Cross-language Syntactic Representation in Chinese-English Bilinguals: Evidence from Structural Priming

Ran Wei

School of Foreign Studies, Jiangsu Normal University, Xuzhou, P R China

Email address:
weiran@jsnu.edu.cn

Abstract: The tendency to use the syntactic structure that has been processed or encountered before is called syntactic priming or structural priming. There are an increasing number of bilingual speakers, therefore, it is crucial to explore the mental storage and processes of two languages in people's mind and to discover the potential similarity or difference between bilinguals and monolinguals so as to interpret the language use in real world. With regard to cross-language priming, it is uncertain about whether bilinguals shared information with the two languages or separate the storage and processing of syntactic information one after another. This study focused on how Chinese-English bilingual speakers represent cross-language syntax using the phenomenon of syntactic priming. With the confederate scripting task, 60 Chinese-English bilinguals took part in the experiment of syntactic priming on passive structure. It was found that the participants produced more English passive structure after they heard either marked passive or unmarked passive in Chinese. However, there is no significant difference between the number of English passive structures produced after Chinese marked and unmarked passive sentences. In other words, both marked passive and unmarked passive structures in Chinese primed English passive structure, which supported the view of syntactic representation as shared between languages and shed light on syntactic account across languages.

Keywords: Chinese-English Bilinguals, Cross-language Syntactic Priming, English Passive Structure, Shared-syntax Account

1. Introduction

People are prone to use the syntactic structure that they just processed before. This interesting phenomenon is called syntactic priming or structure priming. For instance, if the speaker heard a sentence structure 'Tom gave me a pencil', he/she is more likely to repeat the sentence structure in the subsequent sentence processes, even though the other structure patterns such as 'Mon made a new dress for me' or 'Mon made me a new dress' are both acceptable. This phenomenon was later on justified in Bock's experimental study with within-language syntactic priming [1].

Nowadays, more and more people in the world speak more than one language. Therefore, it is important to understand the mental storage and processes of two languages in people's mind and to discover the potential similarity or difference between bilinguals and monolinguals so as to interpret the language use in real world. Take syntax representation as an example in the study, different from within-language priming, we are uncertain about whether bilinguals shared information with the two languages or separate the storage and processing of syntactic information one after another. This study therefore will focus on how Chinese-English bilingual speakers represent cross-language syntax using the phenomenon of syntactic priming, especially on passive structure, to shed more light on the syntactic account across languages.

Hartsuiker et al. investigated Spanish-English syntactic priming on passive structure and found that Spanish passive structure can easily activate the syntactic representation of English passive structure [4]. In other words, a Spanish-English bilingual speaker tended to use the same English

passive structure after just hearing a passive sentence spoken in Spanish. Their finding further confirmed that some syntactic information is shared across two languages and the syntactic access to one language facilitates the activation of the similar syntactic structure in another language.

However, their study inevitably has some limitations. On the one hand, the Spanish-English syntactic priming of passive structure is likely to be attributed to the priming effect of prepositions. In other words, it is not because of the shared grammatical structure in Spanish and English but due to the function word of 'by' in English passive structure and corresponding preposition of 'por' in Spanish passives. The early study conducted by Levelt and Kelter found that when the storeowners were asked 'at what time do you close?' rather than 'what time do you close?', it was more common for them to reply 'at five o'clock' than 'five o'clock' [7]. Similar examples were shared in Bock and Loebell's research on monolingual priming [2]. It is necessary to further elaborate whether it is the similar syntactic structure or the influence of preposition that leads to the priming effect across languages.

On the other hand, a majority of previous cross-linguistic studies on syntactic priming [3, 4, 9] concerned about alphabetic languages in Indo-European language family (e.g. English, Spanish, Dutch, German). We have no idea about whether the cross-language syntactic priming occurred in Chinese-English bilinguals. Since there are obvious differences between Chinese language and Indo-European languages, it is significant to investigate how syntactic representation stored and processed in Chinese-English bilinguals.

The present study

This study will resemble Hartsuiker et al. [4] with the same research design to address the abovementioned gap on whether and how L1 Chinese could use the same syntactic passive structure in the subsequent L2 English. To address the gap of whether the priming happens because of syntactic information or because of function word of preposition, this study will use two types of Chinese passive structure (i.e. one with the passive marker and one without the passive marker) to compare the priming effect from L1 Chinese to L2 English. Different from English passives, Chinese passives mainly have two types: the one with passive marker (e.g. the representative '被, bei4' structure, hereinafter marked passive) and another without passive markers (hereinafter unmarked passive) [14].

For the unmarked passives that express the meaning of passive without the formal marker 被, there is a debate on whether it is a passive structure or not in the previous studies. Some scholars focusing on notional understanding of passives advocate it is the unmarked passive or so-called notional passive [8, 11, 14] in that if the patient rather than the agent appears in the position of the subject of a sentence, it is a passive. Based on this view, both marked and unmarked passives are passives in nature and the only difference between them is with or without the formal marker 被. On the contrary, the opponents [12, 13] argue that it

cannot only depend on the meaning but the grammatical form to make a judgment. The unmarked passives share many similarities with middle construction in Indo-European languages. For instance, the patient is promoted forward to the position of the subject and the agent fails to be expressed on the surface level. Therefore, they define it as middle construction to denote the use of active structure to express the meaning of passive and argue that this structure which focuses on a state probably triggered by a prior action or event is neither passive nor active but middle in structure. Till now, there is no research consensus to confirm the nature of middle construction [15] because the unmarked passive is popularly used to express the meaning of passives since the early ancient China.

In this paper, the traditional passive theory of unmarked passives is used to justify whether the occurrence of Chinese-English syntactic priming is due to function words of preposition or syntactic representation, only the unmarked passive with the verb of disposition meaning and followed by complement to mean 'finished' (e.g. 作业写完了。 The homework was finished.) will be used because it shares the same sentence structure with the marked passive only without the marker 被 and the agent. If it is viewed from the middle construction theory of unmarked passives, it is hard to make the comparison and draw the conclusion for the difference of marked and unmarked passives in their syntactic structure (passive vs. middle). I use the term unmarked passives rather than notional passives in order to distinguish it with marked passives– 被 structure. The numbers of produced English passives will be compared among those after hearing Chinese actives, Chinese marked passives and those after hearing Chinese unmarked passives. For instance,

The mail was delivered by the postman on the morning. (English passive)

苹果被妹妹吃了。 (Chinese marked passive, the apple was eaten by my little sister.)

地板打扫完了。 (Chinese unmarked passive, the floor was swept.)

Based on the view of traditional theory of unmarked passives, if people produce more English passives (e.g. the mail was delivered by the postman in the morning) after they heard Chinese marked passive sentence (e.g. 苹果被妹妹吃了) than after they heard Chinese unmarked passive sentence (e.g. 地板打扫完了) and Chinese active sentence (e.g. 警察抓小偷), it may mean cross-language priming occurs because of the function words rather than syntactic structure. Conversely, if both types of Chinese PV structure can activate the representation of English PV structure (that is their production of English passives are the same after they heard either the Chinese marked passive or the Chinese unmarked passive and meanwhile both are more than those after they heard Chinese actives), Chinese-English syntactic priming comes from the cross-linguistic activation of syntactic representation.

Based on the view of middle construction theory of unmarked passives, the difference of the marked and

unmarked passives in underlying syntactic structure may fail to discover whether it is because of the preposition or the syntactic structure that activates the representation of English PV structure. In other words, people's production of English passives is likely to be more when they heard Chinese marked passives than when they heard Chinese actives and unmarked passives. It can only suggest that there exists the priming effect in cross-linguistic Chinese-English bilinguals but it is difficult to confirm whether it is the priming from the function word of 被 or from the passive structure.

From the aforementioned concerns, this study intends to investigate whether/how cross-language syntactic priming occurs in Chinese-English bilinguals which have few overlapping in grammatical constructions since they belong to different language families so as to provide more evidences for syntactic priming across languages. Besides, two major types of Chinese passive structure will be involved in the study to further justify the priming account from syntax or from lexical function words.

2. Methods

All the stimuli, materials, and data used for analyses will be uploaded on the Open Science Foundation platform (http://osf.io) for public research use.

2.1. Participants

Approximately 60 Year-two undergraduates (at the age from 18–21 years old) from non-English majors in a provincial university will voluntarily attend the experiment. They are all L1 native Chinese speakers with around 10 years' learning experience of English as their L2. All of them are born in mainland China without any living or study abroad experience. Their English proficiencies are intermediate to high according to their scores of College English Test Band Four (CET4) above 500[1]. The male and female proportion will be controlled to nearly 1:1 so as to extract the gender effect in the experiment.

The number of participants in this experiment is decided on the following two concerns. First, the number of participants in the previous studies will be considered as the reference to recruit volunteers. Loebell and Bock recruited 48 German-English speakers in their study [9]. Desmet and Declercq invited 30 Dutch-English bilingual speakers into their experiment [3]. Hartsuiker et al. recruited 24 Spanish-English bilingual speakers in their across-linguistic study [4]. In order to compare the result with theirs, 60 participants will be recruited to generalize the result into the population. On the other hand, I would like to detect a subtle effect of priming rather than a huge effect so that the comparatively large number of participants will be invited to join in the study.

---

1 The reason to use CET4 score as their English proficiency measurement is because all of the Year-two non-English majors in the selected university are required to attend CET4. The full mark in CET4 is 710 with 425 as the passing line. Therefore, 500 is equivalent to 70 of 100.

2.2. Design

The participants will be required to look at a series of pictures with an agent performing an action and another patient undergoing the action (e.g., a picture of a dog eating a bone). Each participant (i.e., real participant) will collaborate with a researcher assistant they never met before the experiment (i.e., confederate or fake participant) in the picture description task. Immediately after the confederate uttered a Chinese passive structure (either marked passive or unmarked passive) or a Chinese active structure in Chinese, the participant will have to repeat the sentence and find the described picture first and then be provided another picture and describe the event on the picture with their L2 English. After that, the confederate has to repeat in the same language and point out the correct picture and the same round goes again and again. The participants will not be informed the confederate identity but only be told of performing a communicative task so that they will have no idea about the real research purpose. In order to avoid the circumstance that the participants notice the different tasks they are doing from the confederate. The fake lots will be drawn between the confederate and the participants. No matter which one the participants will choose, they will be grouped into the English group. In other words, they have to describe the given pictures in English. The aim to use confederate scripting technique is to create the nearly natural communicative environment in interactive condition to elicit more data reflecting the features of syntactic representation and processes across languages.

2.3. Materials

Slight different from Hartsuiker et al. [4] which has four conditions (i.e. passive, active, intransitive, and OVS) with 8 priming sentences in each, this experiment has three conditions (active, marked passive, unmarked passive) as shown in the following table. Therefore, there will be 33 priming sentences in total with 11 priming sentences in each condition. The selection of 33 priming sentences rather than more than that is because I want to match the total number with Hartsuiker et al. [4] and on the other hand to avoid making the experiment too long to fatigue the participants.

All the 33 Chinese priming sentences include 11 active structure, 11 marked passive structure, and 11 unmarked passive structure. 66 corresponding pictures will also be prepared with 33 provided for the participants and another 33 provided for the confederate. The agent is always on the right side of the picture and all of the agents are inanimate (e.g. telephone, sun) with half corresponding patients animate (e.g. human beings) and another half inanimate (e.g. clothes). The control on location and animacy of agent-patient in each picture is to guarantee the opportunity of PV structure production [4]. All the verbs in the pictures will be provided in the bottom right of the picture to ensure participants' use of the verb in picture description. The valence of the verbs will be controlled to use negatively valenced verbs and the actions shown in the corresponding pictures will be same

controlled to be negatively valenced so as to avoid the chance that people are inclined to use active structure for positive events. In order to avoid lexical boost effect in the experiment, different verbs will be provided in the prime and the target. What's worth noting is that the complete Chinese priming sentences will be presented in the pictures provided for the confederate but not for the participants. Twice of 33 priming sentences and 66 pictures will be used as the fillers ($N_{sentence\ fillers}$=66; $N_{picture\ fillers}$=132). The fillers are intransitive sentences and pictures as used in Hartsuiker et al. [4] (e.g., 她在跑步。She is running.) to intervene the participants' attention to aware the test purpose. Besides the experiment pictures and picture fillers, another 396 pictures (3*(66+66)) will be provided as the selection fillers for both the participants and the confederate to use in the picture-ticking stage (i.e., four pictures in one slide for them to point out the picture describing the heard sentence). Before the experiment, 12 practice trials will be presented for the participants to familiarize with the experiment.

2.4. Procedure

The experiment will be conducted in a quiet lab with only the confederate and the participant inside each time. They will be arranged to sit face to face but with two computers in front of them (each for one person) to show the priming pictures in the PowerPoint slides (each slide showing 7s to guarantee the participants can generate the sentence but won't discover the research purpose). Before the experiment, they will be informed that the purpose of the experiment is to measure their cross-language communicative abilities. Once the experiment began, the confederate has to describe the picture (read aloud the script) on the given picture in Chinese while the participant has to repeat the sentence and point out the correct picture in the four given pictures on the slide provided on his/her computer. Then the participant will have another picture (only used verb on it) and he/she has to describe the picture in English and the confederate repeats it in English and finds the correct picture on his/her own computer slide. The same sequence goes on and on till the end of the experiment. The shown order of each slide is one experiment picture–two picture fillers. Each session will last

around 30 minutes. The whole processes will be recorded on audiotape and the participants' descriptions will be fully transcribed after the experiment.

2.5. Data Analysis

The total number of sentences generated by the participants will be manually counted after transcription and then categorized according to active, passive and other. For the active voice sentences, the utterance with a subject containing an agent and the object containing a patient is qualified as active sentences. For the passive sentences, the utterance with a subject containing a patient followed by a to-be form and then a by-phrase containing an agent or without a by-phrase is qualified as passive sentences. All the other sentences either with ungrammatical passive structures (e.g., without the be-verb (the apple eaten by my sister.) or the mispronunciation of the past participle of verbs (the apple was eaten by my sister.)) except those without by-phrase or with morphosyntactic deviations (e.g., failure in SV agreement) will be grouped into the 'other' type. The data from the trials and the 'other' group will be deleted later from the final data analysis.

3. Results

Before the real experiment will be conducted, it is predicted that 1) if the activation of cross-language syntactic representation leads to Chinese-English syntactic priming, then the participants can produce more English passive structure after they just heard either marked passive or unmarked passive in Chinese. In other words, both marked passive and unmarked passive structures in Chinese can prime English passive structure; while 2) if Chinese-English syntactic priming is attributed to the activation of the function words of preposition or if the unmarked passive is middle construction with different syntactic structure from passives, only on the circumstance that they hear Chinese marked passive structure can they produce more English passive structure. That is, Chinese marked passive structure can prime English passive structure but Chinese unmarked passive structure cannot do so.

Table 1. *Three Priming Conditions in the Experiment.*

Priming Conditions	Examples	English Translation
Chinese active	雨淋湿了衣服。	The rain soaked into my clothes.
Chinese marked passive	他被电话吵醒了。	He was woken up by the phone call.
Chinese unmarked passive	衣服晒干了。	The clothes were dried.

Table 2. *The Proportion of Produced English Passive and Standard Deviations for Each Priming Condition.*

Priming Conditions	Percentage of Produced English Passive	SD
Chinese Active	23.4%	6.15
Chinese Marked Passive	35.2%	6.26
Chinese Unmarked Passive	34.3%	6.48

The results showed that participants produced more English passive structures after Chinese marked passive

structures ($p < 0.05$) and after Chinese unmarked passive structures ($p < 0.05$) than they produced after Chinese

active structures. However, there is no significant difference between the number of English passive structures produced after Chinese marked and unmarked passive sentences (p=0.34). It can be concluded that both Chinese marked and unmarked passives can prime English passives. In other words, Chinese-English syntactic priming may be not attributed to the activation of the function words of preposition or because the unmarked passive is middle construction with different syntactic structure from passives. The results confirmed the first prediction which supported Hartsuiker et al.'s syntax-shared account across languages [4].

4. Conclusion

With regard to cross-language syntactic representation, it fails to reach a consensus on whether bilinguals share or separate the storage and processing of syntactic information within two languages. With Chinese-English bilingual speakers as participants and syntactic priming as the experiment paradigm, the current study finds that more English passives are produced after both Chinese marked and unmarked passives and there is no difference between the number of English passives produced after Chinese marked/unmarked passives. In other words, cross-language syntactic priming can indeed occur between Chinese and English, even though these two languages are greatly different. The occurrence of cross-language syntactic priming between Chinese and English passives provided evidence and support for the view of syntactic representations as shared in Hartsuiker et al. [4]. Since all the Chinese-English bilinguals in the study were also English language learners, it will be intriguing to further explore whether shared syntax account also developed in the course of Chinese English learning [5, 10]. Additionally, more syntactic structures, cross-languages and task paradigms should be added into future studies to shed more light on syntactic account across languages.

Acknowledgements

References

[1] Bock, K. (1986). Syntactic persistence in language production. Cognitive Psychology, 18, 355–387.

[2] Bock, K., & Loebell, H. (1990). Framing sentences. Cognition, 35, 1–39.

[3] Desmet, T., & Declercq, M. (2006). Cross-linguistic priming of syntactic hierarchical configuration information. Journal of Memory and Language, 54, 610–632.

[4] Hartsuiker, R., Pickering, M., & Veltkamp, E. (2004). Is syntax separate or shared between languages? Psychological Science, 15, 409–414.

[5] Hartsuiker, R., & Bernolet, S. (2017). The development of shared syntax in second language learning. Bilingualism: Language and Cognition, 20, 219–234.

[6] Hong, L. (2017). Qian xi bei dong ju zhong 'bei' de yin xian gui lv (A preliminary analysis of the appearance and disappearance of 'bei' in bei construction). Modern Chinese (Language Studies), 07, 64–67.

[7] Levelt, W., & Kelter, S. (1982). Surface form and memory in question answering. Cognitive Psychology, 14, 78–106.

[8] Li, Z. (1989). Yi yi bei dong ju de shi yong fan wei (The application scope of Chinese meaning passives). Chinese Teaching in the World, 3, 151–153.

[9] Loebell, H., & Bock, K. (2003). Structural priming across languages. Linguistics, 41, 791–824.

[10] Muylle, M., Bernolet, S., & Hartsuiker, R. (2021). The development of shared syntactic representations in late L2-learners: Evidence from structural priming in an artificial language. Journal of Memory and Language, 119 (1), 104233.

[11] Sun, L. M. (1994). Gu dai han yu yu fa bian hua yan jiu (The variation study of ancient Chinese grammar). Beijing: Chinese Language Press.

[12] Ting, J. (1998). Deriving the bei construction in Mandarin Chinese. Journal of East Asian Linguistics, 7, 1–34.

[13] Ting, J. (2006). The middle construction in Mandarin Chinese and the presyntactic approach. Concentric: Studies in Linguistics, 32 (1), 89–117.

[14] Wang, L. (1985). Zhong guo xian dai yu fa (Chinese modern grammar). Beijing: The Commercial Press.

[15] Yan, C. S. (2011). Han yu mei you 'zhong dong jie gou' (There is no middle construction in Chinese). Journal of PLA University of Foreign Languages, 34 (5), 7–12.