

Instead of hamburger, how about eating restaurant? The Processing of Canonical and Non-Canonical Arguments in Mandarin Chinese

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Mandarin is renowned for its flexibility in the number and the type of arguments that can occur with verbs [1, 2]. In addition to “canonical” arguments, which receive a theme or a patient role from a verb (e.g., *eat hamburger* meaning “eat a hamburger”), Mandarin allows verbs to take “non-canonical” arguments such as location and instrument (e.g., *eat restaurant* meaning “eat in a restaurant”) [2, 3, 4]. The current study took advantage of the flexibility of argument structure in Mandarin to investigate how the verb-argument relations were computed in real time. While both canonical and non-canonical arguments were felicitous in Mandarin, we investigated whether the parser could promptly map the argument to a correct argument role. Specifically, during the processing of non-canonical phrases, we explored whether comprehenders initially considered “restaurant” a canonical argument of *eat* (i.e., something edible) before correctly mapping it to a non-canonical role.

Previous studies have shown that predictability of an object could modulate processing costs [5, 6]. Therefore, we controlled this factor by comparing canonical and non-canonical arguments when both cases were with low predictability. After a norming procedure, three types of stimuli were created: verb phrases with high predictable canonical objects (HCO: *wash clothes*, “wash clothes”, average cloze = 34.63%), verb phrases with low predictable canonical objects (LCO: *wash tableware*, “wash tableware”, average cloze = 0.46%) and verb phrases with low predictable non-canonical objects (NCO: *wash cold-water*, “use cold water to wash”, average cloze = 0.65%) (Table 1). The HCO condition served as the baseline, ensuring the experimental validity, and the predictability of the objects in LCO and NCO conditions were kept equally low. Participants (N=30) read verb phrases using RSVP (600ms/word), and performed a plausibility judgement task at the end of each trial (Figure 1). To balance button pressing, filler items were included. We hypothesized that reaction time to the HCO condition would be the shortest. Furthermore, when controlling for object predictability, we predicted that differences in reaction time might emerge between non-canonical and canonical arguments if participants could not map the non-canonical role to the argument immediately.

Statistical analyses showed a significant effect of object type on reaction time ($F_1(2,48) = 50.95, p < .001$; $F_2(2,88) = 28.45, p < .001$). Post-hoc pairwise t-tests revealed that responses to HCO were significantly faster in comparison to both LCO (LCO vs. HCO: $t_1(24) = 9.64, p < .001$; $t_2(44) = 8.68, p < .001$) and NCO (NCO vs. HCO: $t_1(24) = 9.07, p < .001$; $t_2(44) = 6.20, p < .001$). However, the difference between LCO and NCO was not significant (LCO vs. NCO: $t_1(24) = 1.02, p = 0.32$; $t_2(44) = 1.32, p = 0.20$) (Figure 2 & Figure 3).

Taken together, our data showed that when an object was less predictable, there was no evidence that the canonicity of argument role would modulate response time. It was possible that the parser could efficiently map the object to a correct argument role, leading to similar response time for the non-canonical and canonical arguments. However, an alternative explanation could be that processing an unexpected phrase incurred significant costs, potentially overshadowing the effect of the canonicity of argument role. In an ongoing follow-up experiment, we use a 2 x 2 design to explore the interaction between predictability and canonicity. The canonical conditions are adapted from this experiment, and we include the manipulation of predictability in the non-canonical conditions (predictable: *wrap bandage*, “use bandage to wrap”; less predictable: *wrap tape*, “use tape to wrap”). This design allows for a more comprehensive investigation into whether the canonicity of arguments influences verb-argument processing under different predictability conditions.

Table 1. Example stimulus in each condition.

| High Predictability-Canonical Object (HCO) | Low Predictability-Canonical Object (LCO) | Low Predictability-Non-Canonical Object (NCO) |
|--------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------------------|
| <i>xi yifu</i> wash clothes 'wash clothes' | <i>xi canju</i> wash tableware 'wash tableware' | <i>xi leng-shui</i> wash cold-water 'use cold water to wash' |

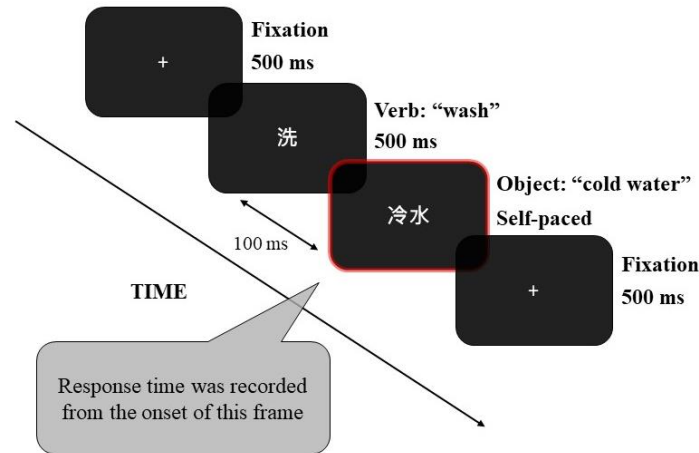


Figure 1. Presentation of stimuli.

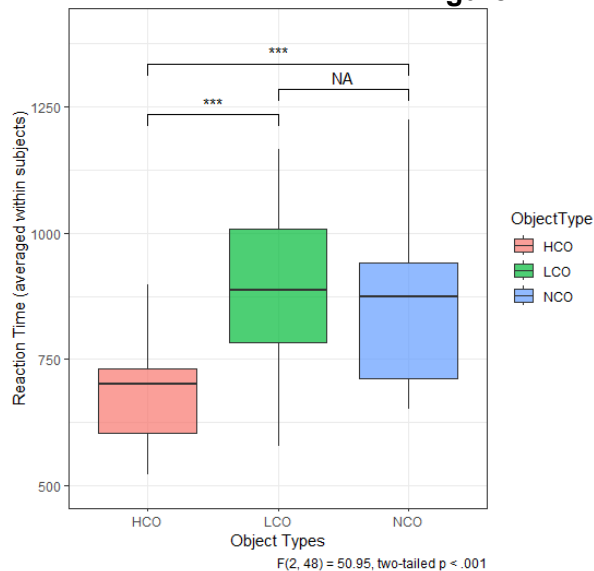


Figure 2. Reaction Time by Object Types (by-subject).

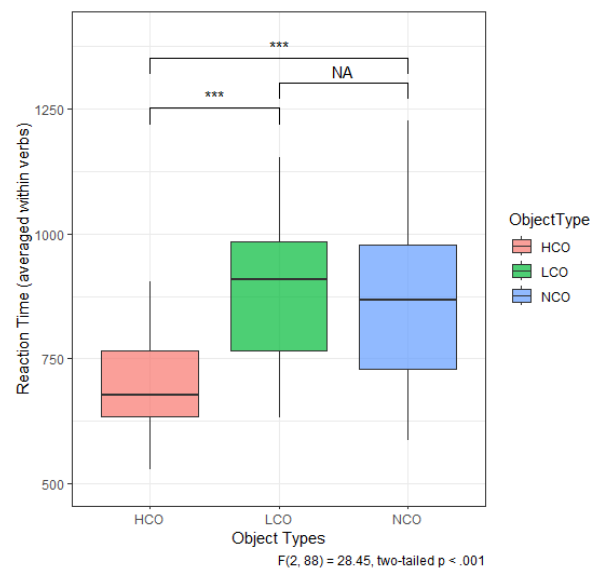


Figure 3. Reaction Time by Object Types (by-item).

References: [1] Tsai, W. T. (2017). Jiwuhua shiyong jiegou yu qing dongci fenxi [Transitivization, applicative construction and light verb analysis]. *Contemporary Research in Modern Chinese* No. 19 (October 2017) p.1-13. [2] Li, Y. H. (2014). Thematic hierarchy and derivational economy. *Language and Linguistics*, 15(3), 295-339. [3] Lin, T. H. (2001). Light Verb Syntax and the Theory of Phrase Structure. [Doctoral dissertation, University of California, Irvine]. [4] Sun, Tianqi, and Yafei Li. (2010). Hanyu fei hexin lunyuan yunzhun jiegou chutan [Licensing non-core arguments in Chinese]. *Zhongguo Yuwen* 2010(1): 21–33. [5] Federmeier, K. D., & Kutas, M. (1999). A rose by any other name: Long-term memory structure and sentence processing. *Journal of memory and Language*, 41(4), 469-495. [6] Thornhill, D. E., & Van Petten, C. (2012). Lexical versus conceptual anticipation during sentence processing: Frontal positivity and N400 ERP components. *International Journal of Psychophysiology*, 83(3), 382-392.