Fewer predictions in L1 source language in consecutive interpreting when cognitive load is high

Background. Prediction has been regarded as an essential characteristic of language processing by psycholinguistics (1). Simultaneously, it is also recognized as a practical strategy employed by interpreters (2). Given this, it becomes crucial to investigate how interpreters process language in real time to better understand the predictive characteristic of language processing. Numerous studies have shown that the availability of cognitive resources (e.g., working memory) is one of the most important factors that influence one's ability to predict (3). However, limited studies have explicitly examined the effect of cognitive load on predictive processing in consecutive interpreting, which itself requires high cognitive resources.

Method. To delve into this issue, we recruited 39 native Mandarin (L1) speakers with experience in interpreting between Mandarin and English (L2) to participate in a visual world paradigm (VWP) eye-tracking experiment. The experiment adopted a design of 2 (**verb**: unpredictive vs. predictive) x 2 (**task**: repeat vs. translate) x 2 (**load**: low vs. high) (**Fig.1**). Participants were instructed to first remember one digit (low load) or five digits (high load), and then listen to a spoken sentence (e.g., "这个男孩想要吃掉/移动蛋糕", *the boy wants to eat/move the cake*, with the former verb predictive and the latter unpredictive of the following noun). After the offset of the sentence, they were asked to repeat or translate the sentence and then type the digit(s) that they had initially heard (**Fig.2**).

Results. A growth curve analysis indicated that there were more fixations to the target when the verb was predictive than when it was not in both task conditions (β = 0.60, *SE* = 0.19, *t* = 3.16, *p* = 0.002), suggesting that participants can use verb information to predict semantically-related upcoming target words in both regular language comprehension (repetition) and L1-to-L2 consecutive interpreting. This is consistent with previous studies showcasing a prediction effect of verb (4-5). Additionally, there was a significant interaction between verb and first-order time (β = 1.95, *SE* = 0.15, *t* = 12.29, p < 0.001), indicating a sharper increase in predictive fixations under predictive conditions compared to non-predictive ones. Lastly, a separate analysis (split by task) revealed a marginal interaction between verb and load in the interpreting task (β = 0.24, *SE* = 0.13, *t* = 1.92, *p* = 0.055), but not in the repetition task, suggesting that high cognitive load may impair the ability to make predictions during interpretation. This effect was not observed during repetition, indicating that the cognitive resources required for predictive processing may be task-dependent (**Fig.3**).

Discussion. The findings suggest that participants can use the verb to predict upcoming words in both regular language comprehension (repetition) and L1-L2 consecutive interpreting. However, the prediction effect is not larger when listening to interpret than to repeat (no interaction between verb predictiveness and task type), which is inconsistent with Zhao et al.(2022). This might be attributed to the different direction of translation in the two studies; their research involved interpreting from L2 to L1, potentially enhancing comprehension due to the facilitative role of the L1 target language. Conversely, this facilitation may not occur when interpreting from L1 to L2. More interestingly, our results suggest that under high cognitive load, participants' likelihood to predict decreases in interpreting tasks, while no such effect is observed in repetition tasks. This implies that predictive processing in L1 source language comprehension is resource-intensive, corroborating the framework proposed by Amos & Pickering (2020). However, note that this effect is only marginally significant. Future studies with larger sample sizes are needed to further explore this trend.

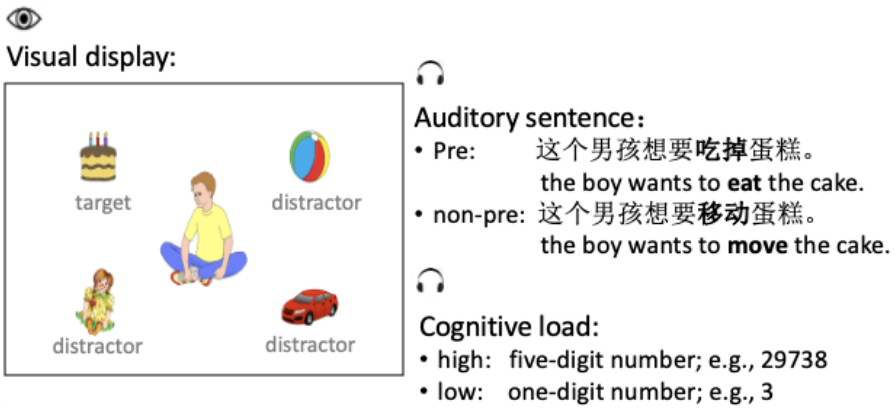

Figure 1. Stimuli design.

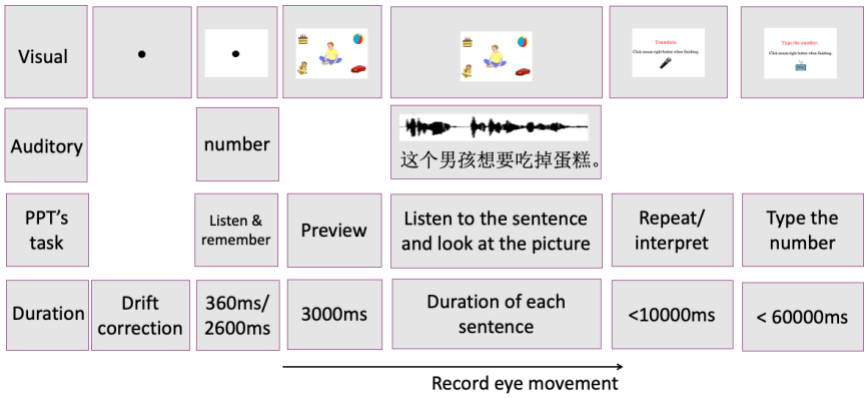

Figure 2. Trial structure

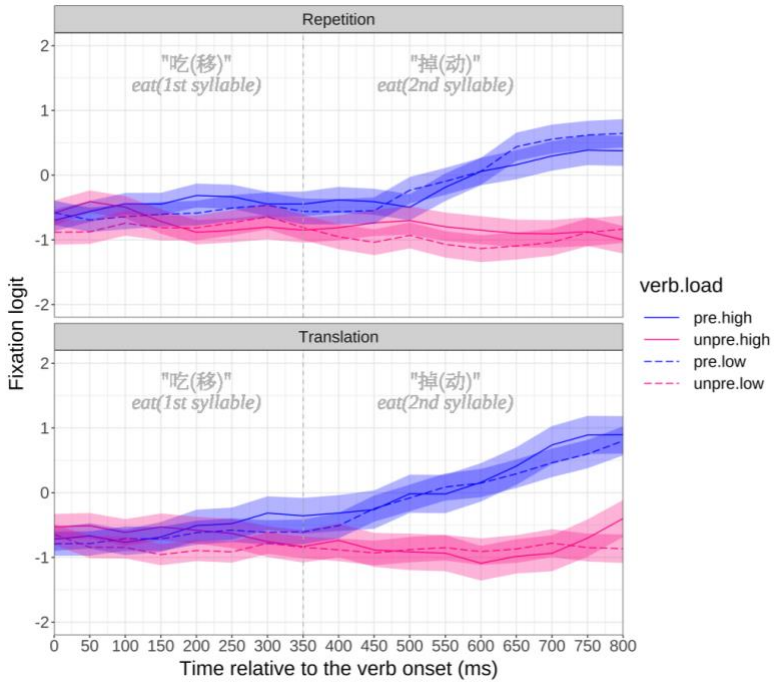

Figure 3. Results. The x-axis shows time relative to the verb onset. The y-axis shows the fixation logit (empirical logit of fixations).

References

1. Kuperberg & Jaeger (2016). *Lang. Cogn. Neurosci.*, 31, 32–59.
2. Li (2015). *Babel,* 61, 170–192.
3. Ito, Corley, & Pickering (2018). *Biling.: Lang. Cogn.*, 21, 251–264.
4. Altmann & Kamide (1999). *Cognition*, 73, 247–264.
5. Liu, et al. (2022).*Biling.: Lang. Cogn.* 25, 801-815.
6. Zhao, Chen, & Cai (2022). *Biling.: Lang. Cogn.*, 25, 588. 602.
7. Amos & Pickering (2020). *Biling.: Lang. Cogn.*, 23, 706–715.