

Single negation interpretations in sentences with multiple negative expressions in Mandarin Chinese. An experimental investigation[☆]



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Abstract

Although Mandarin Chinese (MC) has been characterized as a language in which two negative expressions within the boundaries of a single sentential domain cancel each other to yield a positive reading, this paper examines whether a single negation reading may in fact result under certain conditions. The results of an online perception experiment performed by 114 native speakers of MC showed that single negation readings were indeed obtained, particularly when the first of the two negative expressions was an adjunct (i.e., *cónglái bù/cónglái méi(yǒu)* 'never'), and when there was stress on the second negative expression (i.e., the negative markers *méi(yǒu)* 'not' and *bù* 'not').

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1. Introduction

A macroparametric division of languages into those that use double negation (henceforth DN) and those that use negative concord (henceforth NC) has been postulated in the linguistics literature (Biberauer and Zeijlstra, 2012; Giannakidou, 1998, 2006; van der Wouden, 1994; Zeijlstra, 2004; and others). According to the Law of Double Negation (Horn, 1989), DN refers to the reading obtained when two negative elements cancel each other out ($\neg\neg p \rightarrow p$), yielding an affirmative interpretation, as exemplified by the English sentence *She didn't say nothing*, interpreted (in standard usage) to mean "She said something". On the other hand, NC refers to the reading obtained when two negative elements act in concord or agreement with each other, yielding one single negation (henceforth SN) in the semantics (de Swart and Sag, 2002; Giannakidou, 2000; Labov, 1972; Muller, 1991; van der Wouden, 1994; Zeijlstra, 2004; and others). That is,

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in so-called NC languages, it is expected that multiple negative expressions within a single clause will yield a SN reading, as exemplified in Spanish by *Ella no dijo nada*, which is interpreted to mean “She said nothing”.¹

Taking modern standard Dutch as a paradigmatic example of a ‘DN language’, it has been claimed in the literature (de Swart and Fonville, 2014; Zeijlstra, 2010) that the combination of two negative expressions in this language yields a DN reading, because each morphosyntactically negative expression corresponds to an independent semantic negation with the result that they cancel each other out when the meaning of the full sentence is composed. This is exemplified in (1) (de Swart and Fonville, 2014:86, ex. (1a) and (1b)).

- (1) a. Ik heb niet niemand gezien.
I have not nobody seen
‘I have not seen nobody.’ (i.e., I have seen at least somebody.)
b. Niemand heeft niets gezegd.
nobody has nothing said
‘Nobody said nothing.’ (i.e., Everybody said something.)

However, modern Dutch has been claimed to show SN readings under specific conditions (Zeijlstra, 2010). In describing these conditions, Zeijlstra (2010) focuses on the importance of stress. He indicates, in particular, that in modern Dutch, two negative expressions may yield a single semantic negation reading in constructions that contain Emphatic Multiple Negative Expressions (EMNEs).² These constructions are characterized by having an emphatic reading on the first negative expression. Accordingly, in the examples in (2) (Zeijlstra, 2010:39, ex. (4a,c)) multiple negative expressions consisting of an emphatic negative quantifier followed by a negative adverb are claimed to yield a reading close to SN, as illustrated in the English glosses.

- (2) a. Zij heeft nergens geen zin in.
she has nowhere no desire in
‘She doesn’t feel like anything at all.’
b. Zij hebben nooit geen geld.
They have never no money
‘They never have any money’

Let us now shift our focus from a Germanic language to a Sino-Tibetan language, Mandarin Chinese (henceforth MC), which has also been characterized as a DN language in the literature (Cheng and Li, 1991; Ding et al., 1999; Lü, 1985; and others). In the case of MC, the combinations of multiple negative expressions that yield DN readings generally take the form of a preverbal negative adverb plus a second negative expression, either what is generally conceived in the linguistic literature as a negative quantifier or a second negative adverb, which appear within the boundaries of the same single clause. In this language sentential negation is expressed by means of the negative adverbs *méi(yǒu)* and *bù* (Li and Thompson, 1981; Lü, 1999).³ However, beyond the sentential negative markers *méi(yǒu)/bù* ‘not’, negation can also be expressed by means of other negative expressions *méi(yǒu)rén* ‘no one’, *méi(yǒu)dōngxi* ‘nothing’, and *cónglái/bù/cóngláiméi(yǒu)* ‘never’. Accordingly, from a morphological perspective these MC negative expressions either combine the negative marker *méi(yǒu)* ‘not’ plus a nominal expression (as in *méi(yǒu)rén* ‘no one’, which is the combination of *méi(yǒu)* ‘not’ and *rén* ‘people’, or *méi(yǒu)dōngxi* ‘nothing’, which combines *méi(yǒu)* ‘not’ with *dōngxi* ‘thing’),⁴ or they combine an adverb with a negative marker (as in *cóngláiméi(yǒu)* and *cónglái/bù* ‘never’, which show the combination of *cónglái* ‘always, ever’ with *méi(yǒu)* and *bù*, respectively).⁵ From now on, we will refer to *méi(yǒu)rén* ‘no one’ and *méi*

¹ For a criticism of DN vs. NC languages, see Longobardi (1987, 2014). Following Borer (1984), the parameters of negation can be argued to be essentially encoded in the lexical entries of the sentential negation morpheme and the negative determiners of each language, and the terms ‘DN languages’ and ‘NC languages’ should be regarded as epiphenomenal. In the present paper, we adhere to this view and will therefore use the terms ‘DN readings’ and ‘single negation readings’ instead.

See Zhou et al. (2014) (against Zhu, 1986, Jou, 1988 and Jouie, 1995) for evidence that DN readings for double negative structures are already possible in 5-year-old MC children if a plausible context is provided to children.

² These constructions are said to be found in almost all (non-standard) varieties of Dutch (Zeijlstra, 2010).

³ The basic difference between *bù* and *méi(yǒu)* is that *bù* is not limited by the time frame (Li and Thompson, 1981). Thus, *bù* can be used in the present, future or past, while *méi(yǒu)* is most commonly used for negating in the past.

⁴ In this case, when *méi(yǒu)* is followed by a noun, *méi* is used to negate the verb *yǒu* ‘have’, which can be omitted (Li and Thompson, 1981).

⁵ *Cónglái* is a temporal adverb referring to a situation or state that started in the past and remains unchanged in the present (Lü, 1999:132), such as in the sentence *Wǒ de wūzi cónglái jiù hěn gānjìng* ‘My room has always been clean’. In addition, it should be noted that *cónglái* is usually used in negative sentences (Lü, 1999) and combines with a negative adverb (*méi(yǒu)* or *bù*) to form *cóngláiméi(yǒu)* or *cónglái/bù*, which both mean ‘never’. The difference between *cóngláiméi(yǒu)* and *cónglái/bù* is dependent on the difference between *méi(yǒu)* and *bù* described in footnote 3.

(*yǒu*)*dōngxi* ‘nothing’ as negative quantifiers, whereas *cónglǎiméi*(*yǒu*) and *cónglǎibù* ‘never’ will be referred to as adverbial negative expressions.

From a phonological perspective MC is a tonal language, which means that a lexically significant, contrastive, relative pitch on each syllable, called *tone*, can change the core meaning of the word (Li and Thompson, 1981; McCawley, 1978; Pike, 1948; Yip, 2002).⁶ At the same time, independent of tone, MC can also manifest stress (Duanmu, 2000, 2014), which, according to traditional MC grammar, is classified into two categories, grammatical stress and logical stress (Huang and Liao, 2007; Shao, 2007). Grammatical stress, also called *basic stress*, is not affected by context but is dependent on the particular lexical structure of particular words or phrases. Logical stress, also called *emphatic stress*, is used to highlight one or another semantic meaning in a particular context. Emphatic stress only exists when words are used within a sentence or context rather than being a stress inherent to the words themselves. Its role is to convey emphasis, and therefore it is stronger than grammatical stress (Shao, 2007).

Now let us recall that Zeijlstra’s (2010) theoretical study on (non-standard) varieties of Dutch described the emergence of SN readings when the first element of a series of multiple negative expressions carried stress. To our knowledge, the interaction between negation and stress has not been investigated in MC. Therefore, our aim here is to investigate experimentally the interaction between multiple negative expressions and stress in this language, and to answer the following three research questions.

Q1. In MC, are SN readings ever possible in sentences with multiple negative expressions?

Q2. If so, is this reading influenced by the presence of stress, and does it depend on whether it is the first or the second negative expression that receives the stress? In other words, is this possibility dependent on whether the stress occurs in Word 1 (W1) (i.e., *cónglǎiméi* ‘never’, *cónglǎibù* ‘never’, *méiyǒurén* ‘no one’, *méiyǒudōngxi* ‘nothing’, *méiyǒu* ‘not’, *bù* ‘not’) or in Word 2 (W2) (i.e., *méiyǒu/bù* ‘not’)?⁷

Q3. Is this possibility dependent on the type of the negative expressions involved and the combination thereof?

To answer these questions, an online perception experiment consisting of a judgment task was designed in which native speakers of MC were asked to interpret sentences containing various combinations of two negative expressions. The first goal of the study was to see if participants would give these sentences a SN rather than a DN reading if one of the two negative expressions was presented with stress. A second goal was to explore how much this effect would vary according to the specific combination of negative expressions involved.

The rest of the article is organized as follows. Section 2 describes how the audio materials used in the judgment task were created. Section 3 describes the methods, participants, materials, and procedure of the experiment, while Section 4 presents the results. Finally, Section 5 discusses these results and attempts to explain the factors that may favor SN interpretations of multiple negative expressions in MC.

2. Audio recordings

In order to determine how stress is characterized acoustically in MC and whether MC speakers really perceive stress in combinations of multiple negative expressions, a set of audio recordings were prepared and a preliminary perception task was conducted.

Our first goal was to identify the acoustic properties that are responsible for the auditory differences between unstressed and stressed expressions, and our second goal was to confirm that MC native speakers are aware of these acoustic differences.

To this end, a native speaker of MC was audio-recorded while producing ten syntactic patterns with four different stress patterns. The ten syntactic patterns were designed to cover the set of grammatical conditions involving multiple negative expressions listed in (3).

- (3) a. A negative quantifier expression *méi*(*yǒu*)*rén* ‘no one’ in subject position plus a negative marker *méi*(*yǒu*) ‘not’.
- b. A negative quantifier expression *méi*(*yǒu*)*rén* ‘no one’ in subject position plus a negative marker *bù* ‘not’.
- c. A negative marker *méi*(*yǒu*) plus a negative marker *méi*(*yǒu*).
- d. A negative marker *méi*(*yǒu*) plus a negative marker *bù*.
- e. A negative marker *bù* plus a negative marker *méi*(*yǒu*).

⁶ MC has four tones each of which can be described as a relative, contrastive pitch pattern associated with a syllable (Li and Thompson, 1981), and different tones may lead to different meanings of the word. For example, *mā* with the first tone means ‘mother’, *má* with the second tone means ‘numb’, *mǎ* with the third tone means ‘horse’, and *mà* with the fourth tone means ‘scold’ (though *mā*, *má*, *mǎ* and *mà* all have other meanings as well).

⁷ Note that the negative markers *méiyǒu/bù* ‘not’ were the negative expressions chosen as W2 because they are the only ones that can combine with any negative quantifier, adverbial negative expression or negative marker in W1.

- f. A negative marker *bù* plus a negative marker *bù*.
- g. An adverbial negative expression *cónglǎiméi* ‘never’ plus a negative marker *méi(yǒu)*.
- h. An adverbial negative expression *cónglǎibù* ‘never’ plus a negative marker *bù*.⁸
- i. A negative quantifier expression *méi(yǒu)dōngxi* ‘nothing’ in object position plus a negative marker *méi(yǒu)*.
- j. A negative quantifier expression *méi(yǒu)dōngxi* ‘nothing’ in object position plus a negative marker *bù*.

The four stress patterns applied to each pair of negative expressions are listed in (4).

- (4) a. unstressed plus unstressed (*u + u*)
 b. stressed plus unstressed (*S + u*)
 c. unstressed plus stressed (*u + S*)
 d. stressed plus stressed (*S + S*)

After the recordings were completed, the segments that contained the negative expressions in the ten syntactic patterns were analyzed using Praat (Boersma and Weenink, 2008) for four different acoustic correlates, namely their mean pitch (in Hz), the pitch range between the lowest and highest f0 points (in semitones), their duration (in milliseconds) and their intensity (in dB). Table 1 shows the means (and standard deviations) of these four acoustic correlates as measured for the two negative expressions for each stress pattern. Negative expressions that were intended to be produced with stress appear in gray cells.

Four ANOVAs were run on these results, one for each measure, with STRESS (*unstressed, stressed*) set as a fixed factor (i.e., the factor indicating whether each negative expression in the database was produced with emphatic stress or not, based on the stress pattern of the sentence and the order of negative expressions within it).

The statistical results of the ANOVAs revealed a significant effect of STRESS in all four analyses, indicating that stressed negative expressions, compared to unstressed ones, had higher mean pitch ($F(1, 78) = 81.013, p < .001$), wider pitch range ($F(1, 78) = 53.743, p < .001$), greater duration ($F(1, 78) = 6.986, p = .010$), and greater intensity ($F(1, 78) = 173.114, p < .001$).

In order to determine whether native speakers of MC are aware of the acoustic properties associated with the four different stress patterns, eight native speakers of MC (7 women and 1 man; mean age = 27 years) were recruited to participate in a perceptual stress recognition task.⁹ The task was conducted in a quiet room. Each participant was given a sheet of paper with lines numbered from 1 to 40. They then listened the recordings (presented in a randomized order) of 40 sentences illustrating the ten syntactic patterns described above in (3) and the four stress patterns described in (4). As they listened to each item, participants had to indicate on their numbered sheet which negative expression was stressed, the first, the second, neither or both. The total number of responses obtained was 320 (8 respondents \times 40 responses). The results of this recognition task are shown in Fig. 1.

A Generalized Linear Mixed Model (GLMM) was then run, with PERCEIVED STRESS as the dependent variable (Binomial distribution, Logit link), and a random intercept for PARTICIPANT. The following effects were set as fixed factors: WORD (i.e., the order of the negative expressions: first, second), PATTERN (*u + u, S + u, u + S, S + S*), and their interaction. No significant results were found for the main effect of WORD ($F(1, 632) = 0.162, p = .687$), suggesting that negative expressions in first or second position in the sentences received a statistically similar number of perceptions as stressed or unstressed. However, a significant effect of PATTERN was found ($F(3, 632) = 41.244, p < .001$), indicating that there were patterns which were more often perceived as stressed, with a direction of the effect such that $S + S > S + u, u + S > u + u$, but with no statistical difference between $S + u$ and $u + S$ ($p = .490$). Finally, the interaction WORD \times PATTERN was also found to be significant ($F(3, 632) = 41.051, p < .001$), suggesting no difference between first and second negative expressions in either the *u + u* pattern ($p = .622$) or the *S + S* pattern ($p = .150$), but a difference between the two negative expressions in the two central patterns $S + u$ and $u + S$ in Fig. 1, such that the intended stressed words were more likely to be perceived as stressed than the unstressed ones ($p < .001$ in both cases). In conclusion, stress was found to be significant in the four analyses, always with the direction of the effects being *stressed* > *unstressed*. These results thus confirmed the claim that native speakers of MC are aware of the acoustic properties shown in Table 1 and are capable of perceiving the differences in stress described there.

Consequently, our analyses demonstrated the feasibility of using these audio materials in the subsequent perceptual experiment, which aimed at providing a reply to the three research questions posed at the end of Section 1.

⁸ According to the temporal restrictions already mentioned in footnotes 3 and 5 the combination of the adverbial negative expression *cónglǎiméi* plus the negative marker *bù*, and that of *cónglǎibù* ‘never’ plus *méi(yǒu)* were excluded from our study.

⁹ All the participants of this perception task were Chinese nationals who had been residing in Barcelona for periods of time varying from 4 months to 3 years (mean = 5 months).

Table 1

Measures of the four stress correlates found in the audio materials, where u means 'unstressed' and S means 'stressed' and 1st and 2nd refers to the order of the negative expression in the sentence. Thus for pattern 1, both negative expressions were unstressed. In pattern 2, the first negative expression was stressed but the second was not. In pattern 3, the first negative expression was unstressed while the second was stressed. And in pattern 4, both negatives expressions were stressed. Results for stressed expressions appear in the gray-shaded cells.

Measure	Neg. expr.	Stress Patterns			
		1 (u+u)	2 (S+u)	3 (u+S)	4 (S+S)
Mean pitch (Hz)	1 st	203.98 (18.26)	248.82 (27.86)	206.64 (17.21)	258.83 (24.32)
	2 nd	183.62 (19.93)	181.53 (22.69)	244.88 (40.42)	249.15 (39.79)
Pitch range (st)	1 st	5.93 (2.14)	8.85 (2.21)	6.10 (1.88)	8.81 (2.52)
	2 nd	2.58 (2.00)	1.91 (1.84)	8.63 (2.73)	7.27 (2.53)
Duration (ms)	1 st	601.34 (281.66)	815.00 (358.69)	618.68 (253.46)	843.36 (373.58)
	2 nd	238.61 (99.73)	243.74 (111.30)	413.32 (180.91)	375.87 (178.38)
Intensity (dB)	1 st	69.90 (2.38)	76.23 (1.38)	70.65 (1.49)	76.15 (2.65)
	2 nd	67.33 (1.61)	69.24 (2.95)	75.38 (2.28)	76.04 (2.02)

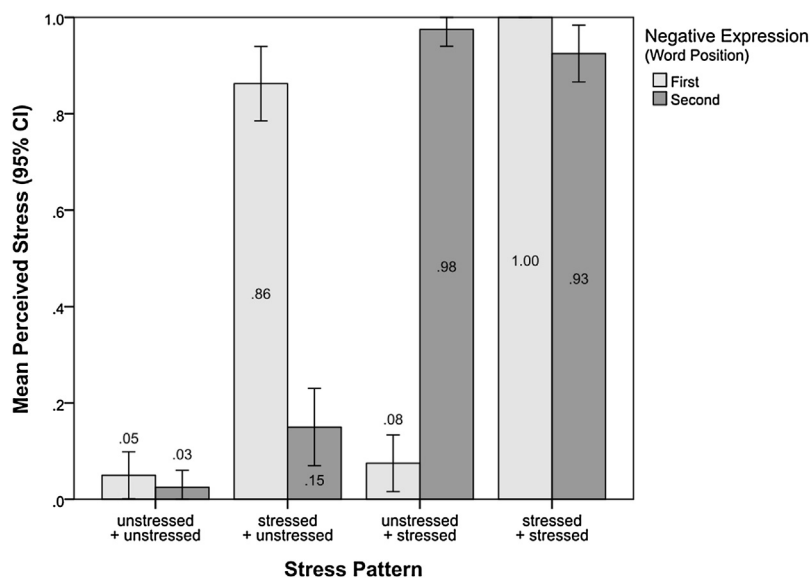


Fig. 1. Averaged results of participants' perception task of 40 recordings of ten sentences containing two negative expressions showing four different stress patterns. Lighter gray columns correspond to negative expressions used in the first position and darker gray columns correspond to negative expressions used in the second position.

3. Methods

A perception experiment was conducted using the online survey platform SurveyMonkey to investigate whether stress plays any role in MC at the time of interpreting sentences containing two negative expressions with stress assigned to either the first negative expression, the second negative expression, both or neither. We also aimed to investigate whether the likelihood of a SN reading was dependent merely on the presence of stress, or instead was also dependent on the type of negative expression involved.

3.1. Participants

Participants were recruited online, all of them native Mandarin-speaking Chinese born in China but living or studying abroad at the time of the experiment.¹⁰ In total, 114 volunteers, consisting of 39 males and 75 females, with a mean age of 27.57 (SD = 5.97), participated in the experiment. With respect to the language used by these participants with their families, 46.5% of them reported it to be MC, 49.1% reported it be other Chinese languages/dialects,¹¹ and 4.4% reported it to be non-Chinese languages such as English or Spanish. Concerning their educational level, 93.9% of them reported having higher education. Moreover, 66.7% of the sample reported having studied linguistics or a related field (i.e., philology, translation or language teaching). None of the participants in this experiment had participated in the preliminary study described in Section 2.

3.2. Materials

The materials used in this perception experiment consisted of 40 question-answer pairs, which were each introduced by a written discourse context. The task of the participants was to indicate which one of two possible interpretations was consistent with their own understanding of the item. For each item, the context, question, and two interpretations were presented to the participant as written text in MC, but the answer was presented as an audio recording.¹² By way of illustration, (5) provides an example (in English, for convenience) of a test item like those used in the experiment.

(5)

Context: Every year the students in your school have the opportunity to attend a summer camp abroad. Today there is a new teacher in your class. During the class, the new teacher asks you:

Question

Is there anybody in the class who hasn't been to America?

Answer



Méi(yǒu)rén

méi(yǒu) qù guò Měiguó.

not.have.people

not.have go PART America

'No one hasn't been to America.'

Interpretation

Interpretation 1: Everyone has been to America.

Interpretation 2: No one has been to America.

The 40 audio recordings (10 syntactic patterns × 4 stress patterns) of the answers used in our perception experiment were those previously analyzed and tested by native speakers as described in Section 2. The ten syntactic patterns used in the answers are illustrated in Table 2.

3.3. Procedure

Participants were asked to complete the online experiment questionnaire at a time and place of their own choosing. The questionnaire consisted of two sections. The first elicited information related to participants' sociolinguistic background, such as their birthplace, the language spoken at home, their education level and their training in linguistics or related areas. The second section consisted of the 40 test items themselves, presented in random order. In each item presented, participants were asked to read a short explanation of the conversational context followed by a question, after which they listened to a recording of the answer to the question. For each question-answer pair, two written interpretations were provided, one corresponding to a DN interpretation of the answer and the other to a SN interpretation (see example

¹⁰ YouTube videos embedded in Survey Monkey currently cannot be downloaded in China due to Chinese legal restrictions. This is why the native speakers of MC that participated in the experiment were recruited from foreign countries.

¹¹ Although MC has been the national statutory common language of China since the twentieth century (Huang and Liao, 2007) it coexists with various provincial dialects, which have been divided into seven dialect regions on the basis of their differing features.

¹² Note that, since in our design the presentation of both the context and the question was visual, participants were free to produce the prosodic contour they thought best fit the interpretation of the question in the given context. Thus, prosody (stress, in particular) on a specific constituent of the question was produced by these participants as a function of their chosen interpretation.

Table 2

The ten syntactic patterns in (3) used as answers in the experiment, with examples.

	Combinations of negative expressions	Examples					
(a)	A negative quantifier expression <i>méi(yǒu)rén</i> 'no one' in subject position plus a negative marker <i>méi(yǒu)</i> .	<i>Méi(yǒu)rén</i> not.have.people 'No one hasn't been to America.'	<i>méi(yǒu)</i> not.have	<i>qù</i> go	<i>guò</i> PART	<i>Měiguó.</i> America	
(b)	A negative quantifier expression <i>méi(yǒu)rén</i> 'no one' in subject position plus a negative marker <i>bù</i> .	<i>Méi(yǒu)rén</i> not.have.people 'No one won't go to Canada.'	<i>bù qù Jiānádà.</i> not go Canada				
(c)	A negative marker <i>méi(yǒu)</i> plus a negative marker <i>méi(yǒu)</i> .	<i>Wǒ</i> I 'I didn't not go to America.'	<i>méi(yǒu)</i> not.have	<i>méi(yǒu)</i> not.have	<i>qù</i> go	<i>Měiguó.</i> America	
(d)	A negative marker <i>méi(yǒu)</i> plus a negative marker <i>bù</i> .	<i>Wǒ</i> I 'It is not the case that I won't go to Canada.'	<i>méi(yǒu)</i> not.have	<i>bù</i> not	<i>qù</i> go	<i>Jiānádà.</i> Canada	
(e)	A negative marker <i>bù</i> plus a negative marker <i>méi(yǒu)</i> .	<i>Wǒ</i> I 'I won't have no time to attend.'	<i>bù</i> not	<i>huì</i> will	<i>méi(yǒu)</i> not.have	<i>shíjiān</i> time	<i>cānjiā.</i> attend
(f)	A negative marker <i>bù</i> plus a negative marker <i>bù</i> .	<i>Wǒ</i> I 'I won't not attend.'	<i>bù</i> not	<i>huì</i> will	<i>bù</i> not	<i>cānjiā.</i> ^a attend	
(g)	An adverbial negative expression <i>cóngláméi</i> 'never' plus a negative marker <i>méi(yǒu)</i> .	<i>Wǒ</i> I 'I didn't never attend summer camp.'	<i>cóngláméi</i> ever.not	<i>méi(yǒu)</i> not.have	<i>cānjiā</i> attend	<i>guò</i> PART	<i>xiàlǐngyíng.</i> summer camp
(h)	An adverbial negative expression <i>cónglábù</i> 'never' plus a negative marker <i>bù</i> .	<i>Wǒ</i> I 'I don't never attend summer camp.'	<i>cónglábù</i> ever.not	<i>bù</i> not	<i>cānjiā</i> attend		<i>xiàlǐngyíng.</i> summer camp
(i)	A negative quantifier expression <i>méi(yǒu)dōngxi</i> 'nothing' in object position plus a negative marker <i>méi(yǒu)</i> .	<i>Wǒ</i> I 'There is nothing I haven't done yet.'	<i>méi(yǒu)dōngxi</i> not.have.thing	<i>hái</i> still	<i>méi(yǒu)</i> not.have	<i>zuò.</i> do	
(j)	A negative quantifier expression <i>méi(yǒu)dōngxi</i> 'nothing' in object position plus a negative marker <i>bù</i> .	<i>Wǒ</i> I 'There is nothing I was not able to do.'	<i>méi(yǒu)dōngxi</i> not.have.thing	<i>bù</i> not	<i>huì</i> can	<i>zuò.</i> do	

^a Note that in most of our examples the two negative elements are adjacent, except examples in syntactic patterns (e,f,i). For patterns (e,f), the sentence would be ungrammatical if W1 *bù* 'not' was adjacent to the second negative marker *méi(yǒu)/bù*. As a result, in these cases the auxiliary verb *huì* 'will' appears between the two negative elements. For pattern (i), the adverb *hái* 'still' can be optionally omitted, in which case the two negative expressions in this pattern would be adjacent.

(5) above). Participants were asked to decide which of the two best expressed their interpretation of the answer and then to click the cursor over a button on the screen that corresponded to their chosen option.

A total of 4560 responses (114 participants × 40 test items) were obtained. The mean duration of the experiment was 13.87 min (SD = 14.93).

4. Results

This section presents the results of the perception experiment, in which native speakers of MC were asked to make a choice in interpretation (DN reading vs. SN reading) for sentences with two negative expressions, of which one or both of them could be stressed. Recall that we aimed at investigating whether from the interaction of stress with multiple negative expressions SN is possible at all within the boundaries of a single clause. Analysis of the results obtained provided an answer to our first research question by showing that SN interpretations of MC sentences with two negative expressions are indeed possible, though these interpretations are relatively uncommon. Out of the 4560 responses obtained in the

Table 3

Mean proportion (and standard deviations) of SN interpretations for the different conditions presented in our experimental stimuli. Different shades of gray represent the number of SN interpretations for each combination, with darker shades indicating higher numbers.

Element Type	Word1	Word2	unstressed	unstressed	STRESSED	STRESSED
			+	+	+	+
			unstressed	STRESSED	unstressed	STRESSED
<i>méiyǒurén</i> & <i>méiyǒudōngxi</i>	<i>méiyǒurén</i>	<i>méiyǒu</i>	.0263 (.1608)	.0708 (.2576)	.0088 (.0941)	.0351 (.1848)
	<i>méiyǒurén</i>	<i>bù</i>	.0088 (.0937)	.0439 (.2057)	.0088 (.0937)	.0354 (.1856)
	<i>méiyǒudōngxi</i>	<i>méiyǒu</i>	.0351 (.1848)	.0354 (.1856)	.0268 (.1622)	.0088 (.0941)
	<i>méiyǒudōngxi</i>	<i>bù</i>	.0354 (.1856)	.0702 (.2566)	.0351 (.1848)	.0439 (.2057)
<i>méiyǒu</i> & <i>bù</i>	<i>méiyǒu</i>	<i>méiyǒu</i>	.0789 (.2708)	.3009 (.4607)	.1404 (.3489)	.1316 (.3395)
	<i>méiyǒu</i>	<i>bù</i>	.0000 (.0000)	.1228 (.3297)	.0179 (.1330)	.0877 (.2841)
	<i>bù</i>	<i>méiyǒu</i>	.0175 (.1319)	.1518 (.3604)	.0265 (.1615)	.0702 (.2566)
	<i>bù</i>	<i>bù</i>	.0088 (.0937)	.0439 (.2057)	.0088 (.0937)	.0702 (.2566)
<i>cónglǎiméi</i> & <i>cónglǎibù</i>	<i>cónglǎiméi</i>	<i>méiyǒu</i>	.0526 (.2243)	.1053 (.3082)	.1842 (.3894)	.1327 (.3408)
	<i>cónglǎibù</i>	<i>bù</i>	.0702 (.2566)	.1404 (.3489)	.1667 (.3743)	.1667 (.3743)

perception experiment, the choice of DN readings is undoubtedly the preferred reading for simple sentences with two negative expressions. The choice of SN readings reached, overall, 7.06%, a percentage that is nonetheless statistically significant when analyzing the main effects of the type of negative element ($p < .001$) and the stress on the second negative expression ($p < .001$) (see Section 4). This means that the participants' SN interpretation associated with multiple negative expressions is not randomly distributed, but caused by a series of (combinations of) factors.

The answer to our second research question, namely, whether the possibility of a SN reading is related to the presence of stress associated with the negative expressions can be found in the results displayed in Table 3, which shows the mean proportion (and standard deviation) of SN interpretations obtained for the different negative expressions, word orders and stress patterns included in our experiment.

As can be seen, though in no instance do SN readings constitute much more than 30% of responses, the highest percentage of SN readings is obtained when *méiyǒu* (W1, unstressed) combines with *méiyǒu* (W2, stressed). Other than that, there are several conditions in which the proportion of SN interpretations is noteworthy, namely, in the specific syntactic patterns combining *bù* + *méiyǒu* (15.18% of SN) and *méiyǒu* + *bù* (12.28% of SN), when the first negative expression is *cónglǎiméi/cónglǎibù* 'never', and especially when stress is assigned to the second negative expression only.

To see if these results were statistically significant, a GLMM was run with PERCEIVED INTERPRETATION as the dependent variable (0 = DN, 1 = SN) (Binomial distribution, Logit link). The following variables were set as fixed factors: ELEMENTTYPE (three types: *méiyǒu/bù*, *méiyǒurén/méiyǒudōngxi*, *cónglǎiméi/cónglǎibù*), STRESSED1 (i.e., whether the first negative expression was stressed or not), STRESSED2 (i.e., whether the second negative expression was stressed or not), and all their possible paired interactions, namely STRESSED1 \times STRESSED2, ELEMENTTYPE \times STRESSED1, and ELEMENTTYPE \times STRESSED2. A random slope was defined for both ELEMENTTYPE and STRESSED1 \times STRESSED2 by SUBJECT. Of all the fixed factors, only STRESSED1 was not found to be significant ($F = .518$, $p = .472$). By contrast, STRESSED2 was

Table 4
General tendencies for SN interpretations in terms of stress pattern.

	Proportion single negation (SE)		Significance
	W2 unstressed	W2 STRESSED	
W1 unstressed	.0090 (.0030)	.0397 (.0087)	$p < .001$
W1 STRESSED	.0189 (.0053)	.0244 (.0062)	$p = .302$

Bold values are statistically significant.

Table 5
General tendencies for SN interpretations in terms of the type of negative element occupying the first position (W1).

ElementType, W1	Proportion of single negation (SE)
<i>cónglǎiméi/cónglǎibù</i>	.0483 (.0120)
<i>méiyǒu/bù</i>	.0228 (.0050)
<i>méiyǒurén/méiyǒudōngxī</i>	.0073 (.0024)

Table 6
General tendencies for SN interpretations in terms of the interaction ELEMENTTYPE of first negative expression (W1) \times STRESSED1.

ElementType, W1	Proportion of single negation (SE)		Significance
	W1 unstressed	W1 STRESSED	
<i>méiyǒurén/méiyǒudōngxī</i>	.0092 (.0033)	.0059 (.0022)	$p = .221$
<i>méiyǒu/bù</i>	.0248 (.0057)	.0210 (.0052)	$p = .377$
<i>cónglǎiméi/cónglǎibù</i>	.0299 (.0091)	.0772 (.0190)	$p = .002$

Bold values are statistically significant.

significant ($F = 16.297, p < .001$), indicating that utterances got more SN readings when the second negative element was produced with stress than when it was not ($p = .001$). Notwithstanding, the three paired interactions were found to be significant, and the first of them, STRESSED1 \times STRESSED2 ($F = 14.739, p < .001$), can be read as reflecting a restriction on the importance of the main effect just described for STRESS2. In other words, the effect of stress on the second negative expression is significant when the first negative element is unstressed ($p < .001$), but not when the first element is stressed ($p = .302$) (see Table 4).¹³

The third research question of this study (namely, whether the possibility of a SN reading is dependent on the particular type of negative expressions involved and their combination) was answered by our results showing a main effect of ELEMENTTYPE ($F = 18.196, p < .001$). This means that *cónglǎiméi/cónglǎibù* obtained more SN readings than both *méiyǒu/bù* ($p = .008$) and *méiyǒurén/méiyǒudōngxī* ($p = .001$), the latter also being significantly different such that more SN readings were obtained for *méiyǒu/bù* compared to *méiyǒurén/méiyǒudōngxī* ($p < .001$) (see Table 5).

The two remaining interactions deal with the role of stress in causing certain negative element types to receive a higher or lower number of SN interpretations. First, the interaction ELEMENTTYPE \times STRESSED1 ($F = 9.499, p < .001$) can be read as indicating that sentences with *cónglǎiméi/cónglǎibù* in the first position received more SN readings when stressed than when unstressed ($p = .002$). However, this effect of stress was not significant for either *méiyǒurén/méiyǒudōngxī* ($p = .221$) or *méiyǒu/bù* ($p = .377$) (see Table 6).

Second, the interaction ELEMENTTYPE \times STRESSED2 ($F = 5.890, p = .003$) can be read in the following way. In those sentences in which *méiyǒu/bù* occupied the first position, utterances with stress in the second expression received more SN readings than those with an unstressed second expression ($p < .001$). However, this effect of stress over the second negative expression was not found to be significant when the first position was occupied by either *méiyǒurén/méiyǒudōngxī* ($p = .080$) or *cónglǎiméi/cónglǎibù* ($p = .162$) (see Table 7). If we return to Table 3 above, we see that this is especially evident when *méiyǒu* is involved, particularly in those sentences in which *méiyǒu* appears twice (see the Discussion section below).

In sum, the GLMM reveals four main results. First, there is a general tendency toward SN interpretations depending on the stress pattern, such that there is an effect of stress in the second position (W2), but only if the first position remains unstressed. Second, there is also a tendency toward SN interpretations depending on the type of negative expression

¹³ From Tables 4–7 the average values and standard errors (SE) correspond to the estimated means from the Generalized Linear Mixed Model.

Table 7

General tendency for SN interpretations in terms of the interaction ELEMENTTYPE of negative expression occurring first (W1) \times STRESSED on the negative expression occurring second in the utterance (W2).

ElementType, W1	Proportion of single negation (SE)		Significance
	W2 unstressed	W2 STRESSED	
<i>méiyǒurén/méiyǒudōngxī</i>	.0052 (.0022)	.0105 (.0033)	$p = .080$
<i>méiyǒu/bù</i>	.0105 (.0030)	.0491 (.0112)	$p < .001$
<i>cónglǎiméi/cónglǎibù</i>	.0407 (.0118)	.0573 (.0149)	$p = .162$

occupying the first position (W1), such that *cónglǎiméi/cónglǎibù* > *méiyǒu/bù* > *méiyǒurén/méiyǒudōngxī*. Third, *cónglǎiméi/cónglǎibù* in the first position triggers more SN readings when it is stressed. Fourth, *méiyǒu/bù* in the first position triggers more SN readings if the second negative expression (which is also *méiyǒu/bù*) is stressed.

5. Discussion

The aim of this study has been to understand whether SN readings are possible at all in MC within the boundaries of a single clause, and to find out which factors seem to favor a SN reading of sentences with multiple negative expressions. We have investigated the role of stress and element type.

The first of these factors consisted of the function of stress when applied to any of the two negative expressions of a sentence (W1 or W2). The results of our perception experiment generally showed that stress on the second negative expression favored more SN readings than stress on the first, especially in those sentences in which W1 was unstressed and W2 was stressed ($u + S$). Thus, it would seem that, when the second negative expression—which corresponds to the negative marker *méiyǒu/bù*—received stress, participants interpreted it as the most salient element expressing negation in the sentence, rather than as interacting with the first expression to produce a DN (and hence positive) reading. This preference for a SN interpretation in $u + S$ sequences might be motivated by the physical properties of the materials, i.e. the structure in which W1 remained unstressed and W2 stressed was the only one in which mean pitch (Hz), pitch range (st) and intensity (dB) provided higher values for W2 than for W1 (see Table 1). This could be seen as a direct violation of the so-called theory of declination in declarative sentences (Pierrehumbert, 1979; Belotel-Grenié and Grenié, 2003, a.o.), according to which a pattern of declination of the fundamental frequency contour and of the lowering of the peaks of accentuated syllables is expected to occur as a sentence approaches its end. Indeed, this slope of expected declination was violated at the time W2 was stressed, and might have had an effect in the interpretation.

Consider (6), one of the examples used in our experiment.

(6) Wǒ *méi(yǒu)* BÙ qù Jiānádà.

I not.have not go Canada

'I am not not going to Canada' (DN reading) / 'I am not going to Canada' (SN reading).

Examples such as (6), which had stress on the second negative marker *bù* 'not' in the audio-recording, were associated with a non-negligible SN reading 12.28% of the time, in contrast to 1.79% when *méi(yǒu)* but not *bù* was stressed. This suggests two conclusions: (i) when two negative markers combine within the boundaries of a sentence and the second one is stressed, thus violating the fundamentals of the theory of declination, the one next to the verb (W2) is the one taken to express sentential negation; (ii) the interaction of syntax and prosody (stress in particular) makes possible the emergence of SN readings in MC, as it has also been shown to be the case in other so-called DN languages (Zeijlstra, 2010; de Swart and Fonville, 2014). In other words, although it seems that the output of syntax should contribute a DN reading (because of the interaction of two negative markers), a special prosody enhances a SN reading.¹⁴

After stress, the second factor playing a role in eliciting SN readings seems to be the type of negative expression involved. When considering the type of expression occurring in the first position (ElementType in W1, see Table 5),

¹⁴ Parallel interaction of syntax and prosody has been discussed in the literature on negation in so-called NC languages in order to account for the emergence of DN readings (Corblin, 1995, 1996; and Déprez, 1999, 2000 for standard French; Vinet, 1998 for Québec French; Corblin and Toven, 2003 for French and Italian; Molnár, 1998 and Puskás, 2006, 2012 for Hungarian; Zanuttini, 1991, 1997, Godard and Marandin, 2007, and Penka, 2007 for Italian; Falaus, 2007 for Romanian; Huddleston, 2010, Biberauer and Zeijlstra, 2012 for Afrikaans; Espinal and Prieto, 2011, Espinal et al., 2016 for Catalan). This means that what we describe in this paper is a particular case of a general property in language design.

cónglǎiméi/cónglǎibù obtained more SN readings than *méiyǒurén/méiyǒudōngxi* ($p = .001$) or *méiyǒu/bù* ($p = .008$). This difference may be due to the fact that *cónglǎiméi/cónglǎibù*, *méiyǒurén/méiyǒudōngxi*, and *méiyǒu/bù* have a different contribution to the meaning of the sentence, which in turn reflects a syntactic difference. When the first negative expression is an adverbial, *cónglǎibù/cónglǎiméi(yǒu)* ‘never’, it behaves like an adjunct. By contrast, when the first negative expression is a quantifier, *méi(yǒu)rén* ‘no one’ or *méi(yǒu)dōngxi* ‘nothing’, it behaves like an argument. Adjuncts may not express negation by themselves, but rather act as modifiers of a negative sentence whose head is the negative marker *méi(yǒu)* or *bù*, a second negative expression preceding the verb. By contrast, negative quantifier expressions (*méi(yǒu)rén* ‘no one’ or *méi(yǒu)dōngxi* ‘nothing’) in argument position, express negation by themselves. As a consequence, the combination of a negative quantifier *méi(yǒu)rén* ‘no one’/*méi(yǒu)dōngxi* ‘nothing’ early in the sentence with the negative marker *méiyǒu/bù* most frequently conveys the expected DN interpretation. This is borne out in our results. Those instances where the first negative expression was the adjunct *cónglǎibù/cónglǎiméi(yǒu)* ‘never’ yielded more SN interpretations than those in which the first expression was the argument *méi(yǒu)rén* ‘no one’ or *méi(yǒu)dōngxi* ‘nothing’. Consider (7a,b), two examples used in our experiment.

- (7) a. Wǒ *cónglǎiméi méi(yǒu) cānjiā guò xiàlǐngyíng.*
 I ever.not not.have attend PART summer camp
 ‘I didn’t never attend a summer camp.’
 b. *Méi(yǒu)rén méi(yǒu) qù guò Měiguó.*
 not.have.people not.have go PART America
 ‘No one hasn’t been to America.’

In example (7a), *cónglǎiméi* ‘never’ appears first and is regarded as an adjunct that modifies the whole negative sentence *wǒ méi(yǒu) cānjiā guò xiàlǐngyíng* ‘I didn’t attend a summer camp’. In effect, under this interpretation, *cónglǎiméi* is a preverbal adjunct that does not duplicate the expression of negation, but merely modifies a sentence whose head is the negator *méi(yǒu)*.¹⁵ As a result, a SN interpretation may be obtained for a syntactic pattern based on adjunction. For the alternative and also possible DN reading that this sentence may have, one should rather assume that both *cónglǎiméi* and *méi(yǒu)* are full negators of the sentence.¹⁶

In example (7b), on the other hand, *méi(yǒu)rén* ‘no one’ is a negative quantificational subject. When *méi(yǒu)rén* ‘no one’ co-occurs with the sentential negative marker *méi(yǒu)* ‘not’, they cancel each other out, in accordance with common expectations, thus yielding a DN interpretation, as if two primary negation markers (*bù* and *méi(yǒu)*) were combined iteratively.

Regarding the interaction of Element Type in $W1 \times$ Stressed in $W1$ (see Table 6), our results also show that *cónglǎiméi/cónglǎibù* conveyed SN even more when it was stressed (7.72%). This can be explained as follows. *Cónglǎiméi/cónglǎibù* ‘never’ can be analyzed as a preverbal adjunct and as such it merely modifies the negative sentence rather than negating it. Furthermore, when this preverbal adjunct is stressed, it diminishes the role of the negative expression coming after it, thus favoring the likelihood of a SN reading.

Concerning the interaction of Element Type in $W1 \times$ Stressed in $W2$ (see Table 7), our findings show that the combination of *méi(yǒu)/bù* in first position and stressed *méi(yǒu)/bù* in second position yielded the highest proportion of SN readings (4.91%) with the highest statistical significance ($p < .001$).

Additionally, Fig. 2 shows that the specific combination of *méi(yǒu)* in first position and *méi(yǒu)* in second position is the one that yielded the highest proportion of SN readings (16.26%), whereas *bù* in first position and *bù* in second position yielded the lowest proportion of SN readings (3.29%).

To illustrate these results, let us consider example (8) from our experiment.

- (8) Wǒ *méi(yǒu) Měi(yǒu) qù Měiguó.*
 I not.have not.have go America
 ‘I didn’t not go to America’ (DN reading)/‘I didn’t go to America’ (SN reading).

¹⁵ See Li (2007) for the hypothesis that no NegP is necessary in MC: *méi(yǒu)* ‘not’ is the head of AspP, which can be preceded by Type I adjuncts (under TopicP) and Type II adjuncts (under TenseP).

¹⁶ It is not our aim in this paper to provide a structural analysis of MC negative sentences. Some authors postulate NegP (Cheng and Li, 1991), while others do not (Ernst, 1995; Li, 2007). As mentioned in footnote 16 *méi(yǒu)* has been analyzed by Li (2007) as head of AspP, and *bù* as adjunct to PredicationP. According to Ernst (1995), standard Mandarin *yǒu* (head of Asp) must be supported by negation (i.e., [+NEG] *yǒu* realizes *méi* as a prefix), and *bù* is an adverb in Spec,AuxP or in Spec,VP. On the other hand, Cheng and Li (1991) posit that Neg may select an AuxP headed by *yǒu*, with *bù* becoming *méi* before *yǒu*.

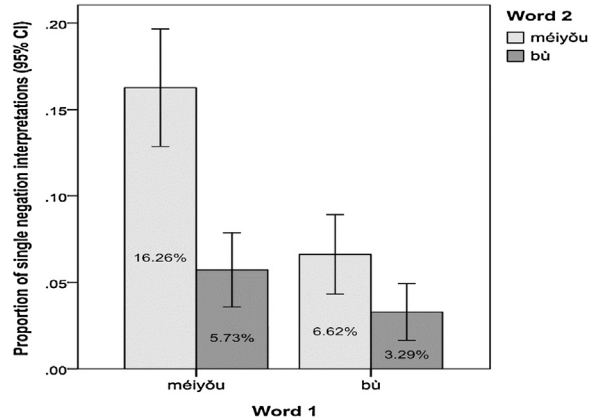


Fig. 2. Proportion of SN interpretations for different combinations of *méi(yǒu)* and *bù*.

In example (8), the second *méi(yǒu)*, which precedes immediately the V, is stressed and made salient as the expression of negation. In this context the first *méi(yǒu)* (a higher head) does not seem to play a major role in the expression of sentential negation.¹⁷

Finally, the combination of *bù* with another *bù* obtained the lowest proportion of SN interpretations (3.29%). This could be due to the fact that *bù* is not involved in the same grammaticalization path $V > T > C$ that is affecting *méi*. In fact, the two instances of *bù* cannot be adjacent to each other, as illustrated in (9). In (9), the first *bù* is not adjacent to the second one. It should be noted that the sentence would be ungrammatical if it were. To avoid this ungrammaticality, some element must intervene between them, in this case the auxiliary verb *huì* 'will'.

- (9) *Wǒ bú huì bù cānjiā.*
 I not will not attend
 'I won't not attend' (DN reading) / 'I won't attend' (SN reading).

This example shows that the first *bù* cliticizes (Ernst, 1995) to the auxiliary verb *huì* 'will' (*bù* is in Spec,AuxP), while the second *bù* attaches to the main verb (*bù* is in Spec,VP). These two negators, which occur in the specifier position of different structural heads, tend to cancel each other out and lead to less SN interpretations.

6. Conclusion

In the literature, a macroparametric division between DN languages and NC languages has been proposed. However, in the spirit of Borer (1984), we have argued that the distinction between DN and NC is not macroparametric but is due rather to different readings attributed to sentences that show different syntactic and prosodic patterns. MC encodes and expresses negation both by means of independent negative markers (*méi(yǒu)* and *bù*) and by means of complex negative expressions (*cóngláiméi*, *cónglábù*, *méi(yǒu)rén*, and *méi(yǒu)dōngxī*). When two such negative expressions co-occur in one sentence they generally cancel each other out to yield a DN reading. However, noting that stress can override the default DN interpretation of emphatic multiple negative expressions in Dutch (Zeijlstra, 2010), we have hypothesized that specific conditions might also occur in MC whereby sentences with multiple negative expressions shift from a DN reading to a SN reading. In the present study, we tested this hypothesis by means of an online judgment task performed by 114 native speakers of MC which also allowed us to determine what factors were most likely to favor a SN reading. The results of our perception experiment showed that a SN reading was favored a) when the second negative expression was stressed and b) when the first negative expression was an adjunct, not an argument.

The answers to our three original research questions are therefore as follows.

¹⁷ This situation most probably relates to the negative head cycle (van Gelderen, 2011), according to which a loss of semantic features accounts for the reanalysis of a lexical head to a higher head: a negative expression derives from a full-fledged verb, it gets reanalyzed as a head in T (as an aspect or modality marker), and/or finally in C (as an interrogative or discourse marker). See also Yang (2011).

Q1. In MC, are SN readings ever possible in sentences with two negative expressions? Our results show that they are, though they occur at a low—albeit statistically significant—rate.

Q2. If so, is this reading influenced by the presence of stress, and does it depend on whether it is the first or the second negative expression that receives the stress? In our findings, SN readings were obtained only when the second negative expression (which in all cases was the negative marker *méi(yǒu)/bù*) received stress. We speculate that this prosodic prominence, being a direct violation of the so-called theory of declination, causes the second expression to be semantically and pragmatically salient, and thus to favor a SN reading.

Q3. Is this possibility dependent on the type of the negative expressions involved and the combination thereof? Our results show that negation readings do indeed depend on the particular combination of negative expressions involved, with SN readings being more likely when the first negative expression is an adjunct (*cónglǎibù/cónglǎiméi(yǒu)*) rather than an argument (*méi(yǒu)rén* or *méi(yǒu)dōngxì*).

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.lingua.2018.04.009>.

References

- Belotel-Grenié, A., Grenié, M., 2003. Declination line and tones variations in standard Chinese. In: Solé, M.J., Recasens, D., Romero, J. (Eds.), *15th International Congress of Phonetic Sciences*, pp. 1281–1284.
- Biberauer, T., Zeijlstra, H., 2012. Negative concord in Afrikaans: filling a typological gap. *J. Semant.* 29, 345–371. <http://dx.doi.org/10.1093/jos/ffr010>
- Boersma, P., Weenink, D., 2008. Praat: Doing Phonetics by Computer [Computer Program]. Retrieved from <http://www.praat.org> (accessed 30.05.14)
- Borer, H., 1984. Parametric Syntax: Case Studies in Semitic and Romance Languages. Foris, Dordrecht. <http://dx.doi.org/10.1515/9783110808506>
- Cheng, L.L.-S., Li, Y.F., 1991. Double negation in Chinese and multi projections. In: *Paper presented at the North America Conference on Chinese Linguistics*. Cornell University.
- Corblin, F., 1995. Compositionality and complexity in multiple negation. *Logic J. IGPL* 3, 449–471. <http://dx.doi.org/10.1093/jigpal/3.2-3.449>
- Corblin, F., 1996. Multiple negation processing in natural languages. *Theoria* 17, 214–259. <http://dx.doi.org/10.1111/j.1755-2567.1996.tb00503.x>
- Corblin, F., Toven, L., 2003. L'expression de la négation dans les langues romanes. In: Godard, D. (Ed.), *Les Langues Romanes. Problèmes de la Phrase Simple*. CNRS, Paris, pp. 281–343.
- de Swart, H., Fonville, R., 2014. Double negatives and intonation in Dutch. In: Gilbers, D., Hoeksema, J. (Eds.), *Black Book: A Festschrift for Frans Zwarts*. CLCG, Groningen, pp. 86–100.
- de Swart, H., Sag, I., 2002. Negation and negative concord in Romance. *Linguist. Philos.* 25, 373–417. <http://dx.doi.org/10.1023/a:1020823106639>
- Déprez, V., 1999. The roots of negative concord in French and French-based creoles. In: DeGraff, M. (Ed.), *Language Creation and Language Change: Creolization, Diachrony, and Development*. MIT Press, Cambridge, MA, pp. 375–427.
- Déprez, V., 2000. Parallel (a)symmetries and the internal structure of negative expressions. *Nat. Lang. Linguist. Theory* 18, 253–342.
- Ding, S.S., et al., 1999. *Xiandai Hanyu Yufa Jianghua* (Lectures in Modern Chinese Grammar). The Commercial Press, Beijing.
- Duanmu, S., 2000. *Hanyu de jiezou* (Rhythm in Chinese). *Contemp. Linguist.* 4, 203–209.
- Duanmu, S., 2014. Zhongyin lilun ji hanyu zhongyin xianxiang (Stress theory and stress phenomena in Chinese). *Contemp. Linguist.* 3, 288–302.
- Ernst, T., 1995. Negation in Mandarin Chinese. *Nat. Lang. Linguist. Theory* 13, 665–707.
- Espinal, M.T., Prieto, P., 2011. Intonational encoding of double negation in Catalan. *J. Pragmat.* 43, 2392–2410.
- Espinal, M.T., Tubau, S., Borràs-Comes, J., Prieto, P., 2016. Double negation in Catalan and Spanish. Interaction between syntax and prosody. In: Larrivière, P., Lee, C. (Eds.), *Negation and Polarity: Cognitive and Experimental Perspectives*. Springer, Berlin, pp. 145–176. http://dx.doi.org/10.1007/978-3-319-17464-8_7
- Falaus, A.M., 2007. Le paradoxe de la double négation dans une langue à concordance négative stricte. In: Floricic, F. (Ed.), *La Négation Dans les Langues Romanes*. John Benjamins, Amsterdam, pp. 75–97.
- Giannakidou, A., 1998. Polarity Sensitivity as (Non) veridical Dependency. John Benjamins, Amsterdam. <http://dx.doi.org/10.1075/la.23>
- Giannakidou, A., 2000. Negative...concord? *Nat. Lang. Linguist. Theory* 18, 457–523. <http://dx.doi.org/10.1023/a:1006477315705>
- Giannakidou, A., 2006. N-words and negative concord. In: Everaert, M., van Riemsdijk, H. (Eds.), *The Blackwell Companion to Syntax*. Blackwell, Oxford, pp. 327–391. <http://dx.doi.org/10.1002/9780470996591.ch45>
- Godard, D., Marandin, J.M., 2007. Aspects pragmatiques de la négation renforcée en italien. In: Floricic, F. (Ed.), *La Négation Dans les Langues Romanes*. John Benjamins, Amsterdam, pp. 137–160.
- Horn, L.R., 1989. *A Natural History of Negation*. University of Chicago Press, Chicago.
- Huang, B.R., Liao, X.D., 2007. *Xiandai Hanyu* (Modern Chinese). Higher Education Press, Beijing.
- Huddleston, K.M., 2010. *Negative Indefinites in Afrikaans* (Ph. D. Dissertation). Utrecht University.
- Jou, J., 1988. The development of comprehension of double negation in Chinese children. *J. Exp. Child Psychol.* 45, 457–471.
- Jouie, M.W.-F., 1995. *Children's Comprehension of Double Negation* (B. A. Dissertation). University of Hong Kong.
- Labov, W., 1972. Negative attraction and negative concord in English grammar. *Language* 48, 773–818. <http://dx.doi.org/10.2307/411989>

- Li, M., 2007. *Negation in Chinese*. Shanghai Foreign Language Education Press, Shanghai.
- Li, C.N., Thompson, S.A., 1981. *Mandarin Chinese: A Functional Reference Grammar*. University of California Press, Berkeley.
- Longobardi, G., 1987. *The negation systems of Romance*. In: Talk Given at the GLOW Workshop, Venice.
- Longobardi, G., 2014. Theory and experiment in parametric minimalism. The case of Romance negation. In: Pensalfini, R., Turpin, M., Guillemin, D. (Eds.), *Language Description Informed by Theory*. John Benjamins, Amsterdam, pp. 217–261. <http://dx.doi.org/10.1075/slcs.147.10lon>
- Lü, S.X., 1985. *Yiwen, fouding, kending (Question, negation and affirmation)*. *Zhongguo Yuwen* 4, 241–250.
- Lü, S.X., 1999. *Xiandai Hanyu Babai Ci (Eight hundred words of modern Chinese)*. The Commercial Press, Beijing.
- McCawley, J.D., 1978. What is a tone language? In: Fromkin, V.A. (Ed.), *Tone: A Linguistic Survey*. Academic Press, New York, pp. 113–131. <http://dx.doi.org/10.1016/b978-0-12-267350-4.50009-1>
- Molnár, V., 1998. Topic in focus. On the syntax, phonology, semantics and pragmatics of the so-called 'contrastive topic' in Hungarian and German. *Acta Linguist. Hung.* 45 (1/2), 89–166.
- Muller, C., 1991. *La négation en français. Syntaxe, sémantique et éléments de comparaison avec les autres langues romanes*. Librairie Droz, Genève.
- Penka, D., 2007. *Negative Indefinites (Ph. D. Dissertation)*. University of Tuebingen.
- Pierrehumbert, J., 1979. The perception of fundamental frequency declination. *J. Acoust. Soc. Am.* 66 (2), 363–369.
- Pike, K.L., 1948. *Tone Languages: A Technique for Determining the Number and Type of Pitch Contrasts in a Language, with Studies in Tonemic Substitution and Fusion*. University of Michigan Press, Ann Arbor.
- Puskás, G., 2006. Double negation and information structure: somewhere between Topic and Focus. In: Molnár, V., Winkler, S. (Eds.), *The Architecture of Focus*. Mouton de Gruyter, Berlin, pp. 291–317.
- Puskás, G., 2012. Licensing double negation in NC and non-NC languages. *Nat. Lang. Linguist. Theory* 30, 611–649.
- Shao, J.M., 2007. *Xiandai Hanyu Tonglun (Modern Chinese theory)*. Shanghai education Press, Shanghai.
- van der Wouden, T., 1994. *Negative Contexts (Ph. D. Thesis)*. Department of Dutch, University of Groningen.
- van Gelderen, E., 2011. *The Linguistic Cycle. Language Change and the Language Faculty*. Oxford University Press, Oxford/New York.
- Vinet, M.T., 1998. Contrastive focus, French n-words and variation. *Can. J. Linguist.* 43 (1), 121–141.
- Yang, H.L., 2011. Is Chinese a negative concord language? In: Jing-Schmidt, Z. (Ed.), *Proceedings of the 23rd North American Conference on Chinese Linguistics, vol. 2*. University of Oregon, Eugene, pp. 208–223.
- Yip, M., 2002. *Tone*. Cambridge Textbooks in Linguistics. Cambridge University Press, Cambridge. <http://dx.doi.org/10.1017/cbo9781139164559>
- Zanuttini, R., 1991. *Syntactic Properties of Sentential Negation: A Comparative Study of Romance Languages (Ph. D. Dissertation)*. University of Pennsylvania.
- Zanuttini, R., 1997. *Negation and Clausal Structure: A Comparative Study of Romance Languages*. Oxford University Press, Oxford.
- Zeijlstra, H., 2004. *Sentential Negation and Negative Concord (Ph. D. Dissertation)*. University of Amsterdam, Amsterdam.
- Zeijlstra, H., 2010. Emphatic multiple negative expressions in Dutch. *Linguist. Rev.* 27, 37–73. <http://dx.doi.org/10.1515/tlir.2010.003>
- Zhou, P., Crain, S., Thornton, R., 2014. Children's knowledge of double negative structures in Mandarin Chinese. *J. East Asian Linguist.* 23, 333–359. <http://dx.doi.org/10.1007/s10831-013-9118-y>
- Zhu, M.S. (Ed.), 1986. *Ertong Yuyan Fazhan Yanjiu (Research on child language development)*. East China Normal University Press, Shanghai.