Obligatory Neg-raising in Mandarin: Negatives and Aspects

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Abstract

This paper offers an explanation to the obligatory neg-raising (NR) phenomenon with Mandarin negative *bu*. This explanation follows Xiang's (2014) exhaustification-based account for (non-)NR, that non-NR readings are derived via local exhaustification or double exhaustification. Based on mixed evidence from both syntax and semantics, especially the interactions between negatives and aspects, I argue that *bu* is a local negative, and that it doesn't satisfy the prerequisites of creating an LF with local or double exhaustification.

Keywords
Neg-raising, negation, aspects, exhaustification, semantics, syntax, Mandarin

1. Introduction

"Neg-raising" (NR) refers to the phenomenon of interpreting the clause-mate negation of a sentence-embedding verb as taking scope inside the complement clause. For instance, (1a) and (2a) are intuitively interpreted as (1b) and (2b), respectively. The narrow scope readings in (1b) and (2b) are called "NR readings", and the wide scope readings in (1c) and (2c) are called "non-NR readings". Predicates that allow NR readings are called "neg-raising predicates" (NRPs).

(1) a. John doesn't believe that it is raining.
    b. $\rightsquigarrow$ John believes that it isn't raining.
    c. $\not\rightsquigarrow$ It isn't the case that John believes that it is raining.

(2) a. John doesn't want to leave here.
    b. $\rightsquigarrow$ John wants not to leave here.
    c. $\not\rightsquigarrow$ It isn't the case that John wants to leave here.

NR was firstly conceived as a syntactic phenomenon (Fillmore 1963, Lakoff 1969, a.o.): negation is generated and interpreted in the embedded clause, but it raises into the main clause and is pronounced there. This syntactic view, since its launch, has been challenged by various pragmatic and semantic approaches, include: the conventional implicature-based approach (Horn 1978), the presupposition-based approach (Gajewski 2005, 2007), and the scalar implicature (SI)-based approach (Romoli 2012, 2014; Xiang 2014). The core idea shared by all the semantic/pragmatic approaches above is the so-called "excluded middle" inference. This inference, first proposed by Bartsch (1973), says that the subject is opinionated about the truth or falsity of the complement clause. For instance, the excluded middle for "*John believes* ϕ" is "*either John believes* ϕ *or John believes* $\neg\phi$". In a basic negative sentence, it is marked to negate an NRP without assuming the excluded middle (Gajewski 2005).

Gajewski (2005) observes that once the negative auxiliary or the NRP is focused (capitals indicate stress), it is natural to suspend the excluded middle and interpret the sentence as non-NR. For instance, (3a) and (3b) do not imply the NR inference in (3c).

(3) a. John DOESn't believe that it is raining. (He has no opinion.)
b. John doesn't BELIEVE that it is raining. (He is unopinionated.)
c. $\not\rightarrow$ John believes it isn't raining.

This focus-associated cancellation effect is seen cross-linguistically. Mandarin negative *bu*, however, behaves abnormally. On the one hand, stressing the bare *bu* doesn't yield a non-NR reading, as shown in (4a); on the other hand, stressing an NRP negated by the bare *bu* is intuitively odd, as shown in (5a). In both cases, to admit a non-NR paraphrase, a focus marker *shi* must be present.

(4) a. Yuehan **BU** xiangxin zai xiayu, # ta qishi bu queding.
John NEG believe PROG rain he actually NEG sure
b. Yuehan **bu** **shi** xiangxin zai xiayu, ta qishi bu queding.
John NEG FOC believe PROG rain, he actually NEG sure
'John DOESn't believe that it is raining, he is actually not sure.'

(5) a. ? Yuehan **bu** XIANGXIN zai xiayu.
John NEG believe PROG rain
b. Yuehan **bu** **shi** XIANGXIN zai xiayu, ta (shi) ZHIDAO zai xiayu.
John NEG FOC believe PROG rain, he FOC know PROG rain.
'John doesn't BELIEVE that it's raining, he KNOWS that it is raining .'

Contrary to *bu*, the other Mandarin negative *mei* behaves in exactly the same way as English *n't*.

(6) a. Yuehan **MEI** juede zai xiayu, ta qishi bu queding.
John NEG think PROG rain, he actually NEG sure
(Roughly)'John doesn't think that it is raining , he is actually not sure.'
b. Yuehan **mei** JUEDE zai xiayu, ta ZHIDAO zai xiayu.
John NEG think PROG rain, he know PROG rain.
'John doesn't THINK that it's raining, he KNOWS that it is raining.'

The main goal of this paper is to explain the obligatory NR with Mandarin negative *bu*. I will first discuss the aspectual system of Mandarin and its interactions with negatives, and then extend the exhaustification-based account for (non-)NR in Xiang (2014) to the case of *bu*. The rest of the paper is organized as follows. Section 2 summarizes the exhaustification-based account for (non-)NR in Xiang (2014). Section 3 discusses the aspectual system and negatives in Mandarin. Section 4 shows how the exhaustification-based account captures the obligatory NR with *bu*.

2. The exhaustification-based account of (non-)NR

2.1. The grammatical view of SIs

In the Gricean tradition (Grice 1975), SI is considered as purely pragmatic. However, recent works by Chierchia (2004) a.o. conceive SI as a grammatical matter. This view, normally referred to as "the grammatical view of SIs", assumes SIs to be derived from the lexicon of scalar items and compositionally computed in embeddings. I decompose the grammatical view into the following three steps.

First, a scalar item triggers a set of alternatives. This set is recursively computed same as questions (Hamblin 1973) and focus (Rooth 1985). See definition adopted from Chierchia (2006).

(7) Basic Clause: For any lexical entry α, $\mathscr{A}lt(\alpha)$ =
   a. $\{[\![\alpha]\!]\}$ if α is lexical and does not belong to a scale;
   b. $\{[\![\alpha_1]\!], ..., [\![\alpha_n]\!]\}$ if α is lexical and part of a scale $\langle [\![\alpha_1]\!], ..., [\![\alpha_n]\!]\rangle$.
   Where $\mathscr{A}lt$ is a function from expressions to a set of interpretations.

(8) Recursive Clause:
   $\mathscr{A}lt(\beta(\alpha)) = \{b(a) : b \in \mathscr{A}lt(\beta)$ and $a \in \mathscr{A}lt(\alpha)\}$

Consider the alternative sets in (9) for a simple illustration. Each alternative of the negative assertion in (9b) is defined by negating its affirmative counterpart in (9a).

(9) a. $\mathscr{A}lt(\phi_{\text{SOME}}) = \{\phi_{\text{SOME}}, \phi_{\text{EVERY}}\}$
   b. $\mathscr{A}lt(\neg\phi_{\text{SOME}}) = \{\neg\phi_{\text{SOME}}, \neg\phi_{\text{EVERY}}\}$

Next, alternatives keep growing until they encounter a covert exhaustivity operator EXH. This operator, with a meaning akin to *only*, affirms the prejacent and negates an excludable subset of the alternative set (notation: $\mathscr{E}xcl(p)$, where p represents the prejacent).[1] The excludable alternatives are all the ones that can be consistently negated with the assertion on its own.

(10) a. $\mathscr{E}xcl(p) = \{q \in \mathscr{A}lt(p) : \lambda w[\neg q(w)] \cap p \neq \emptyset\}$
   b. $\text{EXH}(p) = \lambda w.p(w) \wedge \forall q \in \mathscr{E}xcl(p)[\neg q(w)]$

Accordingly, the SI in (11b) is derived via exercising an EXH-operator over the negative assertion in (11a), as schematized in (12).

(11) a. Not every student came.
   b. $\rightsquigarrow$ Some student came.

(12) a. EXH $(\neg\phi_{\text{EVERY}})$
   b. $\mathscr{A}lt(\neg\phi_{\text{EVERY}}) = \{\neg\phi_{\text{EVERY}}, \neg\phi_{\text{SOME}}\}$
   c. $\mathscr{E}xcl(\neg\phi_{\text{EVERY}}) = \{\neg\phi_{\text{SOME}}\}$
   d. $\text{EXH}(\neg\phi_{\text{EVERY}}) = \neg\phi_{\text{EVERY}} \wedge \neg\neg\phi_{\text{SOME}} = \neg\phi_{\text{EVERY}} \wedge \phi_{\text{SOME}}$

Last, the use of EXH is constrained by the *Strongest Meaning Hypothesis* (Chierchia et al. 2013, Fox and Spector 2009, Magri 2011). This hypothesis rules out the LF in (14), where applying the EXH-operator below negation yields a meaning equivalent to the plain assertion (i.e. the prejacent).

(13) **Strongest Meaning Hypothesis**:
   An occurrence of EXH is marked or unnatural if it gives rise to a reading that is equivalent to or weaker than what would have resulted in its absence

(14) a. $\mathscr{A}lt(\phi_{\text{EVERY}}) = \{\phi_{\text{EVERY}}, \phi_{\text{SOME}}\}$
   b. $\mathscr{E}xcl(\phi_{\text{EVERY}}) = \emptyset$
   c. $*\neg\text{EXH}(\phi_{\text{EVERY}}) = \neg\phi_{\text{EVERY}}$

[1] Here and throughout the paper, symbols like EXH and p are sloppily used for both syntactic phrases and truth conditions. A stricter semantic representation for EXH is as follows, where S is the c-commanded phrase of EXH.

(1) $[\![_{\text{EXH}}\ \text{S}]\!]^{w,g} = [\![S]\!](w) \wedge \forall q \in \mathscr{E}xcl(S)[\neg[\![q]\!](w)]$

2.2. Romoli (2012, 2014)

Romoli (2012, 2014) conceives excluded middles as implicatures (contrary to the presupposition-based view in Gajewski 2007) and extends the grammatical view of SIs to the analysis of NR. He proposes that a positive sentence containing an NRP is associated with two alternatives, namely, the assertion itself and an excluded middle, as schematized in (15a). The excluded middle is entailed by the assertion, and hence the EXH-operator is semantically vacuous, as shown in (15b-c).

(15) a. $\mathscr{A}lt$ ($\mathbf{bel}\phi$) = {$\mathbf{bel}\phi$, $\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi$}
b. $\mathscr{E}xcl$ ($\mathbf{bel}\phi$) = $\emptyset$
c. EXH ($\mathbf{bel}\phi$) = $\mathbf{bel}\phi$

In a negative case, global exhaustification yields the negation of the negated alternatives, giving rise to an NR reading, as schematized in (16). Local exhaustification is avoided, because it gives rise to a reading equivalent to the plain assertion, violating the Strongest Meaning Hypothesis.

(16) a. EXH ($\neg\mathbf{bel}\phi$)
b. $\mathscr{A}lt$ ($\neg\mathbf{bel}\phi$) = {$\neg\mathbf{bel}\phi$, $\neg[\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi]$}
c. $\mathscr{E}xcl$ ($\neg\mathbf{bel}\phi$) = {$\neg[\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi]$}
d. EXH ($\neg\mathbf{bel}\phi$) = $\neg\mathbf{bel}\phi \wedge \neg\neg[\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi] = \mathbf{bel}\neg\phi$

2.3. Xiang (2014)

Xiang (2014) proposes that whether a negative sentence with an NRP is interpreted as NR or non-NR depends on the distributions of two alternative-sensitive features, namely, an SI feature [σ] and a focus feature [F]. The SI feature [σ] comes from Chierchia's (2006, 2013) implementations on scalar items. Chierchia (2006, 2013) proposes that an SI alternative is activated if and only if the [σ] feature is present (viz. [σ] takes the '+' value). Xiang (2014) extends this implementation to NRPs by assuming that a predicate **P** with a mandatory [+σ] feature activates an excluded middle alternative, as schematized in (17).

(17) a. $\mathscr{A}lt$ ($\mathbf{P}_{[-\sigma]}$) = $\{\lambda x\lambda\phi.\mathbf{P}(\phi)(x)\}$ Non-NRPs
b. $\mathscr{A}lt$ ($\mathbf{P}_{[+\sigma]}$) = $\{\lambda x\lambda\phi.\mathbf{P}(\phi)(x), \lambda x\lambda\phi.[\mathbf{P}(\phi)(x) \vee \mathbf{P}(\neg\phi)(x)]\}$ NRPs

Inspired by the Alternative Semantics for focus (Rooth 1985, 1992, 1996), Xiang (2014) assumes that an F-marked item has an [+F] feature. This feature, similar to Rooth's (1996) focus interpretation operator '$\sim$', activates a set of focus-related alternatives $\mathscr{A}lt_F(p)$, namely, a subset of $[\![p]\!]^f$ (the focus value of p) containing the prejacent p and particular contextually selected elements.

Next, following the spirit of Chierchia (2006), Xiang (2014) assumes that both [σ] and [F] features have to be checked off by agreeing with a c-commanding EXH-operator. This assumption keeps only two LF candidates for each sentence pattern, as list below.

(18) John doesn't believe that it is raining.
a. EXH $\neg$ [John believes$_{[+\sigma]}$ it's raining] Global exhaustification
b. $\neg$ EXH [John believes$_{[+\sigma]}$ it's raining] Local exhaustification

(19) John DOESn't believe that it is raining
a. EXH $\neg_{[+F]}$ [John believes$_{[+\sigma]}$ it's raining] Global exhaustification

b. EXH $\neg_{[+F]}$ EXH [John believes$_{[+\sigma]}$ it's raining] Double exhaustification

(20) a. John doesn't BELIEVE that it is raining

b. EXH $\neg$ [John believes$_{[+\sigma,+F]}$ it's raining] Global exhaustification

c. $\neg$ EXH [John believes$_{[+\sigma,+F]}$ it's raining] Local exhaustification

Further, Xiang (2014) rules out the LFs in (18b), (19a), and (20a). First, for the basic negative case in (18), as pointed out by Romoli (2012, 2014), the LF in (18b) is eliminated by the Strongest Meaning Hypothesis, because it gives rise to a meaning equivalent to the plain assertion. The remaining available LF in (18a) yields an NR reading, as expected.

(21) a. John doesn't believe that it is raining.

b. EXH $\neg$ [John believes$_{[+\sigma]}$ it's raining]

(22) a. $\mathscr{A}lt\ (\neg\mathbf{bel}_{[+\sigma]}\phi) = \{\neg\mathbf{bel}\phi, \neg[\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi]\}$

b. $\mathscr{E}xcl\ (\neg\mathbf{bel}_{[+\sigma]}\phi) = \{\neg[\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi]\}$

c. EXH $\neg[\mathbf{bel}_{+\sigma}\phi] = \neg\mathbf{bel}\phi \wedge \neg\neg[\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi] = \mathbf{bel}\neg\phi$

Second, as for (19) that has a stressed negation, the LF in (19a) must be also ruled out because it yields a semantic contradiction. This structure activates both the excluded middle and its negation as alternatives, as underlined in (23c); the former is terminal, and the latter is defined via the composition rule in (8). When global exhaustification takes place, both of the alternatives are excludable (i.e. not entailed by the prejacent) and must be negated. However, negating both the affirmed and the negated excluded middles gives rise to a semantic contradiction, as schematized in (23d).

(23) a. *EXH $\neg_{[+F]}$ $\mathbf{bel}_{[+\sigma]}\phi$

b. $\mathscr{A}lt\ (\neg_{[+F]}\ [\mathbf{bel}_{[+\sigma]}\phi]) = \{\mathbf{bel}\phi, \neg\mathbf{bel}\phi, \mathbf{bel}\phi \vee \mathbf{bel}\neg\phi, \neg[\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi]\}$

c. $\mathscr{E}xcl\ (\text{EXH}\ \neg_{[+F]}\ \mathbf{bel}_{[+\sigma]}\phi) = \{\mathbf{bel}\phi, \underline{\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi}, \underline{\neg[\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi]}\}$

d. EXH $\neg_{[+F]}$ $\mathbf{bel}_{[+\sigma]}\phi = \neg\mathbf{bel}\phi \wedge \neg\mathbf{bel}\phi \wedge \neg[\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi] \wedge \neg\neg[\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi] = \bot$

Alternatively the double exhaustification LF in (19b) doesn't result in a contradiction. The excluded middle has been used up by the local EXH, and hence is not available for the global EXH. This structure yields a non-NR reading, as expected.

(24) a. John DOESn't believe that it is raining.

b. EXH $\neg_{[+F]}$ EXH [John believes$_{[+\sigma]}$ it's raining]

(25) a. $\mathscr{A}lt\ (\mathbf{bel}_{[+\sigma]}\phi) = \{\mathbf{bel}\phi, \mathbf{bel}\phi \vee \mathbf{bel}\neg\phi\}$

b. $\mathscr{E}xcl\ (\mathbf{bel}_{[+\sigma]}\phi) = \emptyset$

c. EXH $[\mathbf{bel}_{[+\sigma]}\phi]] = \mathbf{bel}\phi$

d. $\mathscr{A}lt\ (\neg_{[+F]}\ \text{EXH}\ [\mathbf{bel}_{[+\sigma]}\phi]) = \mathscr{A}lt(\neg_{[+F]}\ \mathbf{bel}\phi) = \{\mathbf{bel}\phi, \neg\mathbf{bel}\phi\}$

e. $\mathscr{E}xcl\ (\neg_{[+F]}\ \text{EXH}\ [\mathbf{bel}_{[+\sigma]}\phi]) = \{\mathbf{bel}\phi\}$

f. EXH $[\neg_{[+F]}\ \text{EXH}\ [\mathbf{bel}_{[+\sigma]}\phi]] = \neg\mathbf{bel}\phi \wedge \neg\mathbf{bel}\phi = \neg\mathbf{bel}\phi$

Third, as for the sentence in (20) where the NRP is stressed, both LF candidates are costly. On the one hand, the global exhaustification one leaves the F-mark on the NRP semantically vacuous, because no excludable alternative is activated by the [F] feature. On the other hand, the local

exhaustification one violates the Strongest Meaning Hypothesis, as it doesn't strengthen the meaning. Under such a dilemma, Xiang (2014) argues that having a vacuous F-mark is a more serious problem than having a vacuous EXH, because the former is overt (syntactically, morphologically, or phonologically marked). Hence, the LF with local exhaustification wins out, yielding a non-NR reading, as expected.

(26) a. $\neg\text{EXH}(\mathbf{bel}_{[+\sigma,+F]}\phi)$
b. $\mathscr{A}lt(\mathbf{bel}_{[+\sigma,+F]}\phi) = \{\mathbf{bel}\phi \vee \mathbf{bel}\neg\phi, \mathbf{bel}\phi, \mathbf{know}\phi\}$
c. $\mathscr{E}xcl(\mathbf{bel}_{[+\sigma,+F]}\phi) = \{\mathbf{know}\phi\}$
d. $\neg\text{EXH}(\mathbf{bel}_{[+\sigma,+F]}\phi) = \neg[\mathbf{bel}\phi \wedge \neg\mathbf{know}\phi] = \neg\mathbf{bel}\phi \vee \mathbf{know}\phi$

To sum up, basic negative sentences take global exhaustifications, yielding NR readings, while ones with stressed negation and ones with stressed NRPs take double and local exhaustifications, respectively, yielding non-NR readings.

3. Negatives and aspects in Mandarin

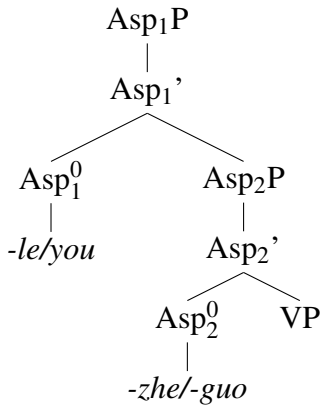
In the next two sections, I will explain the obligatory NR readings with *bu*. The main idea is that the abnormal behaviors of *bu* are consequences of its scope pattern and the way it's F-marked. First, *bu* is a local negation which cannot take scope over an EXH-operator. Second, stressing *bu* doesn't signal the presence of [+F] feature; instead, *bu* must be F-marked via the focus marker *shi*.

3.1. Distributing *bu*

3.1.1. *Bu* is a local negation

Mixed evidence from the distributional patterns of aspectual markers and habituals show that the bare negative *bu* is situated lower than aspects. Here I will examine the interactions between negatives and the following four aspectual markers: two perfectives *you* and *-le*, the durative *-zhe* and the experiential *-guo*.[2] Structures containing an aspectual cluster such as *chi-guo-le* 'eat-DUR-PERF' hint that the aspectual system in Mandarin consists of multiple projections, where the perfectives c-command the remnant, as illustrated in (27).

(27)



[2]In addition to these three aspectual markers, the progressive marker *zai-* is also frequently used. However, the case of *zai-* has a lot of mysteries: on the one hand, *zai-* might not take affix-hopping as it precedes the verb stem in the overt syntax (e.g., *zai-chi* 'PROF-eat'); on the other hand, judgements toward the phrase *bu-zai* 'not-PROG' vary among native speakers.

The distributional patterns of negatives with aspectual markers are exemplified in (28): *bu* cannot co-occur with any aspectual maker, while *mei* (optionally followed by a perfective morpheme *you*) can co-occur with all aspectual markers except the perfective *-le*;[3] beyond bare negatives, the bundle *bu-shi* can freely co-occur with any perfective marker. (See also Wang 1965, Huang 1988, Ernst 1995, Lee and Pan 2001, and Lin 2003.)

(28) a. * Ta **bu** dai {-zhe/ -guo/ -le} maozi.
3SG NEG wear -DUR -EXP -PERF cap

b. Ta **mei** (you) dai {-zhe/ -guo/ *-le} maozi.
3SG NEG PERF wear -DUR -EXP -PERF cap
'He is not wearing a hat./ I haven't worn any hat./ I didn't wear a hat.'

c. Ta **bu** **shi** dai {-zhe/ -guo/ -le} maozi.
3SG NEG FOC wear -DUR -EXP -PERF cap
'It isn't the case that he is wearing a hat./has worn a hat./wore a hat.'

In absence of aspectual markers, dynamic verbs give rise to generic or habitual readings (termed as 'attitudinal habituals' in Lin 2003). Observe in (29) that generic readings survive under *bu* but not under *mei*.[4]

(29) a. Yuehan chouyan.
John smoke
'John smokes' (= 'John has the habit of smoking.')

b. Yuehan **bu** chouyan.
John NEG smoke
'John doesn't smoke.' (= 'John doesn't have the habit of smoking.')

c. Yuehan **mei** chouyan.
John NEG smoke
'John didn't smoke.' (≠ 'John didn't have the habit of smoking.')

Why do *mei* and *bu* have such distinctions with respect to their distributions and interpretations? Here below I will capture these distinctions by assuming *mei* and *bu* to take scope over and below aspect, respectively. Arguments for this assumption relate to both the overt syntax and the LF.

In the overt syntax, to check off aspectual features, either aspectual affixes hop to verb stems, or verb stems take a V^0-to-Asp^0 movement, realizing the linear order of [V-Asp]. The adjacency

[3] *Mei* originats from the verb *mei* 'not have', the antonym of the possessive predicate *you*. Hence its co-occurring morphological variant of perfective has to be *you*, even though the perfective flavor with *you* can sometimes be very weak. This explains why *mei* is complementarily distributed with *-le*. See also Wang (1965) and Ernst (1995).

[4] Note that the selection of negatives in generic sentences in not restricted by tense. In (1b) *bu* is still selected even the event time is *in the past*.

(1) a. Yuehan yiqian chouyan.
John in-the-past smoke
'John smoked in the past.' (='In the past, John had the habit of smoking.')

b. Yuehan yiqian **bu** chouyan.
John in-the-past NEG smoke
'John didn't smoke in the past.' (= 'In the past, John didn't have the habit of smoking.')

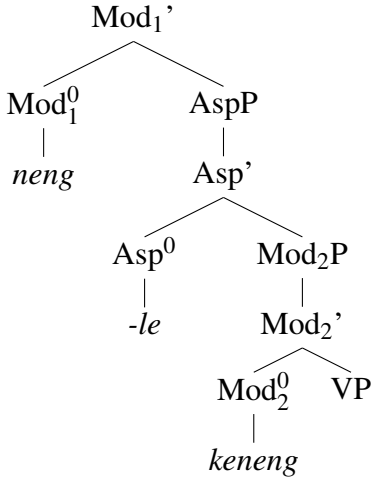
requirement of the former operation as well as the Head Movement Constraint (henceforth HMC, see Travis 1984 and Roberts 2001) of the latter operation prevent from inserting materials into a head node between Asp^0 and V^0. As a simple illustration, consider the minimal pair with modals in (30): the epistemic modal verb *keneng*, but not the ability modal *neng*, can co-occur with the perfective marker *-le*.

(30) a. Ta neng chi-(*le) san wan fan.
3SG $MOD_{ability}$ eat-PERF three bowl rice
'He is able to eat three bowls of rice.'

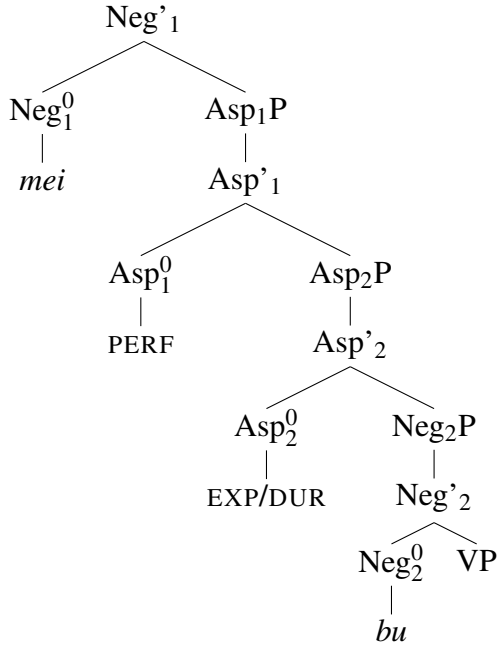
b. Ta keneng chi-le san wan fan.
3SG $MOD_{epistemic}$ eat-PERF three bowl rice
'It might be the case that he has had three bowls of rice.'

The contrast between *keneng* and *neng* above can be attributed to their different scope patterns: *keneng* and *neng* take scope over and below the aspects, respectively, as illustrated in (31a); only the local modal *neng* blocks the affix-hopping of the aspectual marker *-le* (or head-movement of the verb stem *chi*). Distributions of negatives and aspectual markers can be explained along the same line. I assume, as illustrated in (31b), that *bu* and *mei* are Neg heads taking scope below and above aspects, respectively. When an aspectual marker is present, the adjacency condition of affix-hopping or the HMC of head movement bans the local Neg head *bu* but exempts the higher Neg head *mei*. Similar assumptions have been drawn in Gu (1993) and Ernst (1995) a.o., though each implementation has its own nuances.

(31) a.



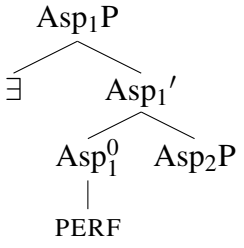
b.



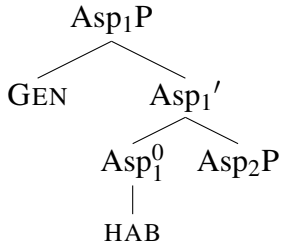
In addition to the overt syntax, distinctions on the scope of negation also manifest on the underlying LF structures, especially on the interactions between negatives and event variable binders. On the Neo-Davidsonian approach, to complete the interpretation of an event and make it into a true or false statement, the set of events must be closed by an existential closure (viz. the $\exists$-closure) or bound by other sorts of quantifiers such as the generic operator GEN which operates on an implicit restriction and exhibits a universal force. (Krifka 1989, 1990; Parsons 1990; Chierchia

1995; Bayer 1997; among the others.) I assume that the ∃-closure and the GEN-binder are both introduced at the specifier of $AspP_1$; the former agrees with a perfective head PERF, and the latter agrees with a habitual head HAB.

(32) a.



b.



The heart of explaining the LF structures is Landman's (1996) *Scope Domain Principle*, which says that only "non-quantificational noun phrases can be entered into scope domains" (creating scopeless readings). Champollion (2011) extends this principle to Event Semantics and argues that the ∃-closure of an event variable cannot scope over sentential operators such as negation. For instance, the negative sentence in (33) should be interpreted as (33a), where negation scopes above the ∃-closure, rather than (33b).

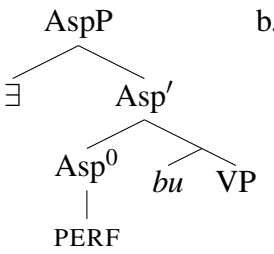
(33) John didn't laugh.

a. $\neg\ \exists e$ [laugh($e \wedge$ Ag(e) = j] "There was no event in which John laughed."

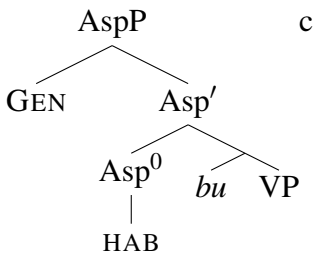
b. $*\exists e\ \neg$ [laugh(e) $\wedge$ Ag(e) = j] "There was an event in which John doesn't laugh."

The assumptions above conjectures that a negative invariably taking scope under the aspect cannot co-occur with an ∃-closure. The structure in (34a) where *bu* co-occurs with a perfective is thus ruled out. (Details about the split-Asp are ignored for simplicity.) This conjecture explains why generic and habitual readings always survive under *bu*: *bu* can only co-occur with HAB.

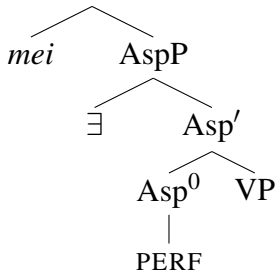
(34) a. (×)



b. (√)



c. (√)



3.1.2. Stressing *bu* doesn't signal [+F]

As I have mentioned in section 1, when an NRP is negated by *bu*, stressing the bare *bu* does not yield a non-NR reading; to suspend the excluded middle of this NRP, *bu* has to be attached to an overt focus-marker *shi*. When this marker is present, no accentuation mark is required.

(35) a. # Yuehan **BU** xiangxin zai xiayu, ta qishi bu queding.
John NEG believe PROG rain he actually NEG sure

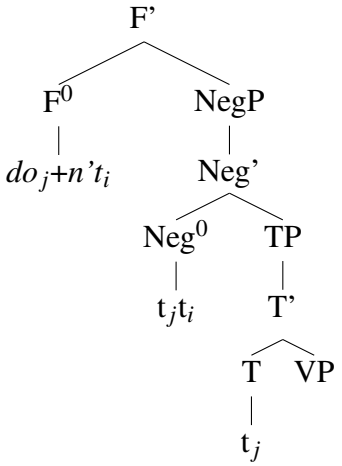
b. Yuehan **bu** **shi** juede zai xiayu, ta qishi bu queding.
John NEG FOC think PROG rain, he actually NEG sure
'John DOESn't believe that it is raining , he is actually not sure.'

Intuitively, the stressed *bu* in (35a) means differently from a stressed English *(do)n't*; the latter is an emphatic denial, while the former suggests only a weak contrast like those in (36). Hence, I propose that the [+F] feature on *bu*, which signals an emphatic denial, can only be morphologically interpreted via an adjacent focus-marker (viz. *shi*); in other words, stressing the bare *bu* doesn't assign an F-mark.

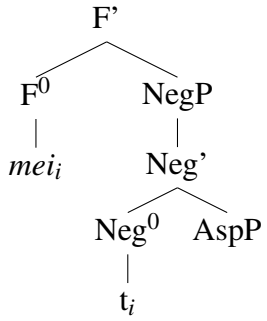
(36) a. John believes the weather is bad, but he BU believes it is raining.
b. Mary believes it is raining, but John BU believes so.

A theoretical explanation to this claim is as follows. I assume that in absence of a focus-marker, an F-marked negation checks off its [+F] feature via moving to F^0 at LF. This movement, following the spirit of the HMC, cannot be intervened by any syntactic or semantic material at a head node. For instance, as illustrated in (37), the projections of English negative *n't* and Mandarin *mei* are immediately below FP. When these negatives are F-marked, nothing intervenes their head-movements to F^0. In contrast, the local negative *bu* cannot carry an [+F] feature, because it is too local to check off an [+F] feature via Neg^0-to-F^0 movement.

(37) a.



b.

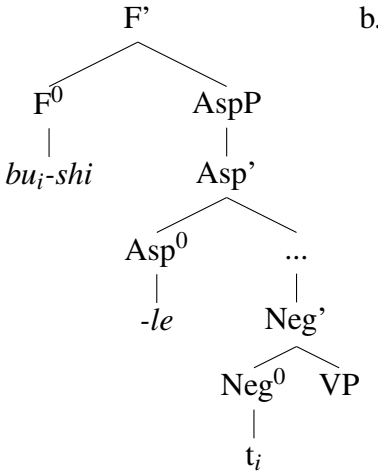


Before delving into the realm of obligatory NR with *bu*, is worthy to point out that the bare negative *bu* and the negative morpheme in *bu-shi* are generated at different Neg head nodes. This claim is supported by their distributional patterns with aspectual markers: the bare *bu* can not co-occur with any aspectual marker, while the bundle *bu-shi* is free to co-occur with any of them.

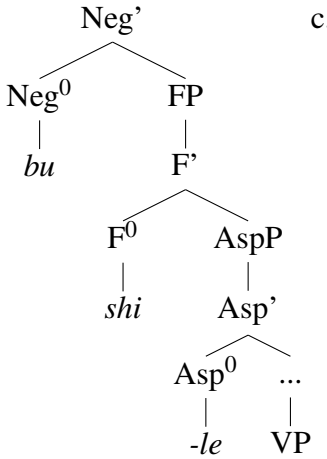
(38) a. * Ta **bu** dai {-zhe/ -guo/ -le} maozi.
3SG NEG wear -DUR -EXP -PERF cap
b. Ta **bu** **shi** dai {-zhe/ -guo/ -le} maozi.
3SG NEG FOC wear -DUR -EXP -PERF cap

According to the HMC, the structure in (39a), where the local negation *bu* moves to F^0 over a perfective head, is untenable. Hence, the negative morpheme in *bu-shi* isn't generated below Asp. Alternatively, we can either assume that the negative morpheme in *bu-shi* is base-generated above FP, as in (39b), or assume that it is moved from the Neg head sandwiched between FP and AspP, as in (39c). Here I don't assess which assumption works better.

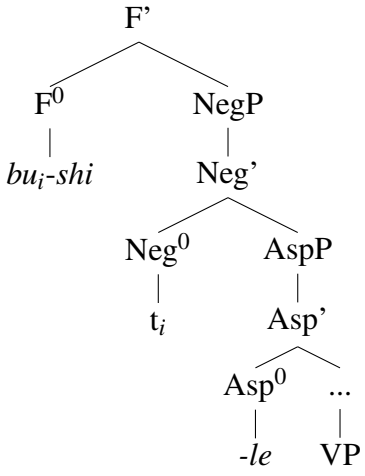
(39) a.



b.



c.



3.2. Obligatory NR with *bu*

In section 3.1.1, I have shown that *mei* and *bu* take scope over and below aspect, respectively. Assuming that event variable binders are introduced at the specifier of AspP, I can thus claim that an EXH, as a propositional operator, cannot scope below aspect (viz. *Aspect > EXH). Linking these two claims together, I can conjecture that there is no eligible position for EXH under *bu*, and hence that a *bu*-sentence cannot take local exhaustification nor double exhaustification.

The oddness of stressing the NRP in (40) is thus captured: the only syntactically well-formed LF, global exhaustification, activates no excludable alternative from the [+F] feature, making the F-mark on the NRP meaningless.

(40) ? Yuehan **bu** XIANGXIN zai xiayu.
John NEG believe PROG rain
Intended: 'John doesn't BELIEVE that it is raining .'

(41) a. ? EXH$\neg$[**bel**$_{[+\sigma,+F]}\phi$]
b. $\mathscr{A}lt$ ($\neg$**bel**$_{[+\sigma,+F]}\phi$) = {$\neg$[**bel**$\phi\vee$ **bel**$\neg\phi$], $\neg$**bel**ϕ, $\neg$**know**ϕ}
c. $\mathscr{E}xcl_{\sigma}$ ($\neg$**bel**$_{[+\sigma,+F]}\phi$) = {$\neg$[**bel**$\phi\vee$ **bel**$\neg\phi$]}
d. $\mathscr{E}xcl_{F}$ ($\neg$**bel**$_{[+\sigma,+F]}\phi$) = $\emptyset$

When the bare negative *bu* is stressed, as in (42), negation is not assigned with an [+F] feature according to the discussion of [+F]-checking in section 3.1.2. Hence, the LF of (42) takes global exhaustification, giving rise to an NR reading, just like a basic negative sentence.

(42) Yuehan **BU**$_{[-F]}$ xiangxin zai xiayu, # ta qishi bu queding.
John NEG believe PROG rain he actually NEG sure
'John doesn't believe that it is raining , # he is actually not sure.'

(43) a. EXH [$\neg_{[-F]}$ [**bel**$_{[+\sigma]}\phi$]]
b. $\mathscr{A}lt(\neg$**bel**$_{[+\sigma]}\phi) = \{\neg$**bel**$\phi, \neg[$**bel**$\phi \vee$ **bel**$\neg\phi]\}$
c. $\mathscr{E}xcl(\neg$**bel**$_{[+\sigma]}\phi) = \{\neg[$**bel**$\phi \vee$ **bel**$\neg\phi]\}$
d. EXH$[\neg$**bel**$_{[+\sigma]}\phi] = [\neg$**bel**$\phi] \wedge \neg\neg[$**bel**$\phi \vee$ **bel**$\neg\phi]] =$ **bel**$\neg\phi$

4. Conclusion

This paper explains the obligatory NR with Mandarin negative *bu* following the exhaustification-based theory in Xiang (2014). To receive a non-NR paraphrase, a negative sentence with an NRP must take local or double exhaustification. To create a local or double exhaustification structure, the negative negating the NRP has to scope over aspect or be able to check off an [+F] feature via head movement. The Mandarin negative *bu*, however, does not satisfy any of these requirements, and hence is obligatory NR.

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