Optionality in semantic-pragmatic interface of bilingualism? Bare numeral constructions in Tibetan and Chinese bilinguals' grammar

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Abstract. Bare numeral constructions (BNCs) can be anaphoric in Chinese but not Tibetan. Since the interpretation of BNCs requires a specific context, we consider it to involve a semantic-pragmatic interface, which has been argued to be vulnerable to crosslinguistic transfer for bilinguals (e.g., Sorace 2005, 2011). This study conducted a controlled sentence-picture matching truth value judgment task to examine whether Tibetan-Chinese bilinguals show crosslinguistic influence when interpreting BNCs in both languages. The data suggests that crosslinguistic effects did occur among some bilinguals. However, there were more bilinguals who successfully differentiated the two languages regarding the interpretation of BNCs. Our findings imply that early bilinguals may not necessarily show optionality in interface phenomena.

Keywords. bare nouns; bilingualism; Chinese; interface; Tibetan

1. Introduction. According to the Interface Hypothesis proposed by Sorace and her colleagues (e.g., Sorace & Filiaci 2006), language structures involving an interface between different linguistic domains such as syntax and pragmatics are less likely to be fully acquired by adult L2 learners. Later, this hypothesis was argued to apply to early bilinguals' L1 acquisition and attrition (Sorace 2011): language structures involving an interface are subject to crosslinguistic influence and are expected to show optionality, which is not observed in monolinguals' grammar. So far most previous studies focused on dyads of European languages. Bilinguals of two Asian languages were rarely studied. In this paper, we fill the gap by providing data from early bilinguals of Tibetan and Chinese, a group of balanced bilinguals that is understudied in the field of bilingualism. We investigated how they interpret the bare numeral construction (BNC) in both languages, which we assume to involve the interface between semantics and pragmatics.[1] Our group data suggest that an interface phenomenon may indeed be subject to crosslinguistic influence. However, an inspection of individual data indicates that many bilinguals are able to overcome crosslinguistic effects and behave target-like in both languages.

2. Anaphoricity of BNCs. English BNCs were found to lack anaphoric use (e.g., Jiang 2012), as in (1):

(1)   John bought three dogs and five cats. *(The/Those) five cats are very expensive. (Jiang 2012:75)

In (1), the BNC five cats cannot refer to the five cats mentioned in the preceding sentence without the help of a definite article the or a demonstrative those. Thus, English BNCs were argued

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[1] It is also possible that the interpretation of BNCs involves an interface between syntax, semantics and pragmatics. We leave this question open.

to lack the property of being anaphoric. Meanwhile, Tibetan BNCs[2] are similar in this aspect (Chen & Jiang 2018):

(2) cogtse thogtu shingtog gnyis dang sgongaibagleb gcig dug, redde John gis shingtog
     table on   apple   two and   bread   one have but   John ERG apple
     gnyis *(de)   bza   rgyured
     two   that   eat   FUT
     'There are two apples and one loaf of bread on the table but John will eat two apples.'

In (2), the BNC *Shingtog gnyis* 'two apples' cannot refer to the two apples in the preceding sentence, which indicates that Tibetan BNCs cannot be anaphoric. In contrast, Chinese BNCs seem different:

(3) zhuozi shang you liang-ge pingguo he yi-ge mianbao, er John chi-le
     table on   have two-CL   apple   and one-CL bread   but John eat-PST
     liang-ge pingguo.
     two-CL   apple
     'There are two apples and one loaf of bread on the table but John will eat two apples.'

Based on our informal consultation with several native Chinese speakers, in (3), the BNC *liangge pingguo* 'two apples' can refer to the two apples mentioned in the previous sentence.[3] Thus, BNCs in Tibetan and Chinese differ in their anaphoricity: Chinse BNCs are anaphoric while Tibetan BNCs are not. Since BNCs cannot be intended to be anaphoric without a specific pragmatic context, we assume that the interpretation of BNCs involves an interface between semantics and pragmatics Thus, the difference between Tibetan and Chinese BNCs provides an ideal testing ground to examine whether bilinguals are subject to crosslinguistic effects and show optionality in interface phenomena.

3. Early bilinguals of Tibetan and Chinese. Chinese is well-known as an SVO language while Tibetan is an SOV language, which is categorized into the Bodic branch of Tibeto-Burman languages in the Sino-Tibetan language family (e.g., DeLancey 2003). We recruited a total of 24 early bilinguals of Tibetan and Chinese, who were all college students (age range: 18-24). They were studying in Mandarin Chinese-speaking cities outside Tibet at the time when this study was conducted. All these bilinguals were born and raised in Garzê Tibetan Autonomous Prefecture (a.k.a. Eastern Tibet) in Sichuan Province of China and they share the following life experience: a. they were born into Tibetan-speaking parents and the dominant language used at home and in their community is Tibetan; b. they were all exposed to Tibetan from birth and formally started learning Mandarin Chinese from age 3 to 7 when entering kindergarten or elementary school; c. they all reported that they were able to speak Chinese fluently by Grade 6 in elementary school; d. after elementary school, they entered Tibetan language-track programs in their middle and high schools (a total of 6 years), where most subjects were taught in Tibetan; e. Mandarin Chinese is the dominant language of the social media they were exposed to from childhood and they also had Chinese classes in their middle and high schools; f. the Tibetan dialect they were exposed to in their schools and communities was Khams Tibetan.

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[2] The Tibetan dialect that this study examines is Khams Tibetan.

[3] This actually goes against Jiang's (2012) claim that Chinese BNCs lack anaphoric use. Later our experimental data will show that Chinese BNCs can indeed be anaphoric.

4. Chinese and Tibetan proficiency tests. The study used Wen's (2015) fill-in-the-blank quasi-C-test as a Chinese proficiency test. There were 50 blanks in two texts and participants are expected to fill in each blank with a single Chinese character. Each blank is worth one point and the full score is 50. Table 1 shows the data from 31 native Chinese speakers, who were tested by Chen and Huan (to appear), and our 24 Tibetan-Chinese bilinguals

	M	*SD*	Highest score	Lowest score
Chen and Huan's (to appear) 31 L1 Chinese participants	47.27	2.55	49.5	36.5
Our 24 Tibetan-Chinese bilinguals	45.63	1.85	49	41.5

Table 1. Chinese proficiency test scores of L1 Chinese speakers and Tibetan-Chinese bilinguals

By checking Chen and Huan's individual data, we found that the lowest score 36.5 is an outlier so we chose the second lowest score 42.5 as a cutoff point to select participants whose Chinese proficiency is native equivalent. That is, if a participant's Chinese proficiency score falls within the range between 42.5 and 50, we consider her Chinese proficiency to be native. By examining our Tibetan-Chinese bilinguals' scores, we observed that only one person's score was below 42.5, which is 41.5. We thus assume that all remaining bilinguals have achieved native equivalent proficiency in Chinese.

As for the Tibetan proficiency test, we created a fill-in-the-blank quasi-C-test, similar to Wen's (2015) Chinese test. We selected an essay from a Tibetan language textbook *Manual of Standard Tibetan* (Tournadre & Dorje, 2005), which was written for L2 Tibetan learners. Since the essay was in Lhasa Tibetan, we asked two Tibetan language specialists to translate it to Khams Tibetan. There were 17 sentences in the essay and we removed one to three words from each sentence, creating a total of 30 blanks for filling in. Each blank is worth one point and the full score is 30. The bilinguals' scores ranged from 15 to 27 (*M*=22.29, *SD*=3.06).

5. Experimental design and materials. A sentence-picture matching truth value judgment task (TVJT) (Crain & Thornton, 1998) was first created in Chinese, based on which a Tibetan version was created. Each Chinese sentence in the Chinese TVJT was closely translated to Tibetan for the Tibetan TVJT. Participants saw written sentences along with pictures on Microsoft Power-Point.

Each bilingual participant completed the Tibetan TVJT first, followed by the Chinese TVJT. After that, they continued to finish the Tibetan and Chinese proficiency tests and filled out a background information sheet. The whole experiment was conducted on VooV Meeting and we interacted with each participant on a one-to-one basis. Apart from the 24 bilingual participants, we recruited 20 L1 Chinese speakers as controls, who were also college students living in China. None of them had experience of living outside China.

For the TVJTs, four characters from a Chinese novel Journey to the West were used: Monkey (4a), Pigsy (4b), Sandy (4c) and Monk (4d). There is also a dog (4e) who can speak languages.

(4) a.   b.   c.   d.   e.

At the beginning of the TVJT, each participant was told that the four characters from (4a) to (4b) love to put pictures of their faces on their own belongings. Here is one example:
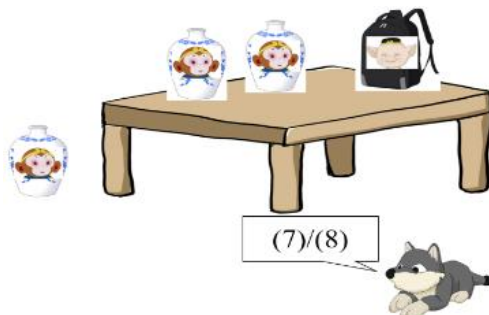
(5)

Background information: there are two Monkey's vases and one Pig's bag on the table. There is one Monkey's vase under the table. Monkey and Pig will use their things.

After seeing the image and the statement below in (5), participants look at the image in (6), where there is a written sentence (7)/(8) located inside the speech bubble produced by the dog:

(6)

(7)   cogtse thogtu metogdambe gnyis dang dpekhug gcig dug redde Sunwukhung
      table   on   vase   two   and   bag   one have but   Monkey
      gis   metogdambe gnyis   khona bedspyod rgyured. (Tibetan)
      ERG   vase   two   only use   FUT
      'There are two vases and one bag on the table but Monkey will only use two vases.'

(8)   zhuozi shang you liang-ge   huaping he   yi-ge   shubao, er
      table on   have two-CL   vase   and   one-CL   bag   but
      Sunwukong   zhi   hui   yong   liang-ge   huaping. (Chinese)
      Monkey   only will use   two-CL   vase
      'There are two vases and one bag on the table but Monkey will only use two vases.'

This is our anaphoric condition, where the BNC in the second clause of the target sentences is intended to refer to the same BNC two vases in the first clause. Participants then judged whether the given sentence and picture matched by saying 'yes' or 'no.' Note that there is a word 'only' following the BNC of the second clause. We expect participants to say 'yes' if the second BNC can be anaphoric and say 'no' if it lacks anaphoric use.

   In addition to the anaphoric condition, there is a nonanaphoric condition. The nonanaphoric version of the above example is shown in (9), where the target sentence is still (7)/(8):

(9)
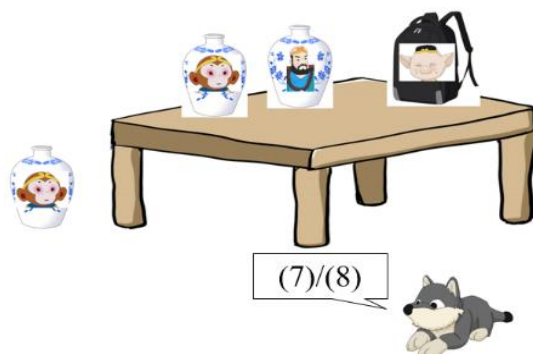
Background information: There are one Monkey's vase, one Sandy's vase and one Pig's bag on the table. There is one Monkey's vase under the table. Monkey, Sandy and Pig will use their things.

In the nonanaphoric condition, the BNC in the second clause of (7)/(8) is not intended to refer to the BNC *two vases* in the first clause. That is, it does not refer to the two vases on top of the table. Rather, it refers to one vase under the table and one on the table. Participants are expected to say 'yes' if the BNC is interpreted to be nonanaphoric, which refers to any two vases in the context.

We created a total of 16 target sentences with different lexicalizations. Each sentence was then assigned with two pictures: one picture indicates the anaphoric condition and another picture indicates the nonanaphoric condition, resulting in 32 sentence-picture pairs. We then distributed these pairs into two lists and ensured that each list had 16 items (8 anaphoric items and 8 nonanaphoric items). Each list only had either the anaphoric or the nonanaphoric condition of each item. Moreover, for each critical item, there were two additional items included as fillers. They all share the same picture. For example, the two filler sentences in Chinese for the critical item in (6) are shown in (10) and (11):

(10) Sunwukong hui   yong huaping. (Chinese)
     Monkey   will use vase
     'Monkey will use vases/a vase.'

(11) Zhubajie hui   yong huaping. (Chinese)
     Pig   will use   vase
     'Pig will use vases/a vase.'

Participants are expected to say 'yes' to (10) and 'no' to (11) in the context of (6). The sentence (10) was categorized as a Type I filler, where the agent *Sunwukong* 'Monkey' is the same as that of the critical sentence (8). There were 8 'yes' and 8 'no' items. Meanwhile, (11) was categorized as a Type II filler, where the agent *Zhubajie* 'Pig' is different from the agent of the critical sentence (8). Similar to Type I fillers, there were 8 'yes' and 8 'no' items. Recall that Chinese BNCs allow both anaphoric and nonanaphoric interpretations. Since our focus is the anaphoric condition and we do not want our participants' anaphoric interpretation to be influenced by their nonanaphoric interpretation if they see both conditions alternatively, we created two blocks within each list: Block 1 only had anaphoric items and Block 2 only had nonanaphoric items, and we presented Block 1 before Block 2 (i.e., anaphoric before nonanaphoric). Each Tibetan-Chinese

bilingual saw Tibetan before Chinese (i.e., Tibetan List 1+ Chinese List 2 or Tibetan List 2+ Chinese List 1).

To ensure our participants fully understand how to do the sentence-picture matching TVJT, we presented several sample items before the real experimental items. Two sample items are shown below: one item had the sentence (12) with the picture (13a); another item had the sentence (12) with the picture in (13b):

(12) Sunwukong$_i$ jigei-le   Shaheshang$_j$ ta$_{i/j}$ de   diannao. (Chinese)
      Monkey   send-PST   Sandy   he GEN computer
      'Monkey sent Sandy his computer.'

(13a)   (13b)
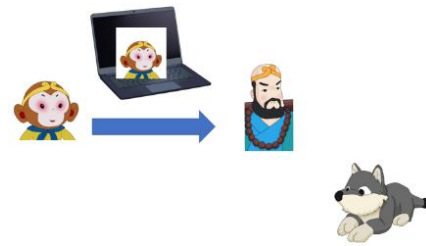
Participants were told that the computers in (13a) and (13b) belonged to Sandy and Monkey respectively. In (12), the pronoun *ta* 'he' can refer to either the subject *Sunwukong* 'Monkey' or the indirect object *Shaheshang* 'Sandy.' Participants first saw (13a) and read (12). Some said 'yes' and some said 'no.' If they say 'no,' which means the picture and sentence do not match, we ask them to reconsider whether it is at all possible to say (12) in the context of (13a). All the participants who initially said 'no' successfully accessed the target interpretation and switched to 'yes.' Then they saw (13b) and read (12) and they all said 'yes' this time. After getting their 'yes' answers on both items, we showed the two sample items again on a single PowerPoint slide and explicitly stated the following rule: if a given sentence is ambiguous or has two possible interpretations, as long as there is one interpretation that matches the picture, the item should be accepted. This procedure was used to teach participants that they need to explore possibilities and make judgment based on acceptability rather than preference.

Moreover, for each of the first three items in Block 1 (i.e., two fillers and one critical item), we gave the following instruction immediately before showing participants the target sentence: could you think about whether it is possible for the next sentence to be said in this situation? Furthermore, right after the Chinese TVJT, we conducted a brief post-experimental interview with each participant on a one-to-one basis: (i) for Tibetan-Chinese bilinguals, we showed one anaphoric item and one nonanaphoric item in both Tibetan and Chinese and recorded their answers; (ii) for Chinese monolinguals, we presented one anaphoric item and one nonanaphoric item in Chinese and recorded their answers. Later we confirmed that their answers in the post-experimental interviews were in line with what they provided in the TVJTs. The post-experimental interview was used to see whether the participants' answers in the TVJTs were legitimate and correctly reflected their intuitive judgment.

6. Findings. First of all, the 20 Chinese monolinguals' data were examined. Recall that there were two critical conditions (anaphoric and nonanaphoric) and each condition had 8 items. Based on binomial cumulative distribution, if a participant accepts or rejects 7 items or more out of 8, we would be more than 95% confident that she did not provide random answers. An initial

screening of the participants' answers of Type I and II fillers shows that they all consistently accepted 'yes' items and consistently rejected 'no' items, which means they had fully understood how to do the TVTJ and were attentive enough. A further examination of their individual data demonstrates that there were 19 (95%) participants who consistently accepted the anaphoric condition while only one (5%) participant who consistently rejected it. Table 2 summarizes the 20 Chinese monolinguals' mean proportion of 'yes' answers in each critical condition of the Chinese TVJT:

Condition	Mean proportion	SD	SE
Anaphoric	0.95	0.22	0.05
Nonanaphoric	0.89	0.31	0.07

Table 2. Summary of the Chinese monolinguals' mean proportions of 'yes' answers in the critical conditions of the Chinese TVJT

Pairwise comparison showed that there was no significant difference between the two conditions ($t = 0.71$, $p = .49$).[4] Given that 95% of the Chinese monolinguals consistently accepted the anaphoric items, we confirmed that Chinese BNCs are anaphoric, contrary to Jiang's (2012) claim.

Now we examine our 24 Tibetan-Chinese bilinguals' Tibetan and Chinese data. For the Type I and II fillers in each language, they consistently accepted 'yes' items and consistently rejected 'no' items, which suggests that they had understood how to do TVJTs and were attentive enough. For each individual's judgment on the Tibetan anaphoric items, there were 20 (83.3%) participants who consistently rejected them and 4 (16.7%) participants who consistently accepted them. Meanwhile, all participants accepted the nonanaphoric items. Table 3 presents a summary of the bilinguals' mean proportion of 'yes' answers in each condition of the Tibetan TVJT:

Condition	Mean proportion	SD	SE
Anaphoric	0.17	0.38	0.08
Nonanaphoric	0.99	0.04	0.01

Table 3. Summary of the Tibetan-Chinese bilinguals' mean proportions of 'yes' answers in the critical conditions of the Tibetan TVJT

Pairwise comparison showed a significant difference between the two conditions ($t = 10.52$, $p < .01$). Thus, both individual and group data suggested that Tibetan BNCs lack anaphoric use. Then we check each individual's judgment on the Chinese anaphoric items. It showed that 7 (29.17%) participants consistently rejected them and the remaining 17 (70.83%) participants consistently accepted them. Meanwhile, 22 (91.67%) participants consistently accepted the Chinese nonanaphoric items. Table 4 presents a summary of the bilinguals' mean proportion of 'yes' answers in each critical condition of the Chinese TVJT:

Condition	Mean proportion	SD	SE
Anaphoric	0.71	0.45	0.09
Nonanaphoric	0.92	0.28	0.06

Table 4. Summary of the Tibetan-Chinese bilinguals' mean proportions of 'yes' answers in the critical conditions of the Chinese TVJT

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[4] Our sample size may not be large enough for this t test.

A significant difference was found between the two conditions ($t = 2.02$, $p = .05$). Further, we used R (R core team, 2021) and *lme4* (Bates, Mächler, Bolker & Walker, 2015) to run linear mixed-effects analysis (using *glmer*) on the relationship between *Anaphoricity* (anaphoric vs. nonanaphoric) and *Language* (Tibetan/Chinese). The dependent variable was participants' answers, with 'yes' coded as 1 and 'no' coded as 0. *Anaphoricity* and *Language* were fixed factors and participants and items were random intercepts. The results are shown in Table 5.

	Estimate	Standard Error	*z*-value	*p*-value
Intercept	2	0.64	3.13	< .01**
Anaphoricity	1.12	0.32	3.45	<.001***
Language	-4.91	0.52	-9.54	< .001***
Anaphoricity*Language	8.51	0.97	8.74	<.001***

Formula: Answer ~ Anaphoricity + Language + Anaphoricity * Language + (1|Participant) + (1|Item).

Table 5. Output of the binomial generalized linear mixed model fit by maximum likelihood

There was a strong significant interaction between *Anaphoricity* and *Language* ($p < .001$) so simple main effects were run: there was a significant difference between Tibetan and Chinese with respect to the anaphoric condition ($F(1, 23) = 225.33$, $p < .001$) but no significant difference between the two languages regarding the nonanaphoric condition ($F(1, 23) = 1.54$, $p = .23$).

By checking the individual data, we identified a divergence among Tibetan-Chinese bilin-guals with respect to the anaphoricity of BNCs in both languages. There are three different groups: (i) 4 participants (Group I) who accepted the anaphoric reading of BNCs in both lan-guages; (b) 7 participants (Group II) who rejected the anaphoric reading of BNCs in both languages; (c) 13 participants (Group III) who rejected the anaphoric reading of BNCs in Tibetan but accepted it in Chinese. Each individual's judgment was in line with what they stated in our post-experimental interview. Table 6 provides a summary of the individual data.

Judgment on the anaphoricity of BNCs	Number of participants	Percentage
Acceptance in Tibetan and Chinese	4	16.66%
Rejection in Tibetan and Chinese	7	29.17%
Acceptance in Chinese & Rejection in Tibetan	13	54.17%
Total	24	100%

Table 6. Summary of the Tibetan-Chinese bilinguals' judgment on the anaphoricity of Tibetan and Chinese BNCs

7. Discussion. The data suggests that there are three groups of Tibetan-Chinese bilinguals that do not share the same interpretations for Tibetan and Chinese BNCs. Group I accept the anaphoric use of BNCs in both languages while Group II reject it. Also, Group III are able to make a distinction between Tibetan and Chinese: they allow Tibetan BNCs to be anaphoric, but not Chinese BNCs. Based on the fact that Chinese BNCs are anaphoric and Tibetan BNCs are not, our question is what lead Group I and Group II to have deviant interpretations.

One reason why the Group I participants allow Tibetan BNCs to be anaphoric might be attributed to crosslinguistic transfer. That is, since Chinese BNCs are anaphoric, Tibetan-Chinese

bilinguals may just transfer such property to Tibetan BNCs. Note that Tibetan BNCs are more semantically restrictive than their Chinese counterparts. The transfer from Chinese to Tibetan then reduces one semantic constraint in Tibetan.

How about the Group II participants who unexpectedly disallow Chinese BNCs to be anaphoric? Recall that almost all our bilingual participants' Chinese proficiency test scores fell into Chinese monolinguals' range, which means they had achieved native equivalent proficiency in Chinese. Their high Chinese proficiency is not surprising because they had been exposed to Chinese from elementary school and Chinese is the dominant language in their social media. Thus, we can assume that the quality of the Chinese input they receive should not differ from that of Chinese monolinguals. However, it is unexpected to see that 7 participants still rejected the anaphoric use of Chinese BNCs, in contrast to our Chinese monolinguals' data: 95% of our Chinese monolingual participants accepted the anaphoric interpretation. Since such interpretation possibly occurs in the input, it is unlikely that the 7 participants had never been exposed to it. Thus, it seems more likely that their acquisition of the anaphoric use was influenced by the transfer of their Tibetan knowledge.

In the meantime, the Group III participants successfully made a distinction between Tibetan and Chinese regarding the anaphoricity of BNCs. No crosslinguistic transfer was identified. Now we check whether our bilinguals' Tibetan and Chinese proficiency levels are relevant to their interpretation of Tibetan and Chinese BNCs. The raw scores of their Tibetan and Chinese proficiency tests were converted to z-scores, which are shown in Figure 1 below:
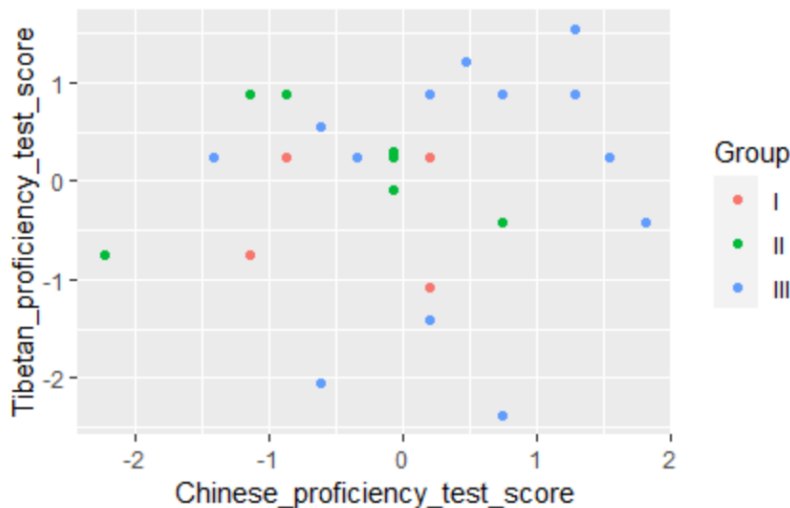

Figure 1. *Z*-scores of the bilinguals' Tibetan and Chinese proficiency tests

The red, green and blue dots indicate Group I, Group II and Group III participants respectively. For the four Group I participants who accepted the Tibetan BNCs' anaphoric use, the reason may not be attributed to their Tibetan proficiency because their Tibetan test scores fell into the range of the Group III participants, who have the knowledge that Tibetan BNCs cannot be anaphoric. On the other hand, for the seven Group II participants who rejected the Chinese BNCs' anaphoric use, we may not blame their Chinese proficiency because except for one participant, all other participants' Chinese proficiency test scores were within the range of the Group III participants, who have the knowledge that Chinese BNCs are anaphoric. Thus, the data of Group I and Group II suggested that the anaphoricity of BNCs, which involves the interface between semantics and

9

pragmatics, is indeed subject to optionality and crosslinguistic effects. Also, the direction of the crosslinguistic transfer does not seem to be predicted by the language proficiency. That is, a high Tibetan proficiency level does not guarantee that the Tibetan grammar would disallow BNCs to be anaphoric. Similarly, a high Chinese proficiency level does not warrant that the Chinese grammar allows BNCs to be anaphoric.

On the other hand, more than half of our bilingual participants belong to Group III, who made a clear distinction between Tibetan and Chinese regarding the BNC's anaphoricity. This finding suggests that bilinguals may not necessarily exhibit optionality in language phenomena that involve interface between linguistic domains. Recall that our Tibetan-Chinese bilinguals are early bilinguals who were exposed to both languages from the childhood. Our data implies that it is possible for early bilinguals to fully acquire interface phenomena have subtle differences between their languages, contrary to what the Interface Hypothesis claims.

8. Conclusion. BNCs are anaphoric in Chinese but not in Tibetan. This study conducted a sentence-picture matching TVJT to investigate whether early bilinguals of Tibetan and Chinese know that the anaphoricity of BNCs differs in the two languages. The data shows that there are three groups of bilinguals: (i) Group One who accept the anaphoric use of BNCs in both Tibetan and Chinese; (ii) Group Two who disallow BNCs to be anaphoric in both languages; (iii) Group Three who have the target knowledge in both languages. Group I and Group II's data indeed confirmed that early bilinguals may be subject to crosslinguistic effects in language phenomena that involve different linguistic domains. However, Group III's data suggest that it is also possible for early bilinguals to fully master interface phenomena that have subtle differences across their languages. Since the language phenomenon of this study only involves the interface between semantics and pragmatics, future studies may examine phenomena that involve interfaces of other domains.

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