

Article

An Experimental Investigation into the Scope Assignment of Japanese and Chinese Quantifier-Negation Sentences

Yunchuan Chen 

Department of Asian and Middle Eastern Studies, Duke University, Durham, NC 27708, USA;
yunchuan.chen@duke.edu

Abstract: Quantifier-Negation sentences such as *all teachers did not use Sandy's car* are known to allow an inverse scope interpretation in English. However, there is a lack of experimental evidence to determine whether this interpretation is allowed in equivalent sentences in Japanese and Chinese. To address this issue, this study conducted a sentence–picture matching truth value judgment experiment in both Japanese and Chinese. The data suggested that Japanese Quantifier-Negation sentences do allow inverse scope readings, which suggests that the subject may be interpreted within the scope of negation. In contrast, Chinese Quantifier-Negation sentences prohibit inverse scope readings, which is in accordance with the strong scope rigidity consistently observed in this language. This paper also discussed how to develop a valid experiment for investigating scope ambiguities.

Keywords: Chinese; Japanese; negation; quantifier; scope



Citation: Chen, Yunchuan. 2024. An Experimental Investigation into the Scope Assignment of Japanese and Chinese Quantifier-Negation Sentences. *Languages* 9: 111. <https://doi.org/10.3390/languages9030111>

Academic Editor: Carlo Cecchetto

Received: 31 December 2023

Revised: 11 February 2024

Accepted: 29 February 2024

Published: 20 March 2024



Copyright: © 2024 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Japanese and Chinese are widely known for their scope rigidity, where the scope assignment of quantificational expressions is solely determined by their surface structural relations (e.g., [Hoji 1985](#); [Huang 1982](#); [Kuno 1973](#); [Kuroda 1979](#)). This study focuses on Quantifier-Negation (Q-Neg) sentences such as *all teachers did not use Sandy's car*, which are negative sentences involving a universal quantified expression as a modifier in the subject position. As will be discussed below, it has been generally agreed that negation can take a wider scope over the universal quantifier in English Q-Neg sentences. However, although previous studies have claimed that Chinese Q-Neg sentences do not allow negation to have scope over the universal quantifier, all their sample sentences included a particle *dou* ('all'), which is generally regarded as a distributive operator ([Lin 1996, 1998](#)). It thus remains unclear whether Chinese Q-Neg sentences without *dou* allow a wide scope of negation. Moreover, for Japanese Q-Neg sentences, researchers have split opinions on whether negation can have scope over the universal quantifier. An examination of the sample sentences presented in earlier studies revealed two types of Q-Neg sentences: a. those with *all* as their sole subject; b. those with *all* serving as the modifier of the subject noun. While previous researchers considered the latter type possible in allowing negation to have scope over the universal quantifier, there is a lack of experimental data to support their claim. This presents an issue, particularly given the widespread belief that Japanese is a scope-rigid language. To address these concerns in Japanese and Chinese, this study conducted a sentence–picture matching truth value judgment (TVJ) task ([Crain and Thornton 1998](#)). The same task was developed for both the Chinese and Japanese versions. The data show that negation can have scope over the universal quantifier in Japanese but not in Chinese.

2. Scope Rigidity in Japanese and Chinese Quantified Sentences

Japanese has long been regarded as a scope-rigid language. Take the following sentence, for example:

- (1) Yonin-no shoonen-ga sannin-no shoojo-o shootaishi-ta.
 four-GEN boy-NOM three-GEN girl-ACC invite-PST
 ‘Four boys invited three girls’. (Japanese, [Hoji 1985](#), p. 236)

According to [Kuno \(1973\)](#) and [Hoji \(1985\)](#), *yonin-no shoonen* (‘four boys’) always has scope over *sannin-no shoojo* (‘three girls’), which generates two possible surface scope (SS) readings: (i) a group of four boys together invited a group of three girls; (ii) each of the four boys invited three different girls. The inverse scope (IS) reading, where *sannin-no shoojo* (‘three girls’) takes a wider scope over *yonin-no shoonen* (‘four boys’),¹ is unavailable.² [Storoshenko \(2004\)](#) noted that the scope rigidity observed in Japanese may not apply to other languages such as English.

- (2) Someone criticized many people.

- (3) Dareka-ga ooku-no-hitobito-o hihanshi-ta.
 Someone-NOM many-GEN-people-ACC criticize-PST
 ‘Someone criticized many people’. (Japanese)

According to [Storoshenko](#), the English sentence in (2) has two possible interpretations: (i) there is a particular person who criticized many people (*someone* > *many*); (ii) for each of many people, there is a unique critic (*many* > *someone*). In contrast, for the equivalent sentence in Japanese, which is shown in (3), the only possible reading is (i) (*someone* > *many*), which is in line with the surface c-command relation between *someone* and *many*.

This scope rigidity was also observed with universal quantified expressions in Japanese. [Marsden \(2009\)](#) discussed a difference between English and Japanese with respect to universal quantifiers:

- (4) Someone read every book.
 Interpretation:
someone > *every*: There is some person x, such that x read every book.
every > *someone*: For each book y, some person read y.
- (5) Dareka-ga dono hon-mo yon-da.
 Someone-NOM every book-also read-PST
 ‘Someone read every book’. (Japanese)
 Interpretation:
someone > *every*: There is some person x, such that x read every book.
 **every* > *someone*: For each book y, some person read y.

For the English example in (4), both the SS reading (*someone* > *every*) and the IS reading (*every* > *someone*) are possible. According to [May \(1977\)](#), quantifier raising (QR) may happen in English so *every book* in (4) can be raised to a nonargument position at Logical Form (LF), which then c-commands and has scope over *someone*. Similarly, *many people* in (2) can also be raised to a structural position that c-commands the subject *someone* at LF. On the other hand, the Japanese sentence in (5), which is equivalent to the English sentence in (4), only allows the SS reading (*someone* > *every*). It implies that Japanese is more restricted in scope assignment, and QR does not occur: the scope of quantified expressions should always reflect their c-command relationship on the surface.

The scope rigidity observed in Japanese was also extensively discussed in Chinese. [Huang \(1982\)](#) stated that Chinese doubly quantified sentences, as in (6), are unambiguous: *meige xuesheng* (‘every student’) should always take a wider scope over *yiben shu* (‘one book’).³

- (6) mei-ge xuesheng dou mai-le yi-ben shu.
 every-CL student all buy-PST one-CL book
 ‘Every student bought one book’. (Chinese)
 Interpretation:
every > *one*: For every student x, there is one book y such that x bought y.
 **one* > *every*: There is one book y, such that every student bought y.

However, the English equivalent of the Chinese sentence in (6) allows two possible readings, as shown in (7):

- (7) Every student bought one book.
 Interpretation:
every > one: For every student *x*, there is one book *y* such that *x* bought *y*.
one > every: There is one book *y*, such that every student bought *y*.

To account for the above difference between Chinese and English, Huang (1982) proposed an Isomorphic Principle:

- (8) The Isomorphic Principle:
 Suppose *A* and *B* are QPs. Then, if *A* c-commands *B* at S-Structure, *A* c-commands *B* at LF. (Huang 1982, p. 214)

According to Huang, Chinese is subject to the Isomorphic Principle while English is not.

3. Scope Rigidity in Chinese Q-Neg Sentences

As introduced earlier, English Q-Neg sentences, as demonstrated in (9), permit both the SS and IS readings.

- (9) All students did not eat apples.
 a. SS reading (*all > not*): ‘none of the students ate apples’.
 b. IS reading (*not > all*): ‘not all students ate apples’.

This scope ambiguity of English Q-Neg sentences has been confirmed by many experimental studies such as Musolino et al. (2000) and Musolino and Lidz (2006). In contrast, numerous experimental studies have shown that Chinese Q-Neg sentences only allow the SS reading (Fan 2017; Wu and Ionin 2019, 2021; Zhou and Crain 2009). However, all these studies used Chinese Q-Neg sentences that involve the particle *dou* (‘all’), which were assumed to be equivalents of English Q-Neg sentences. A sample of their Chinese sentences, which is considered equivalent to (9), is presented below:⁴

- (10) suoyou xuesheng dou meiyou chi pingguo.
 all student all not eat apple
 ‘All students did not eat apples’. (Chinese)
 a. SS reading (*all > not*): ‘none of the students ate apples’.
 b. *IS reading (*not > all*): ‘not all students ate apples’.

However, the Chinese sentence (10) may not be regarded as an equivalent of the English sentence (9) due to the inclusion of an additional particle *dou*, which is generally assumed to be a distributive operator (Lin 1996, 1998), similarly to *all* in English (e.g., Xiang 2016). Zhou and Crain (2009) stated that it is the focus-sensitivity marker *dou* that prevents Chinese Q-Neg sentences from having an IS reading, leading to the scope rigidity. In fact, the true English equivalent of (10) should be (11), where an additional universal quantifier *each* occurs as an adverb:

- (11) All students each did not eat apples.
 a. SS reading (*all > not*): ‘none of the students ate apples’.
 b. *IS reading (*not > all*): ‘not all students ate apples’.

Sentence (11) is a direct word-for-word translation of (10), and it does not permit an IS reading either. Therefore, we need to remove *dou* as a confounding factor when creating Q-Neg sentences in Chinese. This study proposes that the Chinese sentence that is truly equivalent to (9) is (12), which does not have the particle *dou*:

- (12) suoyou xuesheng meiyou chi pingguo.
 all student not eat apple
 ‘All students did not eat apples’. (Chinese)

While (12) may not sound as natural as (10) for some native Chinese speakers, it does occur. The author examined the corpus of the Beijing Language and Culture University

Corpus Center (Xun et al. 2016) and identified at least 11 Q-Neg sentences without *dou*. Through informal consultations with six native Chinese speakers, it was found that Q-Neg sentences without *dou* also prohibit the IS reading, the same as in Q-Neg sentences with *dou*. Later, we will see whether this observation is substantiated by experimental data.

4. Scope Rigidity in Japanese Q-Neg Sentences

For Japanese Q-Neg sentences, there is a divergence of judgments among researchers regarding whether an IS reading is permissible. First of all, Kitamoto (1986) argued that in Japanese Q-Neg sentences, the universal quantifier always has wider scope over negation, as in (13):

- (13) zen'in-ga repooto-o das-ana-katta.
all-NOM report-ACC submit-NEG-PST
'All people did not submit a report'.
a. SS reading (*all* > *not*): 'none of the people submitted a report'.
b. *IS reading (*not* > *all*): 'not all people submitted a report'.

According to Kitamoto, (13) is not ambiguous: the SS reading '*all* > *not*' is the only available interpretation, which is in accordance with linearity. Meanwhile, Kitamoto observed that replacing the nominative case marker *-ga* with the topic marker *-wa* in (13) results in an IS reading, as seen in (14):

- (14) zen'in-wa repooto-o das-ana-katta.
all-TOP report-ACC submit-NEG-PST
'All people did not submit a report'.
a. *SS reading (*all* > *not*): 'none of the people submitted a report'.
b. IS reading (*not* > *all*): 'not all people submitted a report'.

Kitamoto argued that the nominative case marker *-ga* carries a focus function, assigning the subject a wide scope over negation. On the other hand, there are studies arguing that Japanese Q-Neg sentences do allow negation to have scope over the universal quantified expression. Saito (2009) stated that an IS reading is available when the sentence is embedded in a conditional clause, as in (15), or when the sentence is stated in a specific context, as in (16):

- (15) zen'in-ga sono tesuto-o uke-nakat-ta-ra, raigetsu mata tesuto-o suru.
all-NOM that test-ACC take-NEG-PST-if next month again test-ACC do
'If all do not take the exam, we will have another exam next month'.
- (16) Context: students have a choice of taking an exam or submitting a term paper to receive a credit for a course.
Sentence: zen'in-ga shiken-o erab-anai to omou.
all-NOM exam-ACC choose-NEG that think
'I think that all will not choose an exam over a term paper'.

There are more examples from Ota and Kato (1986) and Shibata (2014) which the authors claimed allow negation to take a wide scope:

- (17) zenin-ga ko-na-katta.
all-NOM come-NEG-PST
'All did not come'.
a. SS reading (*all* > *not*): 'none of the people came'.
b. IS reading (*not* > *all*): 'not all people came'.
- (18) subete-no gakusei-ga ko-na-katta.
all-GEN student-NOM come-NEG-PST
'All students didn't come'.
a. SS reading (*all* > *not*): 'none of the students came'.
b. IS reading (*not* > *all*): 'not all students came'.

It was argued that the above sentences were all ambiguous, as the universal quantified expression can potentially have scope over negation, and vice versa. Additionally,

Kataoka (2006) and Shibata (2014) argued that negation may even have scope over a numeral quantifier in the subject position, as in (19):

- (19) gonin ijoo-no gakusei-ga ko-na-katta.
 five more-GEN student-NOM come-NEG-PST
 ‘More than five students didn’t come’.
 a. SS reading (*five* > *not*): ‘More than five students did not come’.
 b. IS reading (*not* > *five*): ‘Five or fewer students came’.

Furthermore, Miyagawa (2001) made several observations on Japanese Q-Neg sentences. First of all, he agreed with Kitamoto (1986) that when the subject is just a single universal quantifier, the IS reading is not available:

- (20) zen’in-ga sono tesuto-o uke-na-katta
 all-NOM that test-ACC take-NEG-PST
 ‘All did not take that test’.
 a. SS reading (*all* > *not*): ‘none of the people took that test’.
 b. *IS reading (*not* > *all*): ‘not all people took that test’.

According to Miyagawa, (20) is unquestionably unambiguous and only allows the SS reading as its sole interpretation. That is, the universal quantifier *zen’in* (‘all’) should always have scope over negation. The reason was attributed to the syntactic structure: the negation phrase (NegP), which is a projection of a negation head, is located between *vP* and TP (e.g., Pollock 1989; Laka 1990):

- (21) [TP DP_{subj} [T' [NegP [*vP* t_{subj} [*vP* DP_{obj} [*v'* [VP t_{obj} V] *v*]]] Neg] T]]

In (21), the subject moves from [Spec, *vP*] to [Spec, TP], triggered by the EPP feature on T (See also Miyagawa 2003). But why is the subject unable to reconstruct into its base position at LF and be interpreted under the scope of negation? Miyagawa claimed that it is because A-movement does not leave a copy (Chomsky 1995; Lasnik 1999). In the meantime, however, he also noted that when the universal quantifier *zen’in* (‘all’) occurs as a modifier inside the DP in the subject position, the quantifier may be interpreted within the scope of negation:⁵

- (22) Zen’in-no gakusei-ga sono tesuto-o uke-na-katta.
 all-GEN student-NOM that test-ACC take-NEG-PST
 ‘All students didn’t take that test’.
 a. SS reading (*all* > *not*): ‘none of the people took that test’.
 b. IS reading (*not* > *all*): ‘not all people took that test’.

The availability of the IS interpretation in (22) indicates that negation can have scope over the universal quantifier. Based on this finding, Miyagawa argued that when the subject DP *zen’in no gakusei* (‘all students’) moves from [Spec, *vP*] to [Spec, TP], it does leave a copy in its base position. Thus, at LF, the subject can reconstruct into its base position and be interpreted inside the scope of negation. In addition, Miyagawa observed that while (20) only permits the SS reading, scrambling the object in (20) can result in a semantically ambiguous sentence, as in (23):

- (23) Sono tesuto-o zen’in-ga t_i uke-na-katta.
 that test-ACC all-NOM take-NEG-PST
 ‘All did not take that test’.
 a. SS reading (*all* > *not*): ‘none of the people took that test’.
 b. IS reading (*not* > *all*): ‘not all people took that test’.

In (23), both the SS reading and the IS reading are possible. In Miyagawa’s analysis, the object DP *sono tesuto* (‘that test’) can be raised to [Spec, TP]. Then, the subject DP *zen’in* (‘all’) should remain in situ at [Spec, *vP*]. Thus, according to the structure in (21), the Neg head can c-command the subject, leading to an IS reading.

To summarize, Miyagawa identified two types of Q-Neg sentences in Japanese that differ in their scope assignment. The first type involves a bare universal quantifier, such

as *zen'in* 'all', in its subject position. The second type involves the universal quantifier as the modifier of the subject DP. Regarding the first type, there are two groups of researchers with divergent judgments on the presence of the IS reading. While one group of researchers (e.g., Ota and Kato 1986; Saito 2009; Shibata 2014) claimed that negation can have scope over the subject, another group of researchers (e.g., Kitamoto 1986; Miyagawa 2001) argued that the wide scope of negation is disallowed. For the second type of Q-Neg sentences, the judgments seem more consistent, as shown in (18), (19), and (22). But there is a lack of experimental evidence.

Regarding the universal quantifier *zen'in*, it is a Sino-Japanese word, composed of *zen*, meaning 'all', and *in*, a counter for people. In a specific context, this quantifier can be solely employed as a subject to denote a particular group of individuals, which makes the first type of Q-Neg sentences possible. However, it seems that both English and Chinese lack a universal quantifier of this type that can function as the sole subject in Q-Neg sentences. In both languages, universal quantifiers must function as modifiers within the subject DP of Q-Neg sentences. Therefore, for the purpose of comparing the scope assignment of Q-Neg sentences between Japanese and Chinese, the second type of Japanese Q-Neg sentences is preferred because the subject DP, composed of 'all+ noun', can find its equivalent in Chinese, while a sole universal quantifier cannot.

If the widely held belief is true that both Japanese and Chinese Q-Neg sentences adhere to scope rigidity, they are expected to be acceptable only in contexts that allow for an SS reading.

5. Previous Experimental Studies on Japanese Quantified Sentences with Negation

Han et al. (2004) pointed out that the conflicting scope judgments on Japanese Q-Neg sentences in the previous literature might be attributed to the methodology used for eliciting judgments from native speakers. They stated that it is difficult for some speakers to access a certain interpretation without a detailed context (see also Han et al. 2007). Hence, many experimental studies on sentential/anaphoric interpretations (e.g., Chen 2021; Han and Storoshenko 2012; Inagaki 2006; O'Grady et al. 2011) have resorted to using TVJ tasks, where participants can interpret sentences under specific contexts. Storoshenko (2004) claimed that TVJ tasks allow researchers to present ambiguous sentences in a carefully controlled context, where only one reading is allowed. This method was deemed more appropriate than solely relying on people's judgments because when individuals encounter semantically ambiguous sentences without any contextual cues, they may just offer a preferred reading without considering an alternative reading that is possible but less favored. However, as will be discussed later, the preference issue still remains if we use TVJ tasks without caution.

Han et al. (2004) conducted a sentence–picture matching TVJ task with native Japanese speakers to examine the following: (i) whether there is any scope ambiguity in Japanese negation sentences with a universal quantifier in object position, as exemplified in (24); (ii) whether the scope assignment differs when it comes to the *wa*-negation, as illustrated in (25):

- (24)

Donarudo-ga
orenji
subete-o
tabe-na-katta.

Donald-NOM
orange
all-ACC
eat-NEG-PST

'Donald did not eat all oranges'.
- (25)

Donarudo-ga
orenji
subete-o
tabe-wa
shi-na-katta.

Donald-NOM
orange
all-ACC
eat-TOP
do-NEG-PST

'Donald did not eat all oranges'.

A between-subjects design was used in their study. The data revealed that the acceptance rates of the '*all* > *not*' and '*not* > *all*' interpretations in the *wa*-negation sentence were both very high, standing at 98% and 94%, respectively. But when it comes to the plain negation sentence, as in (24), the '*all* > *not*' interpretation was consistently accepted at a rate of 98%, but the acceptance rate of the '*not* > *all*' interpretation was only 54%. Han et al. also conducted an analysis of each individual's judgment on the latter interpreta-

tion.⁶ There were 4 trials testing that interpretation. While five participants accepted all trials, four rejected all. Also, there were three participants who accepted 1, 2, and 3 trials, respectively. Han et al. argued that this bi-modal distribution, where the majority of participants either uniformly accepted or consistently rejected the trials, indicates that there was a split among native speakers regarding the availability of the ‘not > all’ interpretation in plain negation sentences. However, when faced with sentences with scope ambiguity, participants may unconsciously overlook a less preferred reading that is in fact permitted in their grammar (Ionin 2010; Meyer and Sauerland 2009; White et al. 1997). That is, the four participants’ consistent rejection of the target trials in Han et al.’s (2004) study may not be attributed to the fact that their grammar is different from those who completely accepted the trials. Rather, it might be because the ‘not > all’ interpretation is less preferred than the ‘all > not’ interpretation. When participants are presented with a sentence of two possible interpretations, they may pick up the preferred reading and ignore the less favored, but possible reading. This also explains why some participants in Han et al.’s (2004) displayed inconsistency in their judgments: sometimes they successfully accessed the less favored reading, but sometimes they did not. Therefore, it is crucial for participants to fully understand that for each sentence presented in a scenario, they should take time to ‘stretch’ to consider whether the target reading is possible or not. The second issue is that there were only four trials in each critical condition. Recall that the answer for each trial is binomial (‘yes’/‘no’). When participants make random judgments, the probability of obtaining all ‘yes’ or ‘no’ answers is 0.125. This means that for those who consistently accept/reject the target trials, we can only have 87.5% confidence that they did not make random choices, falling below the 95% confidence level.

Han et al. (2008) created another TVJ task to explore the scope of negation in Japanese sentences with a numeral quantifier in the subject/object position, as in (26) and (27).

- (26) Futari-no otokonoko-ga suika-o shokudoo-de tabe-na-katta.
Two-GEN boy-NOM watermelon-ACC cafeteria-in eat-NEG-PST
‘Two boys did not eat a watermelon in the cafeteria’.
- (27) Junko-ga futari-no otokonoko-o rooka-de kera-na-katta.
Junko-NOM two-GEN boy-ACC hallway-in kick-NEG-PST
‘Junko did not kick two boys in the hallway’.

The data were in accordance with Han et al. (2004). For sentences with a subject QP such as (26), native Japanese participants uniformly allowed the SS reading (*two > not*) at a rate of 97.66% but rejected the IS reading (*not > two*) with an acceptance rate of 9.38%. This finding contradicts Kataoka’s (2006) claim that negation can have scope over the subject numeral QP in Japanese sentences. For sentences with an object QP such as (27), the acceptance rates of the SS reading (*two > not*) and the IS reading were 85.94% and 38.38%, respectively. Similarly to Han et al. (2004), the authors analyzed each individual’s acceptance rate of the IS reading with an object QP. Again, there were four trials in this condition. While 7 participants accepted all trials, 13 participants rejected all. Also, several participants showed inconsistency in their judgments: six participants accepted one trial, three participants accepted two trials and three participants accepted three trials. These findings were argued to constitute another piece of evidence for Han et al.’s (2007) proposal that native speakers may diverge in their grammars. Among the native Japanese participants of this study, it was claimed that some allow verb raising, which leads to the availability of the IS reading of ‘not > two’, while others prohibit it.⁷ Nevertheless, the issues observed in Han et al. (2004) also apply to this study: a. participants may overlook the IS reading because it is less favored; b. the number of trials is limited.

As discussed in the previous section, in Japanese and Chinese Q-Neg sentences, whether the universal quantifier can be interpreted inside the scope of negation remains unsettled and has not been tested by controlled experiments. To explore this issue, the study designed a sentence–picture matching TVJ task and sought answers to the following research questions: (i) Do Japanese and Chinese Q-Neg sentences allow negation to have scope over the universal quantifier? (ii) What inferences can be made from the experimen-

tal data regarding the underlying structures of Japanese and Chinese Q-Neg sentences? An experimental approach that tackles the preference issue in interpreting ambiguous sentences will also be presented and discussed.

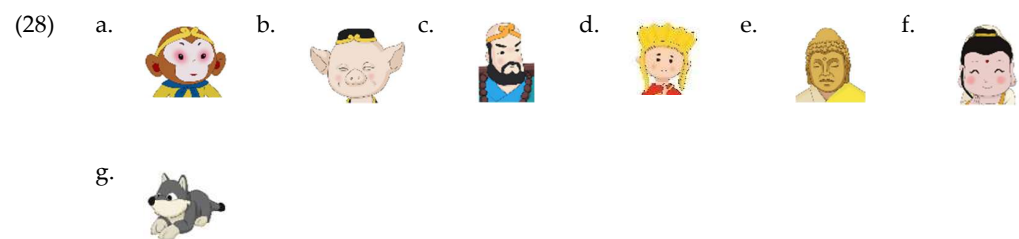
6. Experiment

A total of 25 native Japanese speakers and 25 native Chinese speakers participated in this experiment. Their ages fell into the range between 18 and 64. All of them were born and raised in monolingual families and communities, and none had any experience living outside their home countries (Japan and People's Republic of China) before the age of 18. All participants were residing in their home countries at the time of the experiment.

A Japanese version of a sentence–picture matching TVJ task was first created, based on which an equivalent Chinese TVJ task was made. Each Japanese sentence in the Japanese task was closely translated to Chinese for the Chinese task. Following Han et al. (2008), all sentences were presented in their written form to participants, along with corresponding pictures displayed on Microsoft PowerPoint. All experimental trials in Japanese and Chinese are provided in the Appendix A (all experimental files, including images, can be accessed through the following link: <https://osf.io/kd3zp/>).

The whole experiment was conducted on Zoom/VooV and the experimenter interacted with each participant on a one-to-one basis. There was no time limit for the TVJ tasks.

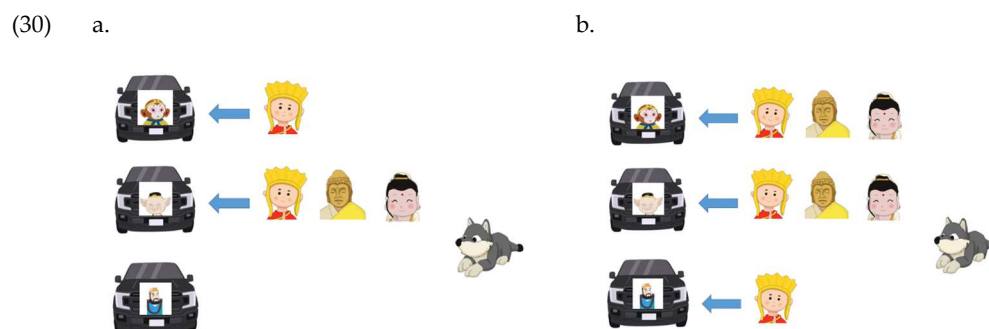
Six characters from a Chinese novel *Journey to the West*⁸ were used in the TVJ tasks. Three of them were students: *Monkey* (28a), *Pig* (28b), and *Sandy* (28c). The other three characters were teachers: *Monk* (28d), *Sakyamuni* (28e), and *Goddess* (28f). There was also a dog (28g) that can speak Japanese/Chinese.



The participants were told that the three students, Monkey, Pig, and Sandy, like to put photos of their faces on their belongings. Each experimental item starts with a brief story, exemplified by the following scenario: one day, the three students bought their own cars, as shown in (29):



Each item had two conditions: an SS condition (*all > not*) and an IS condition (*not > all*). For the SS condition, the story in (29) continues as follows: the three teachers, Monk, Sakyamuni and Goddess, used Pig's car. Monk also used Monkey's car, but no one used Sandy's car, as depicted in (30a). For the IS condition, the story in (29) continues as follows: the three teachers used Monkey's car and Pig's car. Monk also used Sandy's car, as depicted in (30b). In both conditions, the dog saw what had happened.



Then, the dog says a Japanese sentence in (31) or a Chinese equivalent in (32):

- (31) zen'in-no-sensei-ga Sandi-no-kuruma-o tsukawa-na-katta.
 all-GEN-teacher-NOM Sandy-GEN-car-ACC use-NEG-PST
 'All teachers did not use Sandy's car'. (Japanese)⁹
- (32) suoyou laoshi meiyong yong Shaheshang de che.
 all teacher NEG use Sandy GEN car
 'All teachers did not use Sandy's car'. (Chinese)

Although each scenario was conveyed with a combination of visual images and written words, for the initially presented item in each experimental list, the experimenter also verbally went over the story, ensuring that participants fully comprehended it. Participants were then asked to judge whether the sentence and the picture matched each other by saying 'match' or 'mismatch'. The experimenter then recorded their answer. Note that the SS reading (*all > not*) entails the IS reading (*not > all*) (Zhou and Crain 2009). Therefore, the only way we can test the availability of the IS reading is to establish a context where the dog's statement is true under the IS reading but false under the SS reading. The story in (30b) only provides an IS reading context. That is, in order for (31) and (32) to match (30b), the IS reading must be true, where negation has scope over the universal quantifier. The SS reading, conversely, must be false under the context of (30b). Thus, (31)/(32) and (30b) form an IS item. If both (31) and (32) disallow the IS reading, we expect our Japanese and Chinese participants to reject this item. Simultaneously, the scenario in (30a) creates an SS reading context, and in conjunction with (31)/(32), it constitutes an SS item in the TVJ tasks.¹⁰ SS items serve as our baseline items, for which we expect consistent acceptance from our participants.

Participants were presented with one trial at a time on a computer screen. A total of 20 items of different lexicalizations were created, each of which had two conditions, resulting in 40 tokens. These tokens were further distributed to two lists so that each list contained only one condition from the same lexicalization. Thus, there were 20 critical stimuli in each list, and each condition had 10 trials.

For each of the 20 experimental trials, apart from the critical sentence, there were two filler sentences included, which were categorized as Type I filler and Type II filler, respectively. The Type I fillers for the sample involving (30a) and (31)/(32) are shown in (33):

- (33) a. zen'in-no-sensei-ga Buta/Saru-no-kuruma-o tsuka-tta.
 all-GEN-teacher-NOM Pig/Monkey-GEN-car-ACC use-PST
 'All teachers used Pig's/Monkey's car'. (Japanese)
- b. suoyou laoshi yong-le Zhubajie/Sunwukong-de che.
 all teacher use-PST Pig/Monkey-GEN car
 'All teachers used Pig's/Monkey's car'. (Chinese)

The Type I fillers involved positive statements with the universal quantifier *all*. They were used as baseline items to monitor whether our participants had understood how to perform the experiment. There were 10 'match' trials and 10 'mismatch' trials in each list. The Type II fillers for the sample involving (30a) and (31)/(32) are presented in (34):

- (34) a. Shakanyorai-ga Saru/Buta-no-kuruma-o tsukaw-ana-katta.
Sakyamuni-NOM Monkey/Pig-GEN-car-ACC use-NEG-PST
'Sakyamuni did not use Monkey's/Pig's car'. (Japanese)
- b. Rulaifo meiyong yong Sunwukong/Zhubajie-de che
Sakyamuni not use Monkey/Pig-GEN car
'Sakyamuni did not use Monkey's/Pig's car'. (Chinese)

The Type II fillers were straightforward negation sentences. They were used to monitor whether our participants were attentive enough during the experiment. Similarly to the Type I fillers, each list contained 10 'match' and 10 'mismatch' Type 2 fillers. To sum up, each experimental item block consists of a critical sentence, a Type I filler and a Type II filler, and there were 20 blocks in each list. The order of the three trials within each block was randomized. The order of blocks was pseudo-randomized in each list.¹¹

As mentioned earlier, a preference issue may arise when we interpret sentences with semantic ambiguity. According to Meyer and Sauerland (2009), for a sentence with both SS and IS readings, it might be judged to be false in a scenario where the SS reading is false while the IS reading is true. This is because the SS reading is more accessible than the IS reading. Meyer and Sauerland provided the following sentence from Heim and Kratzer (1998) as an example.

- (35) One student is typing on every computer.
a. SS reading: there is one student typing on every computer. (one > every)
b. IS reading: For every computer, there is one student typing on it. (every > one)

If this sentence is stated in a situation where John, Bill, and Peter are each typing on a computer, the IS reading would be true but the SS reading would be false. However, native English speakers may still judge (35) to be false in this situation because the more accessible SS reading is false. Meyer and Sauerland further argued that it is precisely this situation where ambiguity can be perceived. White et al. (1997) also discussed this preference issue: when faced with semantically ambiguous sentences, participants may unconsciously adhere to a preferred reading and overlook a less favored one. Thus, it is essential for us to provide instructions that enable participants to make judgments based on acceptability rather than preference.

First of all, the instructional section of the experiment included several sample trials presented to the participants. Two of the sample trials are as follows: one had the Japanese/Chinese sentence in (36) and the picture in (37a); another trial included the Japanese/Chinese sentence in (36) and the picture in (37b):

- (36) a. Saru-ga Buta-ni kare-no-keiki-o okut-ta.
Monkey-NOM Pig-to he-GEN-cake-ACC send-PST
'Monkey sent Pig his cake'. (Japanese)
- b. Sunwukong ji-gei-le Zhubajie ta-de dangao.
Monkey send-to-PST Pig he-GEN cake
'Monkey sent Pig his cake'. (Chinese)

(37) a.

b.



In Japanese (36a) and Chinese (36b), the third-person pronouns *kare* ('him') and *ta* ('him') can refer to either *Monkey* or *Pig*. Participants first looked at the picture (37a) and then read (36). If they responded with 'mismatch', they were asked to take additional time to consider whether it is possible to say this sentence in the given context. All the participants who had initially responded with 'mismatch' successfully switched to 'match' after

reconsideration. Then, the trial involving (36) and (37b) was presented, and all participants responded with ‘match’.

There was another set of practice trials, which involve the Japanese/Chinese sentence in (38) and the pictures (39a) and (39b):

- (38) a. Sandi-wa Saru-ga jibun-no hamigakiko-o tsukat-ta to it-ta.
Sandy-TOP Monkey-NOM self-GEN toothpaste-ACC use-PST that say-PST
‘Sandy said that Monkey used his toothpaste’. (Japanese)
- b. Shaheshang shuo Sunwukong yong-le ziji-de yagao.
Sandy say Monkey use-PST self-GEN toothpaste
‘Sandy said that Monkey used his toothpaste’. (Chinese)
- (39) a. b.



In Japanese (38a) and Chinese (38b), the morphologically simplex reflexive pronouns *jibun* (‘self’) and *ziji* (‘self’) can refer to either the matrix subject *Sandy* or the embedded subject *Monkey*. Again, participants were expected to say ‘match’ to the trial of (38) and (39a) as well as the trial of (38) and (39b). If they were unable to get the intended interpretation, the same procedure used during the presentation of the previous sample trials was applied. After that, the following rule was explicitly stated: if a sentence has two possible interpretations, as long as one of them aligns with the given picture, the item should be accepted. Thus, our participants were instructed to explore possibilities and base their judgments on acceptability rather than preference.

Although the above sample trials with instructions were provided at the beginning of the experiment, in a pilot study of this research, there were some Japanese-speaking participants who initially responded with ‘mismatch’ to the IS trial but subsequently switched their answer to ‘match’ after reconsideration. But this never happened when participants looked at the SS trial. This SS preference has also been observed in many previous studies (e.g., [Anderson 2004](#); [Reinhart 2006](#)). Therefore, for the first block of trials in each list, which consists of an IS trial and two fillers,¹² participants were instructed to take time to think about whether there is any possibility of saying the target sentence in the given context. Participants were given the freedom to change their responses when seeing a trial, but they were not allowed to revisit previous trials. Also, during the experiment, participants were allowed to ask about the name of any character they might have forgotten, although no one did so.

7. Findings

The Chinese data from 25 native participants were first analyzed. Recall that there were two critical conditions: the SS condition (*all > not*) and the IS condition (*not > all*). Since there were 10 items in each critical condition, based on the binomial cumulative distribution, participants are considered to have made consistent judgments if they accept or reject 8 items or more out of 10.¹³ First of all, the participants’ individual data on Type I and Type II fillers were examined. The result shows that all participants consistently accepted ‘match’ items and consistently rejected ‘mismatch’ items, which suggests that they knew how to perform the TVJ task and were attentive enough during the experiment. For the IS items, there were 23 (92%) participants who consistently rejected them and 2 (8%) participants who consistently accepted them. All participants consistently accepted the SS items. Table 1 summarizes the 25 Chinese participants’ mean proportion of ‘match’ answers in each critical condition of the Chinese TVJ task:

Table 1. Summary of the native Chinese participants' mean proportion of 'match' answers in the critical conditions of the Chinese TVJ task.

Condition	Mean Proportion	SD	SE
Surface Scope	1	0	0
Inverse Scope	0.1	0.28	0.06

A pairwise comparison revealed a significant difference between the two conditions ($t(24) = 16.34, p < 0.01$). The consistent rejection of IS items by 92% of Chinese participants confirms the prohibition of IS reading in Chinese Q-Neg sentences. This finding aligns with the observation made in previous studies involving Q-Neg sentences with the particle *dou*.

Now we examine the Japanese data from the 25 native participants. An initial screening of Type I and Type II fillers reveals that all participants consistently accepted 'match' items and consistently rejected 'mismatch' items, which indicates that they fully understood how to perform the TVJ task and were attentive enough throughout the experiment. For the critical items, 24 (96%) participants consistently accepted the IS items and only one (4%) participant consistently rejected them. Meanwhile, all participants consistently accepted the SS items. Table 2 summarizes the 25 Japanese participants' mean proportion of 'match' answers in each critical condition of the Japanese TVJ task:

Table 2. Summary of the native Japanese participants' mean proportion of 'match' answers in the critical conditions of the Japanese TVJ task.

Condition	Mean Proportion	SD	SE
Surface Scope	1	0	0
Inverse Scope	0.95	0.2	0.04

A pairwise comparison showed no significant difference between the two conditions ($t(24) = 1.2, p = 0.24$). Thus, both individual and group data of the Japanese participants strongly indicate that the IS reading is available in Japanese Q-Neg sentences, supporting Miyagawa's (2001) claim.

8. Discussion

The Japanese data showed that almost all participants accepted the IS reading in Japanese Q-Neg sentences, which strongly suggest that Japanese Q-Neg sentences do allow negation to have scope over the universal quantifier. This finding gains additional support when compared to the Chinese data. The contrast between the two languages is clear: while the IS reading is prohibited in Chinese Q-Neg sentences, it is readily available in Japanese Q-Neg sentences. The Japanese data align with Saito's (2009) argument that the IS reading of Japanese Q-Neg sentences is readily available when an appropriate context is given.

The next question is why the IS reading is possible in Japanese Q-Neg sentences but not in Chinese Q-Neg sentences. Miyagawa's (2001) Japanese example in (22) is repeated in (40):

- (40) Zen'in-no gakusei-ga sono tesuto-o uke-na-katta.
 All-GEN student-NOM that test-ACC take-NEG-PST
 'All students didn't take that test'.
 a. SS reading (*all* > *not*): 'none of the people took that test'.
 b. IS reading (*not* > *all*): 'not all people took that test'.

Following the analysis that subjects are based-generated in [Spec, *v*P] (Chomsky 1995) and negation has its own projection (e.g., Pollock 1989; Laka 1990), Miyagawa argued that the subject DP *zen'in-no gakusei* ('all students') is raised from [Spec, *v*P] to [Spec, TP] due to the strong EPP feature on T, as in (41):

- (41) [TP Zen'in-no gakusei-ga [T' [NegP [*v*P t_i [*v*P sono tesutoj-o [*v*' [VP t_j t_k] uke]]] na] katta]]

According to Miyagawa, since the raised subject DP leaves a copy in its base position, it can reconstruct into its base position at LF and be interpreted within the scope of negation.

On the other hand, there are studies arguing that negative sentences involve negation raising. According to Haegeman (1995) and Moscati (2010), the negation *not* can be raised and adjoined to IP at LF. For Q-Neg sentences, *not* can c-command *all*, which generates the IS interpretation (not > all). Moscati (2010) also argued that negation raising is costly in processing because it involves an additional step to derive the IS reading at LF. For Japanese Q-Neg sentences, Kato (1993) proposed a negation raising analysis to explain how the IS reading can be derived: negation is adjoined to T and is then raised to C. Thus, it can c-command and has scope over the subject. In addition, Koizumi (2000) also argued that verbs are overtly raised to C in Japanese, which was based on evidence from coordination, clefting, and scrambling. In support of the negation raising analysis, Kishimoto (2008) further presented evidence from the licensing of the negative polarity item (NPI) *daremo* 'anyone' in Japanese. Thus, if it is true that the negation affixes to the verb and both elements move together to C in Japanese, it well predicts the existence of the IS reading, where negation has scope over the subject.

The present study does not commit itself to either the subject reconstruction analysis or the negation raising analysis, and it is beyond the scope of this paper to discuss which analysis is better. What this paper wants to highlight is the experimental observation that Japanese Q-Neg sentences do allow negation to have scope over the subject. Future experimental studies may investigate Q-Neg sentences with a bare universal quantifier *zen'in* in the subject position.

Regarding the Chinese data, it has been shown that 92% of the participants consistently rejected the IS items. This suggests that Chinese Q-Neg sentences, even when *dou* is removed, strongly prohibit the IS reading and only allow for the SS reading. Thus, a strong scope rigidity is implicated. Wible (1990) and Aoun and Li (1993) argued that Chinese lacks subject raising, attributing this to the weak nature of Infl/T in this language. This degenerate nature of Infl/T is evident through its absence of agreement features in Chinese. Thus, according to these studies, the subject is generally base-generated at [Spec, *v*P] and stays in situ. Then, where is the NegP located in Chinese negation sentences? The syntactic structure for Japanese negation sentences proposed by Miyagawa (2001), demonstrated in (21), is repeated in (42):

- (42) [TP DP_{subj} [T' [NegP [*v*P t_{subj} [*v*P DP_{obj} [*v*' [VP t_{obj} V] *v*]]] Neg] T]]

As for Chinese Q-Neg sentences, in the absence of subject raising, if the NegP is in a syntactically higher position than *v*P, we predict a wide scope of negation over the subject. However, since this prediction is not supported by the experimental data, we can infer that the NegP should be hierarchically lower than *v*P in Chinese.¹⁴

In addition, the experimental data demonstrated a clear contrast between Japanese and Chinese regarding scope assignment in Q-Neg sentences: while Japanese allows IS, Chinese does not. This finding in fact contradicts Bobaljik and Wurmbrand's (2012) proposal, which links scope rigidity to the presence of scrambling in a language.

- (43) Dareka-ga subete-no hon-o yon-da
 someone-NOM all-GEN book-ACC read-PST
 'Someone read all the books'. (Kuroda 1970)
 a. 'someone > all' reading
 b. *'all > someone' reading
- (44) Subete-no hon-o dareka-ga yon-da.
 all-GEN book-ACC someone-NOM read-PST
 'Someone read all the books'.
 a. 'someone > all' reading
 b. 'all > someone' reading

The Japanese sentence (43) is in its canonical SOV word order, while (44), where the object *subete-no hon* ‘all books’ is moved to the front, is the scrambled counterpart of (43). It has been widely observed that sentences like (43) do not allow the IS reading ‘all > someone’ (e.g., [Hoji 1985](#)). However, when the object is moved to the front, the ‘all > someone’ reading becomes possible (e.g., [Hoji 1985](#); [Marsden 2009](#)), as shown in (44). [Bobaljik and Wurmbrand \(2012\)](#) argued that the IS reading ‘all > someone’ in (43) is in fact blocked by the existence of the scrambled sentence (44), which has a clearer reflection of the scope. Thus, they proposed that languages like Japanese, which permit scrambling, do not allow IS. In contrast, languages like English, which do not involve scrambling, permit IS. Since Chinese is also a language without scrambling, we predict it to allow IS, similarly to English. However, the present study found the opposite of this prediction: Japanese permits IS in its Q-Neg sentences, while Chinese does not. Future studies may explore whether other quantified sentences in Japanese and Chinese show a similar distinction.

Furthermore, in the present study, the majority of Japanese participants not only consistently accepted the SS reading but also consistently accepted the less preferred IS reading. This consistent acceptance of the IS reading stands in contrast to the experimental results of numerous previous studies ([Han et al. 2004, 2008](#)), where many participants showed inconsistency in their judgments. As reviewed, previous studies overlooked a crucial aspect, i.e., ensuring that participants can access both the preferred and less preferred readings in semantically ambiguous sentences. To address this concern, the present study introduced a novel approach: (i) a practice session was included to train participants on potential ambiguity of sentences; (ii) in the first block of three trials, participants were instructed to take their time to consider whether the sentence can possibly be stated in the given scenario. Furthermore, the utilization of video conferencing platforms such as Zoom allow us to run image-based TVJ tasks with participants individually over the internet. This one-to-one approach facilitates real-time interaction between experimenters and participants, which leads to smooth and efficient communication.

Through a comparative analysis of the data obtained from Japanese and Chinese participants in this study, we can see that the novel methodology worked effectively, yielding clear-cut results: Japanese and Chinese Q-Neg sentences are not subject to the same scope rigidity. The constraint of scope rigidity was only found in Chinese Q-Neg sentences. For future research, we may use a similar experimental approach to investigate whether quantified sentences in other languages that potentially involve scope interaction are subject to scope rigidity.

9. Conclusions

Japanese and Chinese are generally considered as scope-rigid languages, compared to many other languages such as English. For Q-Neg sentences, there is a consensus that English allows negation to take scope over the universal quantifier in the subject position, which has been experimentally supported. However, whether the wide scope of negation is also possible in Japanese and Chinese Q-Neg sentences has not been formally investigated by experiments. This study conducted a controlled sentence–picture matching TVJ task to approach this issue. The data suggest that in Japanese Q-Neg sentences, negation can indeed take scope over the universal quantifier. This finding is further strengthened by comparing it to the Chinese data as a baseline. Thus, we can infer that Japanese Q-Neg sentences are free from scope rigidity: negation can c-command the subject and have a wider scope at LF. This paper also discussed the importance of designing a valid experiment when investigating scope ambiguities. It showed that detailed instructions can help our participants access a less favored reading that would otherwise be overshadowed by the preferred reading. Future studies may use similar experiments to examine language phenomena that potentially involve scope ambiguities in different languages.

Funding: This research was funded by the Asian and Pacific Studies Institute at Duke University (funding number: 4517632).

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Campus Institutional Review Board of Duke University (2021-0388, date of approval: 19 March 2021).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The author declares no conflict of interest.

Appendix A

The experimental trials used in the Japanese and Chinese truth value judgment tasks.

List 1

Item	Situation	Type	Target Sentence (JPN+CHN+ENG Translation)	Prediction
1	All teachers used Monkey's car and Pig's car. Monk also used Sandy's car.	Filler 1	全員の先生がさるの車を使った. 所有老师用了孙悟空的车.	Y Y
			All teachers used Monkey's car.	Y
		Critical	全員の先生がサンディーの車を使わなかった. 所有老师没有用沙和尚的车.	Y N
			All teachers did not use Sandy's car.	Y
		Filler 2	釈迦如来がぶたの車を使わなかった. 如来佛没有用猪八戒的车.	N N
			Shakyamuni did not use Pig's car.	N
		Critical	全員の先生がぶたのかびんを使わなかった. 所有老师没有用猪八戒的花瓶.	Y N
			All teachers did not use Pig's vase.	Y
		Filler 2	女神がさるのかびんを使わなかった. 观音没有用孙悟空的花瓶.	N N
2	All teachers used Monkey's vase and Sandy's vase. Monk also used Pig's vase.		Goddess did not use Monkey's vase.	N
		Filler 1	全員の先生がサンディーのかびんを使った. 所有老师用了沙和尚的花瓶.	Y Y
			All teachers used Sandy's vase.	Y
		Filler 1	全員の先生がぶたのケーキを食べた. 所有老师吃了猪八戒的蛋糕.	N N
			All teachers ate Pig's cake.	N
		Critical	全員の先生がサンディーのケーキを食べなかった. 所有老师没有吃沙和尚的蛋糕.	Y Y
			All teachers did not eat Sandy's cake.	Y
		Filler 2	釈迦如来がぶたのケーキを食べなかった. 如来佛没有吃猪八戒的蛋糕.	Y Y
			Shakyamuni did not eat Pig's cake.	Y

Item	Situation	Type	Target Sentence (JPN+CHN+ENG Translation)	Prediction
4	All teachers watched Pig's video and Sandy's video. Monk also watched Monkey's video.	Filler 1	全員の先生がサンディーのビデオをみた.	Y
			所有老师看了沙和尚的视频.	Y
			All teachers watched Sandy's video.	Y
		Filler 2	女神がぶたのビデオをみなかった.	N
			观音没有看猪八戒的视频.	N
			Goddess did not watch Pig's video.	N
		Critical	全員の先生がさるのビデオをみなかった.	Y
			所有老师没有看孙悟空的视频.	N
			All teachers did not watch Monkey's video.	Y
5	All teachers read Pig's report. Monk also read Sandy's report.	Filler 2	女神がサンディーのレポートを読まなかった.	Y
			观音没有读沙和尚的报告.	Y
			Goddess did not read Sandy's report.	Y
		Critical	全員の先生がさるのレポートを読まなかった.	Y
			所有老师没有读孙悟空的报告.	Y
			All teachers did not read Monkey's report.	Y
		Filler 1	全員の先生がサンディーのレポートを読んだ.	N
			所有老师读了沙和尚的报告.	N
6	All teachers drank Monkey's coffee and Sandy's coffee. Monk also drank Pig's coffee.		All teachers read Sandy's report.	N
		Filler 2	釈迦如来がさるのコーヒーを飲まなかった.	N
			如来佛没有喝孙悟空的咖啡.	N
			Shakyamuni did not drink Monkey's coffee.	N
		Filler 1	全員の先生がサンディーのコーヒーを飲んだ.	Y
			所有老师喝了沙和尚的咖啡.	Y
			All teachers drank Sandy's coffee.	Y
		Critical	全員の先生がぶたのコーヒーを飲まなかった.	Y
7	All teachers used Sandy's dictionary. Monk also used Monkey's dictionary.		所有老师没有喝猪八戒的咖啡.	N
			All teachers did not drink Pig's coffee.	Y
		Critical	全員の先生がぶたのじしよを使わなかった.	Y
			所有老师没有用猪八戒的字典.	Y
			All teachers did not use Pig's dictionary.	Y
		Filler 1	全員の先生がさるのじしよを使った.	N
			所有老师用了孙悟空的字典.	N
			All teachers used Monkey's dictionary.	N
		Filler 2	釈迦如来がさるのじしよを使わなかった.	Y
			如来佛没有用孙悟空的字典.	Y
			Shakyamuni did not use Monkey's dictionary.	Y

Item	Situation	Type	Target Sentence (JPN+CHN+ENG Translation)	Prediction
8	All teachers ate Monkey's rice and Pig's rice. Monk also ate Sandy's rice.	Critical	全員の先生がサンディーのごはんを食べなかった.	Y
			所有老师没有吃沙和尚的饭.	N
			All teachers did not eat Sandy's rice.	Y
		Filler 2	女神がぶたのごはんを食べなかった.	N
			观音没有吃猪八戒的饭.	N
			Goddess did not eat Pig's rice.	N
		Filler 1	全員の先生がさるのごはんを食べた.	Y
			所有老师吃了孙悟空的饭.	Y
			All teachers ate Monkey's rice.	Y
9	All teachers used Monkey's pencil. Monk also used Sandy's pencil.	Filler 1	全員の先生がサンディーのえんぴつを使った.	N
			所有老师用了沙和尚的铅笔.	N
			All teachers used Sandy's pencil.	N
		Critical	全員の先生がぶたのえんぴつを使わなかった.	Y
			所有老师没有用猪八戒的铅笔.	Y
			All teachers did not use Pig's pencil.	Y
		Filler 2	女神がぶたのえんぴつを使わなかった.	Y
			观音没有用猪八戒的铅笔.	Y
10	All teachers ate Pig's chocolate. Monk also ate Monkey's chocolate.	Filler 1	全員の先生がさるのチョコレートを食べた.	N
			所有老师吃了孙悟空的巧克力.	N
			All teachers ate Monkey's chocolate.	N
		Filler 2	釈迦如来がさるのチョコレートを食べなかった.	Y
			如来佛没有吃孙悟空的巧克力.	Y
			Shakyamuni did not eat Monkey's chocolate.	Y
		Critical	全員の先生がサンディーのチョコレートを食べなかった.	Y
			所有老师没有吃沙和尚的巧克力.	Y
			All teachers did not eat Sandy's chocolate.	Y
11	All teachers used Pig's bag and Sandy's bag. Monk also used Monkey's bag.	Filler 2	釈迦如来がサンディーのかばんを使わなかった.	N
			如来佛没有用沙和尚的书包.	N
			Shakyamuni did not use Sandy's bag.	N
		Critical	全員の先生がさるのかばんを使わなかった.	Y
			所有老师没有用孙悟空的书包.	N
			All teachers did not use Monkey's bag.	Y
		Filler 1	全員の先生がぶたのかばんを使った..	Y
			所有老师用了猪八戒的书包.	Y
			All teachers used Pig's bag.	Y

Item	Situation	Type	Target Sentence (JPN+CHN+ENG Translation)	Prediction
12	All teachers used Pig's printer. Monk also used Sandy's printer.	Filler 2	女神がサンディーのプリンターを使わなかった. 观音没有用沙和尚的打印机. Goddess did not use Sandy's printer.	Y Y Y
		Filler 1	全員の先生がサンディーのプリンターを使った. 所有老师用了沙和尚的打印机. All teachers used Sandy's printer.	N N N
		Critical	全員の先生がさるのプリンターを使わなかった. 所有老师没有用孙悟空的打印机. All teachers did not use Monkey's printer.	Y Y Y
		Critical	全員の先生がぶたのおちゃを飲まなかった. 所有老师没有喝猪八戒的茶. All teachers did not drink Pig's tea.	Y Y Y
		Filler 1	全員の先生がサンディーのおちゃを飲んだ. 所有老师喝了沙和尚的茶. All teachers drank Sandy's tea.	N N N
		Filler 2	釈迦如来がサンディーのおちゃを飲まなかった. 如来佛没有喝沙和尚的茶. Shakyamuni did not drink Sandy's tea.	Y Y Y
		Critical	全員の先生がぶたの家を使わなかった.. 所有老师没有用猪八戒的房子. All teachers did not use Pig's house.	Y N Y
		Filler 2	女神がさるの家を使わなかった. 观音没有用孙悟空的房子. Goddess did not use Monkey's house.	N N N
		Filler 1	全員の先生がサンディーの家を使った. 所有老师用了沙和尚的房子. All teachers used Sandy's house.	Y Y Y
15	All teachers read Monkey's book and Pig's book. Monk also read Sandy's book.	Filler 1	全員の先生がさるの本を読んだ. 所有老师读了孙悟空的书. All teachers read Monkey's book.	Y Y Y
		Critical	全員の先生がサンディーの本を読まなかった. 所有老师没有读沙和尚的书. All teachers did not read Sandy's book.	Y N Y
		Filler 2	釈迦如来がぶたの本を読まなかった. 如来佛没有读猪八戒的书. Shakyamuni did not read Pig's book.	N N N

Item	Situation	Type	Target Sentence (JPN+CHN+ENG Translation)	Prediction
16	All teachers drank Pig's wine. Monk also drank Sandy's wine.	Filler 1	全員の先生がサンディーのおさを飲んだ.	N
			所有老师喝了沙和尚的酒.	N
			All teachers drank Sandy's wine.	N
		Filler 2	女神がサンディーのおさを飲まなかった.	Y
			观音没有喝沙和尚的酒.	Y
			Goddess did not drink Sandy's wine.	Y
		Critical	全員の先生がさるのおさを飲まなかった.	Y
			所有老师没有喝孙悟空的酒.	Y
			All teachers did not drink Monkey's wine.	Y
17	All teachers used Pig's computer and Sandy's computer. Monk also used Monkey's computer.	Filler 2	女神がサンディーのコンピューターを使わなかった.	N
			观音没有用沙和尚的电脑.	N
			Goddess did not use Sandy's computer.	N
		Critical	全員の先生がさるのコンピューターを使わなかった.	Y
			所有老师没有用孙悟空的电脑.	N
			All teachers did not use Monkey's computer.	Y
		Filler 1	全員の先生がぶたのコンピューターを使った.	Y
			所有老师用了猪八戒的电脑.	Y
18	All teachers used Monkey's hat. Monk also used Pig's hat.		All teachers used Pig's computer.	Y
		Filler 2	釈迦如来がぶたのぼうしを使った.	Y
			如来佛没有戴猪八戒的帽子.	Y
			Shakyamuni didn't use Pig's hat.	Y
		Filler 1	全員の先生がぶたのぼうしを使った.	N
			所有老师戴了猪八戒的帽子.	N
			All teachers used Pig's hat.	N
		Critical	全員の先生がサンディーのぼうしを使わなかった.	Y
			所有老师没有戴沙和尚的帽子.	Y
19	All teachers played Sandy's game. Monk also played Monkey's game.		All teachers did not use Sandy's hat.	Y
		Critical	全員の先生がぶたのゲームをしなかった..	Y
			所有老师没有玩猪八戒的游戏.	Y
			All teachers did not play Pig's game.	Y
		Filler 1	全員の先生がさるのゲームをした.	N
			所有老师玩了孙悟空的游戏.	N
			All teachers played Monkey's game.	N
		Filler 2	女神がさるのゲームをしなかった.	Y
			观音没有玩孙悟空的游戏.	Y
			Goddess did not play Monkey's game.	Y

Item	Situation	Type	Target Sentence (JPN+CHN+ENG Translation)	Prediction
20	All teachers drank Monkey's juice and Pig's juice. Monk also drank Sandy's juice.	Critical	全員の先生がサンディーのジュースを飲まなかった.	Y
			所有老师没有喝沙和尚的果汁.	N
			All teachers did not drink Sandy's juice.	Y
		Filler 2	釈迦如来がぶたのジュースを飲まなかった.	N
			如来佛没有喝猪八戒的果汁.	N
			Shakyamuni did not drink Pig's juice.	N
		Filler 1	全員の先生がさるのジュースを飲んだ.	Y
			所有老师喝了孙悟空的果汁.	Y
			All teachers drank Monkey's juice.	Y

List 2

Item	Situation	Type	Target Sentence (JPN+CHN+ENG Translation)	Prediction
1	All teachers ate Monkey's chocolate and Pig's chocolate. Monk also ate Sandy's chocolate.	Filler 1	全員の先生がさるのチョコレートを食べた.	Y
			所有老师吃了孙悟空的巧克力.	Y
			All teachers ate Monkey's chocolate.	Y
		Critical	全員の先生がサンディーのチョコレートを食べなかった.	Y
			所有老师没有吃沙和尚的巧克力.	N
			All teachers did not eat Sandy's chocolate.	Y
		Filler 2	釈迦如来がぶたのチョコレートを食べなかった.	N
			如来佛没有吃猪八戒的巧克力.	N
2	All teachers used Monkey's dictionary and Sandy's dictionary. Monk also used Pig's dictionary.	Filler 2	女神がさるのじしよを使わなかった.	N
			观音没有用孙悟空的字典.	N
			Goddess did not use Monkey's dictionary.	N
		Critical	全員の先生がぶたのじしよを使わなかった.	Y
			所有老师没有用猪八戒的字典.	N
			All teachers did not use Pig's dictionary.	Y
		Filler 1	全員の先生がサンディーのじしよを使った.	Y
			所有老师用了沙和尚的字典.	Y
3	All teachers used Sandy's bag. Monk also used Pig's bag.	Critical	全員の先生がさるのかばんを使わなかった.	Y
			所有老师没有用孙悟空的书包.	Y
			All teachers did not use Monkey's bag.	Y
		Filler 2	釈迦如来がぶたのかばんを使わなかった.	Y
			如来佛没有用猪八戒的书包.	Y
			Shakyamuni did not use Pig's bag.	Y
		Filler 1	全員の先生がぶたのかばんを使った.	N
			所有老师用了猪八戒的书包.	N
			All teachers used Pig's bag.	N

Item	Situation	Type	Target Sentence (JPN+CHN+ENG Translation)	Prediction
4	All teachers drank Sandy's coffee. Monk also drank Monkey's coffee.	Filler 2	女神がさるのコーヒーを飲まなかった. 观音没有喝孙悟空的咖啡.	Y
			Goddess did not drink Monkey's coffee.	Y
		Filler 1	全員の先生がさるのコーヒーを飲んだ. 所有老师喝了孙悟空的咖啡.	N
			All teachers drank Monkey's coffee.	N
		Critical	全員の先生がぶたのコーヒーを飲まなかった. 所有老师没有喝猪八戒的咖啡.	Y
			All teachers did not drink Pig's coffee.	Y
5	All teachers read Pig's report and Sandy's report. Monk also read Monkey's report.	Critical	全員の先生がさるのレポートを読まなかった. 所有老师没有读孙悟空的报告.	Y
			All teachers did not read Monkey's report.	Y
		Filler 2	釈迦如来がぶたのレポートを読まなかった. 如来佛没有读猪八戒的报告.	N
			Shakyamuni did not read Pig's report.	N
		Filler 1	全員の先生がサンディーのレポートを読んだ. 所有老师读了沙和尚的报告.	Y
			All teachers read Sandy's report.	Y
6	All teachers used Pig's computer. Monk also used Sandy's computer.	Critical	全員の先生がさるのコンピューターを使わなかった. 所有老师没有用孙悟空的电脑.	Y
			All teachers did not use Monkey's computer.	Y
		Filler 1	全員の先生がサンディーのコンピューターを使った. 所有老师用了沙和尚的电脑.	N
			All teachers used Sandy's computer.	N
		Filler 2	女神がサンディーのコンピューターを使わなかった. 观音没有用沙和尚的电脑.	Y
			Goddess did not use Sandy's computer.	Y
7	All teachers ate Monkey's cake and Pig's cake. Monk also ate Sandy's cake.	Critical	全員の先生がサンディーのケーキを食べなかった. 所有老师没有吃沙和尚的蛋糕.	Y
			All teachers did not eat Sandy's cake.	Y
		Filler 2	女神がぶたのケーキを食べなかった. 观音没有吃猪八戒的蛋糕.	N
			Goddess did not eat Pig's cake.	N
		Filler 1	全員の先生がさるのケーキを食べた. 所有老师吃了孙悟空的蛋糕.	Y
			All teachers ate Monkey's cake.	Y

Item	Situation	Type	Target Sentence (JPN+CHN+ENG Translation)	Prediction
8	All teachers ate Monkey's rice. Monk also ate Pig's rice.	Filler 2	釈迦如来がぶたのごはんを食べなかった. 如来佛没有吃猪八戒的饭. Shakyamuni did not eat Pig's rice.	Y Y Y
		Critical	全員の先生がサンディーのごはんを食べなかった. 所有老师没有吃沙和尚的饭. All teachers did not eat Sandy's rice.	Y Y Y
		Filler 1	全員の先生がぶたのごはんを食べた. 所有老师吃了猪八戒的饭. All teachers ate Pig's rice.	N N N
		Filler 1	全員の先生がサンディーのえんぴつを使った. 所有老师用了沙和尚的铅笔. All teachers used Sandy's pencil.	Y Y Y
		Critical	全員の先生がぶたのえんぴつを使わなかった. 所有老师没有用猪八戒的铅笔. All teachers did not use Pig's pencil.	Y N Y
		Filler 2	釈迦如来がさるのえんぴつを使わなかった. 如来佛没有用孙悟空的铅笔. Shakyamuni did not use Monkey's pencil.	N N N
		Filler 1	全員の先生がぶたのビデオをみた. 所有老师看了猪八戒的视频. All teachers watched Pig's video.	N N N
		Filler 2	女神がぶたのビデオをみなかった. 观音没有看猪八戒的视频. Goddess did not watch Pig's video.	Y Y Y
		Critical	全員の先生がさるのビデオをみなかった. 所有老师没有看孙悟空的视频. All teachers did not watch Monkey's video.	Y Y Y
11	All teachers drank Pig's wine and Sandy's wine. Monk also drank Monkey's wine.	Critical	全員の先生がさるのおさけを飲まなかった. 所有老师没有喝孙悟空的酒. All teachers did not drink Monkey's wine.	Y N Y
		Filler 1	全員の先生がサンディーのおさけを飲んだ. 所有老师喝了沙和尚的酒. All teachers drank Sandy's wine.	Y Y Y
		Filler 2	女神がぶたのおさけを飲まなかった. 观音没有喝猪八戒的酒. Goddess did not drink Pig's wine.	N N N

Item	Situation	Type	Target Sentence (JPN+CHN+ENG Translation)	Prediction
12	All teachers used Pig's printer and Sandy's printer. Monk also used Monkey's printer.	Filler 2	釈迦如来がサンディーのプリンターを使わなかった. 如来佛没有用沙和尚的打印机. Shakyamuni did not use Sandy's printer.	N
		Filler 1	全員の先生がぶたのプリンターを使った. 所有老师用了猪八戒的打印机. All teachers used Pig's printer.	Y
		Critical	全員の先生がさるのプリンターを使わなかった. 所有老师没有用孙悟空的打印机. All teachers did not use Monkey's printer.	Y
				N
				Y
				Y
				Y
				N
				Y
13	All teachers read Monkey's book. Monk also read Pig's book.	Filler 1	全員の先生がぶたの本を読んだ. 所有老师读了猪八戒的书. All teachers read Pig's book.	N
		Critical	全員の先生がサンディーの本を読まなかった. 所有老师没有读沙和尚的书. All teachers did not read Sandy's book.	Y
		Filler 2	釈迦如来がぶたの本を読まなかった. 如来佛没有读猪八戒的书. Shakyamuni did not read Pig's book.	Y
				Y
				Y
				Y
				Y
				Y
14	All teachers used Pig's car. Monk also used Monkey's car.	Filler 2	女神がさるのくるまを使わなかった. 观音没有用孙悟空的车. Goddess did not use Monkey's car.	Y
		Filler 1	全員の先生がさるのくるまを使った. 所有老师用了孙悟空的车. All teachers used Monkey's car.	N
		Critical	全員の先生がサンディーのくるまを使わなかった. 所有老师没有用沙和尚的车. All teachers did not use Sandy's car.	Y
				Y
				Y
				Y
				Y
				Y
15	All teachers used Monkey's hat and Pig's hat. Monk also used Sandy's hat.	Filler 1	全員の先生がぶたのぼうしを使った. 所有老师用了猪八戒的帽子. All teachers used Pig's hat.	Y
		Filler 2	女神がさるのぼうしを使わなかった. 观音没有用孙悟空的帽子. Goddess did not use Monkey's hat.	N
		Critical	全員の先生がサンディーのぼうしを使わなかった. 所有老师没有用沙和尚的帽子. All teachers did not use Sandy's hat.	Y
				N
				Y
				N
				Y
				Y

Item	Situation	Type	Target Sentence (JPN+CHN+ENG Translation)	Prediction
16	All teachers played Monkey's game and Sandy's game. Monk also played Pig's game.	Filler 2	釈迦如来がさるのゲームをしなかった.	N
			如来佛没有玩孙悟空的游戏.	N
			Shakyamuni did not play Monkey's game.	N
		Filler 1	全員の先生がサンディーのゲームをした.	Y
			所有老师玩了沙和尚的游戏.	Y
			All teachers played Sandy's game.	Y
		Critical	全員の先生がぶたのゲームをしなかった.	Y
			所有老师没有玩猪八戒的游戏.	N
			All teachers did not play Pig's game.	Y
17	All teachers used Sandy's computer. Monk also used Monkey's computer.	Critical	全員の先生がぶたのかびんを使わなかった.	Y
			所有老师没有用猪八戒的花瓶.	Y
			All teachers did not use Pig's vase.	Y
		Filler 1	全員の先生がさるのかびんを使った.	N
			所有老师用了孙悟空的花瓶.	N
			All teachers used Monkey's vase.	N
		Filler 2	釈迦如来がさるのかびんを使わなかった.	Y
			如来佛没有用孙悟空的花瓶.	Y
			Shakyamuni did not use Monkey's vase.	Y
18	All teachers drank Monkey's tea and Sandy's tea. Monk also drank Pig's tea.	Filler 1	全員の先生がサンディーのおちゃを飲んだ.	Y
			所有老师喝了沙和尚的茶.	Y
			All teachers drank Sandy's tea.	Y
		Filler 2	女神がさるのおちゃを飲まなかった.	N
			观音没有喝孙悟空的茶.	N
			Goddess did not drink Monkey's tea.	N
		Critical	全員の先生がぶたのおちゃを飲まなかった.	Y
			所有老师没有喝猪八戒的茶.	N
			All teachers did not drink Pig's tea.	Y
19	All teachers drank Monkey's juice. Monk also drank Pig's juice.	Filler 1	全員の先生がぶたのジュースを飲んだ.	N
			所有老师喝了猪八戒的果汁.	N
			All teachers drank Pig's juice.	N
		Critical	全員の先生がサンディーのジュースを飲まなかった.	Y
			所有老师没有喝沙和尚的果汁.	Y
			All teachers did not drink Sandy's juice.	Y
		Filler 2	釈迦如来がぶたのジュースを飲まなかった..	Y
			如来佛没有喝猪八戒的果汁.	Y
			Shakyamuni did not drink Pig's juice.	Y

Item	Situation	Type	Target Sentence (JPN+CHN+ENG Translation)	Prediction
20	All teachers used Sandy's house. Monk also used Monkey's house.	Critical	全員の先生がぶたの家を使わなかった.	Y
			所有老师没有用猪八戒的房子.	Y
			All teachers did not use Pig's house.	Y
		Filler 1	全員の先生がさるの家を使った.	N
			所有老师用了孙悟空的房子.	N
			All teachers used Monkey's house.	N
		Filler 2	女神がさるの家を使わなかった.	Y
			观音没有用孙悟空的房子.	Y
			Goddess did not use Monkey's house.	Y

Notes

- 1
- The IS reading would be as follows: ‘for each of the three girls, there are four different boys that invited her’.
- 2
- [Hayashishita \(1999, 2000\)](#) and [Shibata \(2015\)](#) pointed out that the IS reading is indeed available. The author left this issue open for future studies.
- 3
- Huang’s example is subject to an entailment issue: the IS reading entails the SS reading (See [Scontras et al. 2017](#)) because the book that every student bought may happen to be the same. We may use another example to avoid this issue, where the SS reading entails the following IS reading:
- (i) liang-ge xuesheng mai-le suoyou de shu.

Two-CL student buy-PST all GEN book

‘Two students bought all books’

two > all: There are two particular students who bought all books.

**all > two*: For each book *y*, there are two different students who bought *y*.

In (i), the SS reading is allowed but the IS reading is prohibited, which aligns with Huang’s argument but avoids the entailment issue.
- 4
- Most previous studies used the universal quantifier *mei* (‘every’) in their Q-Neg sentences. Only [Wu and Ionin \(2021\)](#) used *suoyou* (‘all’).
- 5
- [Miyagawa \(2001\)](#) observed that some native Japanese speakers may not allow *zen’in* (‘all’) to occur in the modifier position and suggested these speakers use *subete* (‘all’) instead.
- 6
- The individual data were discussed in [Han et al. \(2008\)](#).
- 7
- According to [Han et al. \(2008\)](#), some native Japanese speakers allow the verb to raise to T⁰. When this occurs, the verb picks up negation along the way, forming a complex head.
- 8
- Journey to the West* is widely considered to be written in the 16th century, and the six main characters are well known in East Asia.
- 9
- As mentioned earlier, [Miyagawa \(2001\)](#) stated that some native Japanese speakers may not accept *zen’in* as a noun modifier. However, none of the native Japanese participants in this study pointed out that the use of ‘*zen’in*+noun’ in the experimental trials is unnatural/ungrammatical. Also, their accuracy in distinguishing between correct and incorrect Type 1 fillers, which also incorporated ‘*zen’in*+noun’, indicated their full understanding that *zen’in* is used to modify the subsequent noun.
- 10
- Note that the context that satisfies the SS reading is also logically compatible with the IS reading.
- 11
- No more than two blocks having critical items of the same condition were grouped together.
- 12
- Since the pilot study indicated a lower preference for the IS reading compared to the SS reading, each experimental list was designed to start with a block that had an IS item.
- 13
- The cumulative probability of having 8 or more successes out of 10 independent trials is 0.05.
- 14
- The author acknowledges that this analysis differs from the long-standing perspective that NegP occurs above *vP* (e.g., [Ernst 1995](#)), and leaves this issue open for further exploration. Future studies may also investigate what prevents Chinese Q-Neg sentences from having an IS reading.

References

Anderson, Catherine. 2004. The Structure and Real-Time Comprehension of Quantifier Scope Ambiguity. Ph.D. dissertation, Northwestern University, Evanston, IL, USA.

Aoun, Joseph E., and Yen-hui Audrey Li. 1993. *Syntax of SCOPE*. Cambridge: MIT Press.

Bobaljik, Jonathan David, and Susi Wurmbrand. 2012. Word Order and Scope: Transparent Interfaces and the 3/4 Signature. *Linguistic Inquiry* 43: 371–421.

- Chen, Yunchuan. 2021. Anaphor reconstruction in Japanese relative clauses. *Language and Linguistics* 22: 243–71.
- Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge: MIT Press.
- Crain, Stephen, and Rosalind Thornton. 1998. *Investigations in Universal Grammar: A Guide to Experiments on the Acquisition of Syntax and Semantics*. Cambridge: MIT Press.
- Ernst, Thomas. 1995. Negation in Mandarin Chinese. *Natural Language and Linguistic Theory* 13: 665–707.
- Fan, Li. 2017. No “Chinese-speaking phase” in Chinese Children’s Early Grammar—A Study of the Scope between Negation and Universal Quantification in Mandarin Chinese. *Lingua* 185: 42–66. [\[CrossRef\]](#)
- Haegeman, Liliane. 1995. *The Syntax of Negation*. Cambridge: Cambridge University Press.
- Han, Chung-hye, and Dennis Ryan Storoshenko. 2012. Non-subject antecedent potential of caki in Korean. In *Japanese/Korean Linguistics* 21. Edited by Seungho Nam, Heejeong Ko and Jongho Jun. Stanford: CSLI Publications, pp. 45–57.
- Han, Chung-hye, Dennis Ryan Storoshenko, and Yasuko Sakurai. 2004. Scope of negation, and clause structure in Japanese. In *Proceedings of the 30th Annual Meeting of the Berkeley Linguistics Society*. Berkeley: Berkeley Linguistics Society, pp. 118–29.
- Han, Chung-hye, Dennis Ryan Storoshenko, and Yasuko Sakurai. 2008. An experimental investigation into the syntax of negation in Japanese. *Language Research* 44: 1–31.
- Han, Chung-hye, Jeffrey Lidz, and Julien Musolino. 2007. Verb-raising and grammar competition in Korean: Evidence from negation and quantifier scope. *Linguistic Inquiry* 38: 1–47. [\[CrossRef\]](#)
- Hayashishita, J.-R. 1999. Two ways of deriving distributive readings. In *Proceedings of the 23rd Annual Penn Linguistics Colloquium*. Edited by Jim Alexander, Na-Rae Han and Michelle Minnick Fox. Philadelphia: University of Pennsylvania, pp. 201–16.
- Hayashishita, J.-R. 2000. Scope ambiguity and scrambling. In *Proceedings of West Coast Conference on Formal Linguistics (WCCFL)* 19. Edited by Roger Billerey and Brook Danielle Lillehaugen. Somerville: Cascadia Press, pp. 204–17.
- Heim, Irene, and Angelika Kratzer. 1998. *Semantics in Generative Grammar*. Oxford: Blackwell.
- Hoji, Hajime. 1985. Logical Form and Configurational Structures in Japanese. Ph.D. dissertation, University of Washington, Seattle, WA, USA.
- Huang, Cheng-Teh James. 1982. Logical Relations in Chinese and the Theory of Grammar. Ph.D. dissertation, MIT, Cambridge, MA, USA.
- Inagaki, Shunji. 2006. Manner of motion verbs with location/directional PPs in L2 English and Japanese. In *Inquiries in Linguistic Development: In Honor of Lydia White*. Edited by Roumyana Slabakova, Silvina Montrul and Philippe Prévost. Amsterdam: John Benjamins, pp. 41–68.
- Ionin, Tania. 2010. The scope of indefinites: An experimental investigation. *NATURAL Language Semantics* 18: 295–350. [\[CrossRef\]](#)
- Kataoka, Kiyoko. 2006. *Nihongo Hiteibun-no Kouzou [The Structure of Japanese Negative Sentences]*. Tokyo: Kuroshio Publishers.
- Kato, Yasuhiko. 1993. Negative polarity, feature checking, and inflection parameter. *Sophia Linguistica* 33: 85–99.
- Kishimoto, Hideki. 2008. On the variability of negative scope in Japanese. *Journal of Linguistics* 44: 379–435. [\[CrossRef\]](#)
- Kitamoto, Misako. 1986. The relative scope of negation and quantification in Japanese. *Descriptive and Applied Linguistics* 19: 115–26.
- Koizumi, Masatoshi. 2000. String Vacuous Overt Verb Raising. *Journal of East Asian Linguistics* 9: 227–85. [\[CrossRef\]](#)
- Kuno, Susumu. 1973. *The Structure of the Japanese Language*. Cambridge: MIT Press.
- Kuroda, Shige-Yuki. 1970. Remarks on the notion of subject with reference to words like *also*, *even*, and *only*. *Annual Bulletin* 4: 127–52.
- Kuroda, Shige-Yuki. 1979. *Generative Grammatical Studies in Japanese Language*. New York: Garland Publishing.
- Laka, Itziar. 1990. Negation in Syntax: On the Nature of Functional Categories and Projections. Ph.D. dissertation, MIT, Cambridge, MA, USA.
- Lasnik, Howard. 1999. Chains of arguments. In *Working Minimalism*. Edited by Samuel David Epstein and Norbert Hornstein. Cambridge: MIT Press, pp. 189–215.
- Lin, Jo-Wang. 1996. Polarity Licensing and *wh*-Phrases Quantification in Chinese. Ph.D. dissertation, University of Massachusetts, Amherst, MA, USA.
- Lin, Jo-Wang. 1998. Distributivity in Chinese and its implications. *Natural Language Semantics* 6: 201–43. [\[CrossRef\]](#)
- Marsden, Heather. 2009. Distributive quantifier scope in English-Japanese and Korean-Japanese interlanguage. *Language Acquisition* 16: 135–77. [\[CrossRef\]](#)
- May, Robert. 1977. The Grammar of Quantification. Ph.D. dissertation, MIT, Cambridge, MA, USA.
- Meyer, Marie-Christine, and Uli Sauerland. 2009. A pragmatic constraint on ambiguity detection: A rejoinder to Büring and Hartmann and to Reis. *Natural Language and Linguistic Theory* 27: 139–50. [\[CrossRef\]](#)
- Miyagawa, Shigeru. 2001. The EPP, scrambling, and *wh*-in-situ. In *Ken Hale: A Life in Language*. Edited by Michael Kenstowicz. Cambridge: MIT Press, pp. 293–38.
- Miyagawa, Shigeru. 2003. A-movement scrambling and options without optionality. In *Word Order and Scrambling*. Edited by Simin Karimi. Oxford: Blackwell, pp. 177–200.
- Moscati, Vincenzo. 2010. *Negation Raising: Logical Form and Linguistic Variation*. Newcastle upon Tyne: Cambridge Scholars Publishing.
- Musolino, Julien, and Jeffrey Lidz. 2006. Why children aren’t universally successful with quantification. *Linguistics* 44: 817–52. [\[CrossRef\]](#)
- Musolino, Julien, Stephen Crain, and Rosalind Thornton. 2000. Navigating Negative Quantificational Space. *Linguistics* 38: 1–32. [\[CrossRef\]](#)

- O'Grady, William, Hye-Young Kwak, On-Soon Lee, and Miseon Lee. 2011. An emergentist perspective on heritage language acquisition. *Studies in Second Language Acquisition* 33: 223–46. [\[CrossRef\]](#)
- Ota, Akira, and Yasuhiko Kato. 1986. The relative scope of neg and quantifiers in English and Japanese. *Sophia Linguistica* 20–21: 25–40.
- Pollock, Jean-Yves. 1989. Verb movement, universal grammar, and the structure of IP. *Linguistic Inquiry* 20: 365–424.
- Reinhart, Tanya. 2006. *Interface Strategies: Optimal and Costly Computations*. Cambridge: MIT Press.
- Saito, Mamoru. 2009. Optional A-scrambling. In *Japanese/Korean Linguistics* 16. Edited by Yukinori Takubo, Tomohide Kinuhata, Szymon Grzelak and Kayo Nagai. Stanford: CSLI Publications, pp. 44–63.
- Scontras, Gregory, Maria Polinsky, Cheng-Yu Edwin Tsai, and Kenneth Mai. 2017. Cross-linguistic scope ambiguity: When two systems meet. *Glossa A Journal of General Linguistics* 2: 36. [\[CrossRef\]](#)
- Shibata, Yoshiyuki. 2014. Negative structure in Japanese. *University of Pennsylvania Working Papers in Linguistics* 20: 31.
- Shibata, Yoshiyuki. 2015. Negative structure and object movement in Japanese. *Journal of East Asian Linguistics* 24: 217–69.
- Storoshenko, Dennis Ryan. 2004. Negation Scope and Phrase Structure in Japanese. Master's thesis, Simon Fraser University, Burnaby, BC, Canada.
- White, Lydia, Joyce Bruhn-Garavito, Takako Kawasaki, Joe Pater, and Philippe Prévost. 1997. The researcher gave the subject a test about himself: Problems of ambiguity and preference in the investigation of reflexive binding. *Language Learning* 47: 145–72. [\[CrossRef\]](#)
- Wible, David Scott. 1990. Subjects and the Clausal Structure of Chinese and English. Ph.D. dissertation, University of Illinois, Urbana-Champaign, Champaign, IL, USA.
- Wu, Mien-Jen, and Tania Ionin. 2019. L1-Mandarin L2-English speakers' acquisition of English quantifier-negation scope. In *Proceedings of the 43th Boston University Conference on Language Development*. Edited by Megan Brown and Brady Dailey. Somerville: Cascadia Press, pp. 716–29.
- Wu, Mien-Jen, and Tania Ionin. 2021. Does explicit instruction affect L2 linguistic competence? An examination with L2 acquisition of English inverse scope. *Second Language Research* 38: 607–37. [\[CrossRef\]](#)
- Xiang, Yimei. 2016. Mandarin particle dou: Exhaustification over pre-exhaustified alternatives. In *Empirical Issues in Syntax and Semantics* 11. Edited by Piñón Christopher. Paris: University Paris 7, pp. 275–304.
- Xun, Endong, Gaoqi Rao, Xiaoyue Xiao, and Jiaojiao Zang. 2016. Da shu ju bei jing xia BCC yu liao ku de yan zhi [The Construction of the BCC Corpus in the Age of Big Data]. *Yu Liao Ku Yu Yan Xue [Corpus Linguistics]* 3: 93–109.
- Zhou, Peng, and Stephen Crain. 2009. Scope assignment in child language: Evidence from the acquisition of Chinese. *Lingua* 119: 973–88. [\[CrossRef\]](#)

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.