictory truth-conditions, as shown below.

(67) $\lambda.\forall w'[\text{SIM}(w)(w')(\lambda w''.$
       she did not eat some pudding in $w'') \to \forall w'''(\text{LAW}(w')(w''')(\lambda w''.$ **she ate pudding in** $w'') \to$ the pudding was made with gelatin in $w'']$ and $\forall w'[\text{SIM}(w)(w')(\lambda w''.$ she ate some pudding in $w'') \to \forall w'''(\text{LAW}(w')(w''')(\lambda w''.$ she ate pudding in $w'') \to$ the pudding was made without gelatin in $w''')]$

LN is going to require that we consider all relevant worlds in which Mary did not eat pudding, but **C** in the restriction of the second modal can only "see" the positive proposition that-she ate pudding. As a result we end up with a mismatch between the worlds in the first modal base (the modal base of *would*) and the worlds in the second modal base (the modal base of *have to*). We contend that this mismatch is the reason why BCs like (62) are bad.

    Finally, the proposal accounts for NCs with LN in the consequent such as (4) repeated in (68).

(68)   If there were no oil in the tank, the furnace wouldn't <u>already</u> be running.

LN originates in the consequent but adjoins the modal at LF for type reasons. This is also true for *yaoshi* conditionals in Chinese, as shown in (69).

(69)   yaoshi ta cuoguo na.ban huoche, ta bu hui   yijing dao jia   le.
       if   he miss   that.CL train,   he not would already arrive home Prf.
       'If he had missed that train, he wouldn't have already got home.'

Just like in the English example, we claim that *bu* is an instance of LN and that it raises at LF to adjoin the modal *yaoshi* for type reasons. We will see in the next section that this has nice consequences with respect to the obligatorily counterfactuality of NCs.

4.4   The obligatory counterfactuality

Elaborating on Schwarz's suggestion that LN in German is factive, we propose that LN and its counterparts in English carry a factive feature which is interpreted as presupposing the truth of the proposition expressed by the clause from which LN has raised. The structure in (70) shows the presence of the factive feature **fact** in the antecedent clause from where LN has raised.

(70)

Formally, we analyse the feature **fact** as a partial identity function of type $<< st >< st >>$. It carries the presupposition that its argument is true in the world of the context, as shown below.

(71) $[\![\textbf{fact}]\!]^c = \lambda p_{<st>} : p(w_c) = 1.p$

From a structural point of view, we propose that LN moves from the position where **fact** feature is, leaving the latter behind. In NCs such as (68), repeated in (72), where LN occurs in the consequent clause, **fact** takes as its argument the consequent, which is then presupposed to be true in the world of the context.

(72)   If there were no oil in the tank, the furnace wouldn't <u>already</u> be running.
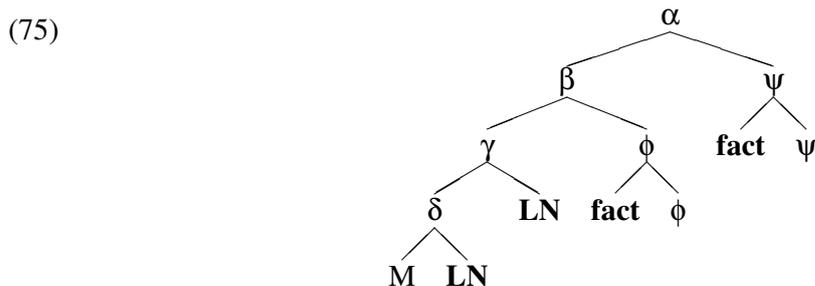
This is illustrated structurally by (73).

(73)

```
                        α
                      /   \
                    β       ψ
                   / \     / \
                  γ   φ  fact  ψ
                 / \
                M  LN
```

Interestingly, there are also cases where LN can occur in both the antecedent and the consequent clauses like in the following example.

(74)   If you hadn't received <u>some</u> help from the teacher, you wouldn't <u>already</u> have a job.

This example has the same strengthened meaning as our previous examples, but in addition it presupposes that both the antecedent and the consequent clauses are true: you received some help from the teacher and you already have a job. We suggest that this example involves movement of LN from both the antecedent and the consequent clauses, leaving a *fact* feature in each clause.

(75)

```
                          α
                        /   \
                      β       ψ
                     / \     / \
                    γ   φ  fact  ψ
                   / \  / \
                  δ  LN fact φ
                 / \
                M  LN
```

Evidence for the close relation between negation and a factive feature comes from the obligatory cooccurrence of the phrase *for the fact that S* and *for DP* with negation in *would*-conditionals.

(76)   a.   If it were<u>n't for the fact that</u> John received some/*any help from his teachers, he would have failed.
        b.   If it were<u>n't for</u> some/*any oil in the tank, there would be an explosion.

These overtly factive counterfactuals show the same pattern as NCs. First, as the examples above show, NPIs are not licensed and PPIs are not anti-licensed. Second, both the antecedent and the consequent clauses must be false. Crucially, the expressions *for the fact that* and *for* must occur with negation.[6]

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[6]Note that the ungrammaticality of (77) cannot be due to the fact that the antecedent is presupposed to be true, as the following example is grammatical and felicitous:

(77)   a.   *If it were <u>for the fact that</u> John received some help from his teachers, he would have
               passed.
        b.   *If it were <u>for</u> some oil in the tank, there wouldn't be an explosion.

These facts provide support for Schwarz's suggestion that LN is factive, in the sense described
above. The behavior of PPIs and NPIs is no longer puzzling: as the structure in (70) shows, PPIs
are no longer in the immediate scope of an antilicenser (negation), as F shields them from negation.
NPIs, on the other hand, are not licensed because a factive presupposition (of the *because*-kind)
intervenes between them and their potential licensor, just like it does in the following example.

(78)   *John didn't offend anybody because he's a good guy (but because he wanted to win a
        bet)).

Finally, in conditionals where LN starts off in the antecedent, the counterfactuality of the
consequent follows from the cooccurrence of LN and **fact**. Take (79).

(79)   If John hadn't received some help from his teachers, he would have failed the exam.

Not receiving help from his teachers is sufficient and necessary for failing the test. Since in the
world of the context John did receive some help from his teachers, it follows that he did not fail
the test. [7]

     The obligatory counterfactuality of both the antecedent and the consequent clauses in NCs,
which we proposed is explained as the result of the strengthening meaning of LN together with the
factivity feature, is absent from *unless* conditionals. Geis (1973) claimed that *unless* conditionals
cannot be counterfactuals based on examples like the following, reported from von Fintel (1992).

(80)   *Unless you had helped me, I would never have been able to finish on time.

However, von Fintel (1992) reports an example discovered by Fujita (1987) that is both felicitous
and counterfactual.

(81)   "Unless you had been told to the contrary, you would in all probability have considered
        her to be in poor circumstances - at any rate to begin with. Who was exactly who told
        you that she was well off?" (A. Christie, *The Hound of Death*, Fontana Paperbacks, 1982,
        p.91)

We are not going to settle this issue here. However, in light of both Geis' and Fujita's examples,
we will suppose that *unless* conditionals do not have to be counterfactual and that the badness of
Geis' example is due to other, at the moment unknown, factors. One possibility that is suggested
by our analysis is that, unlike NCs, *unless* conditionals do not involve LN. In our story the factivity

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(i)   If John received help from his teachers–which we all know he did–he would not have failed.

[7]Notice that in the proposal described above (just like in Schwarz (2006)), the negation that occurs in NCs is
meaningful and it contributes to the semantic meaning of the clause where it occurs. In this respect, NCs are different
from *unless* conditionals, which have been convincingly argued to be different from *if not* conditionals. Cf. Geis
(1973) and Fintel (1992). There are, however, interesting similarities between NCs and *unless* conditionals, such as
the incompatibility with overt focus particle such as *only*, the behavior of NPIs, and the rethorical flavor of these
conditionals when the consequent is a question. However, for lack of space we won't be able to discuss these issues in
this paper.

is triggered by LN: it is a feature that is part of LN and that it is left behind when LN raises at LF to adjoin the modal operator. Hence, without the trigger (LN), there is no factivity.

To sum up, our claim is that the negations that occur in NCs in English, German, and Chinese are all instances of factive LN. In German LN and regular negation are distinguishable in some contexts. In English these two types of negation cannot be distinguished overtly unless a PPI occurs. As for Chinese, *yaobushi* conditionals are unambiguously LN conditionals, with LN raising to adjoin the modal overtly; just like in English, though, in regular *yaoshi* conditionals negation is ambiguous between regular negation and LN, unless a PPI occurs in which case the LN reading is obligatory.

5   Concluding remarks

NCs have the following properties cross-linguistically. First, the antecedent is interpreted as expressing a negative proposition thanks to a negation which occurs in the antecedent (or consequent) clause (as in English and German) or in the complementizer domain (as in Chinese). Second, in NCs PPIs are not antilicensed despite the presence of negation. Third, in NCs NPIs are not licensed despite the presence of negation. Finally, NCs are obligatorily counterfactual.

We proposed that, first, the negation that occurs in NCs, i.e. LN, is a strengthening operator modifying the modal and forcing the *iff* interpretation of NCs. Second, LN adjoins the modal for type-reasons. This movement is overt in Chinese *yaobushi* conditionals, covert in German and English NCs, as well as in Chinese NCs conditionals with *yaoshi*. Third, following Schwarz and Bhatt's proposal, we proposed that LN is factive.

By doing so, we hope to have answered the following questions: (i) why PPIs are not antilicensed; (ii) why NPIs are not licensed; (iii) why the consequent is always understood to be false; (iv) why NCs are incompatible with *then*; (v) why they are fine with *which is why*; and finally, why NCs are incompatible with backtracking counterfactuals.

Some open questions remains. First, given the many similarities between NCs and *unless* conditionals and the link we have drawn between factivity and the licensing of NPIs, it is puzzling that, even though *unless* conditionals are not factive, they still do not license NPIs. One possibility is that the impossibility of licensing NPIs in NCs is not due to the factivity but to the incompatibility between strengthened conditionals and licensing of NPIs. The contrast between (82) and (83) below shows that *only* is incompatible with NPIs in the antecedent.

(82)   If you had answered any question, you would have passed.

(83)   ??You would have passed only if you had answered any question.

Similarly for *even*.

(84)   ??Even if I had met anyone, I would have left.

If the impossibility of licensing NPIs in NCs were due to the presence of a strengthening operator, then the impossibility of licensing NPIs in *unless* conditionals despite their non-factivity would no longer be puzzling.

Second, as we reported above, in German LN can occur in negative questions as well, as shown here below.

(85)   Hat Fritz nicht Frage   3 beantwortet?
        has Fritz not   question 3 answered
        'Didn't Fritz answer question 3?'

Is there a relation betwen the operator we described in this paper and the LN in (85)? We hope to have made some progress in understanding the contribution of LN in NCs but we must leave these and other questions for future inquiry.

References

Arregui, Ana Cristina. 2005. On the accessibility of possible worlds: the role of tense and aspect. Doctoral Dissertation, UMass Amherst.

Baker, C. Lee. 1970. Problems of polarity in counterfactuals. In *Studies presented to Robert B. Lees by his students*, ed. J. Sadock and A. Vanek. Linguistic Research Inc.

Büring, Daniel, and Christine Gunlogson. 2000. Aren't positive and negative polar questions the same? Manuscript.

von Fintel, Kai. 1992. Exceptive conditionals: The meaning of *Unless*. In *Prceedings of the north east linguistics society 22*, 135–148. GLSA.

von Fintel, Kai. 1993. Exceptive constructions. *Natural Language Semantics* 1:123–148.

Fujita, Takao. 1987. Counterfactual *Unless*. *English Linguistics* 4:342–346.

Geis, Michael. 1973. *If* and *Unless*. In *Issues in linguistics: Papers in honor of henry and renée kahane*, ed. Braj B. Kachru, Robert B. Lees, Y. Malkiel, A. Petrangeli, and Sol Saporta, 231–253. University of Illinois Press.

Han, Chung-hye, and Maribel Romero. 2004. On negative yes/no questions. *Linguistics and Philosophy* 27:609–658.

Henderson, Robert. 2010. *If not for Counterfactuals*: Negating causality in natural language. University of California, Santa Cruz.

Iatridou, Sabine. 2000. The grammatical ingredients of counterfactuality. *Linguistic Inquiry* 31:231–270.

Ippolito, Michela. 2007. On the meaning of some focus-sensitive particles. *Natural Language Semantics* 15(1):1–34.

Kratzer, Angelika. 1991. Modality. In *Semantics. an international handbook of contemporary research*, ed. A. v. Stechow and D. Wunderlich, 639–650. Berlin: De Gruyter.

Krifka, Manfred. 1992. Some remarks on polarity items. In *Semantic universals in universal semantics*, ed. D. Zäfferer, 150–189. Foris, Berlin.

Leslie, Sarah-Jane. 2009. *If*, *Unless*, and quantification. In *Compositionality, context and semantic values*, ed. R. J. Stainton and C. Viger, 3–30. Springer Science+Business Media.

Meibauer, Jörg. 1990. Sentence mood, lexical categorial filling, and non-propositional *nicht* in German. *Linguistische Berichte* 130:441–465.

Schwarz, Bernhard. 2006. When counterfactuality rescues positive polarity items: A note on Szabolcsi (2004). Manuscript.

Schwarz, Bernhard, and Rajesh Bhatt. 2006. Light negation and polarity. In *Cross-linguistic research in syntax and semantics: Negation, tense and clausal architecture*, ed. R. Zanuttini, H. Campos, E. Herburger, and P. Portner, 175–198. Georgetown UP.

Szabolcsi, Anna. 2004. Positive polarity–negative polarity. *Natural Language & Linguistic Theory* 22:409–452.