Integrated bilingual syntax: the role of shared voice without shared word order

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An integrated syntax model assumes that syntactic knowledge is shared between bilinguals' languages (Hartsuiker et al., 2004). Some studies claim that the integrated syntactic system requires two languages to be as similar as possible, but how similar need two syntactic representations be? To date, studies have tested whether identical word order is necessary for syntactic knowledge to be shared; however, the results of previous research are mixed (Shin & Christianson, 2009 vs. Bernolet et al., 2007), leaving open the possibility that shared syntactic knowledge may relate not only to word order, but also to other aspects of syntax. We report four experiments that investigated whether a shared syntactic system is affected by how structures assign a grammatical role (e.g., subject) to an argument (e.g., patient). To investigate this question, we selected Mandarin and English transitive (active & passive) structures in a cross-linguistic priming paradigm. We chose these structures because 1) Mandarin passives (e.g., translating as *a soldier bei a cat kicked* (NP-Patient *bei* NP-Agent V)) have a different word order from English passives (e.g., *a soldier is kicked by a cat* (NP-Patient V PP-Agent)); and 2) transitive structures have different agent/patient grammatical assignments between passive and active voice. If a cross-linguistic priming effect occurs despite these word order differences, it would suggest that there is a shared syntactic representation of transitives that is not dependent on shared word order but may instead be based on shared voice.

EXP1: L1 Mandarin speakers with intermediate to advanced L2 English proficiency (N=72) participated either in a L1-L2 or in a L2-L2 priming paradigm. The prime-target pairs used verbs that were translation-equivalent (TEV), in order to yield the strongest priming effect between Mandarin and English ('lexical boost'; Pickering & Branigan, 1998). Participants heard/described transitive events in a picture-matching/-description task (Fig.1). We used animal agents and human patients to promote passive responses (Branigan et al., 2008), and manipulated the prime structure (active vs. passive) within-participants, while measuring frequency of passive responses. Participants produced more passives after passive than after active primes (76% vs.16%; p<.001) (Fig.2, A). Hence, we found cross-linguistic priming between passive sentences with different word orders.

EXP2: We modified EXP1 using translation-non-equivalent verbs (T-non-EV) in prime and target. Participants (N=72) produced more passives after passive primes than active primes (56% vs. 11%; p<.001); priming in the L2-L2 condition was stronger than in the L1-L2 condition (31% vs. 7%; p<.001) (Fig.2, B). Hence, we found cross-linguistic priming between passive sentences with different word orders, even when they involved translation-non-equivalent verbs. However, the priming effect might be based on the shared human-animal order and/or the shared thematic role order. Therefore, we conducted a further experiment using Mandarin *rang* passives, which have the same word order as *bei* passives, but are considered less prototypically passive (e.g. can be translated using other non-passive structures; see examples in the final page) (Tang, 2001). If cross-linguistic priming were due to human-animal order or thematic order, *bei* and *rang* primes should yield similar priming; if it were due to voice, they should yield different priming.

EXP3: EXP3 (N=36) replaced all Mandarin *bei* passives with *rang* passives, using TEV in prime and target, and testing only the L1-L2 condition. Participants produced more passives after passive primes than active primes (45% vs. 6%; p<.001) (Fig.2, C).

EXP4: EXP4 was identical to EXP3 but with T-non-EV (N=36). Participants produced more passives after passive primes than active primes (9% vs. 6%; p<.001). Crucially, a combined analysis between EXP2 and EXP4 showed stronger priming after *bei* passives than *rang* passives (7% vs.3%; p=.003; Fig.2, D).

These results argue against an animacy or thematic order explanation, and instead suggest that passive voice affects cross-language priming. Hence, our results suggest a shared syntactic representation of transitives that is not dependent on shared word order but may instead be based on shared voice.

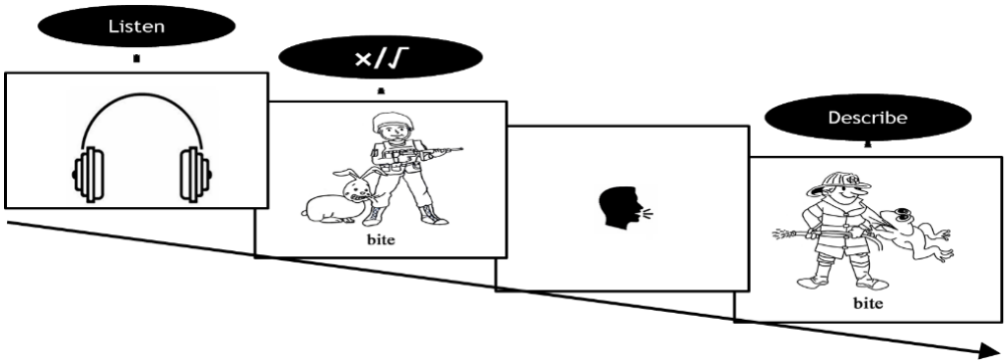

Fig.1. Procedure and example materials. Participants first heard an English recording (e.g. *a solider is being bitten by a rabbit*). Then, they chose whether the picture was matched or mismatched with the recording by pressing X (mismatched) or √ (matched). After they pressed either of these two buttons, the computer screen presented a target picture. After the beep sound, participants described the target picture as soon as possible.

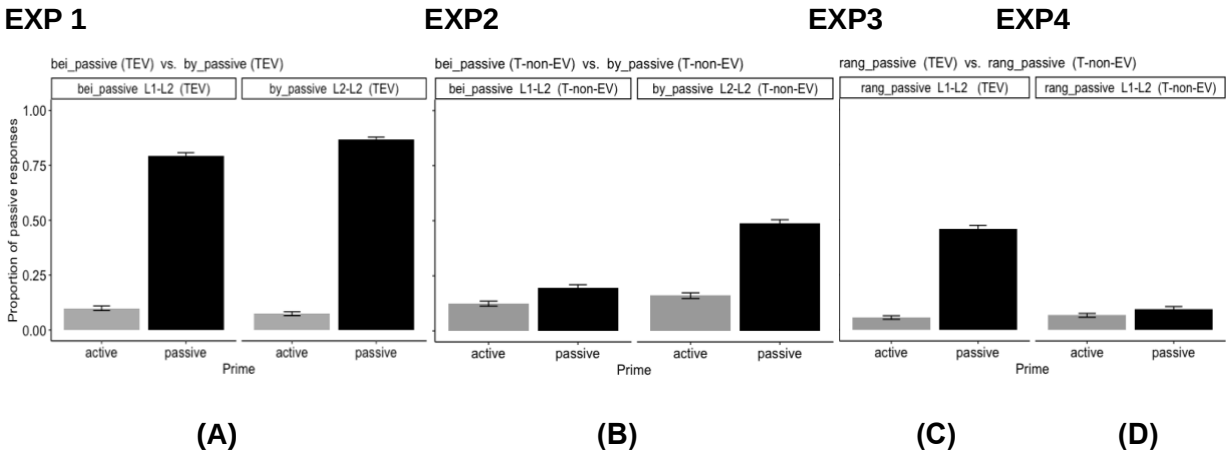

Fig. 2. Overall proportion of passive productions by Prime in EXP1 (A), EXP2 (B), EXP3 (C) and EXP4 (D). Error bars reflect by-subject standard errors. TEV refers to translation-equivalent verbs; T-non-EV refers to translation-non-equivalent verbs.

Additional information about the studied language

Mandarin passives: In Mandarin, *bei*-passive (b) is the most prototypical passive structure. *Rang*-passive is less prototypical. Different from English, verbs in Mandarin passives do not convey passive meaning, but instead *bei* and *rang* conveys the sense of passivity as passive markers (Hashimoto, 1988).

1(a) Yizhi tuzi zhengzai zhuibu yige yisheng. (Mandarin active)
One-ZHI rabbit ZHENGZAI chase one-GE doctor.
A rabbit is chasing a doctor.

1(b) Yige yisheng zhengzai bei yizhi mao zhui zhe. (Mandarin bei-passive)
One-GE doctor ZHENGZAI BEI one-ZHI cat chase-ZHE.
A doctor is being chased by a cat.

1(c) Yige daifu zhengzai rang yizhi mao zhui zhe. (Mandarin rang-passive)
One-GE doctor ZHENGZAI RANG one-ZHI cat chase-ZHE.
A doctor is being chased by a cat.

Glossary: NP -- noun phrase, V – verb, PP - prepositional phrase, GE/ZHI - noun classifiers in Mandarin, LE - a mark of aspect in Mandarin.

References: Bernolet et. al.,(2007); Branigan et al.,(2008); Hartsuiker et al.,(2004);Pickering, M. J., & Branigan, H. P. (1998);Shin & Christianson (2009);Tang (2001); Hashimoto (1988).