

## Predicting object states in Mandarin Chinese – insights from the *bǎ*-construction

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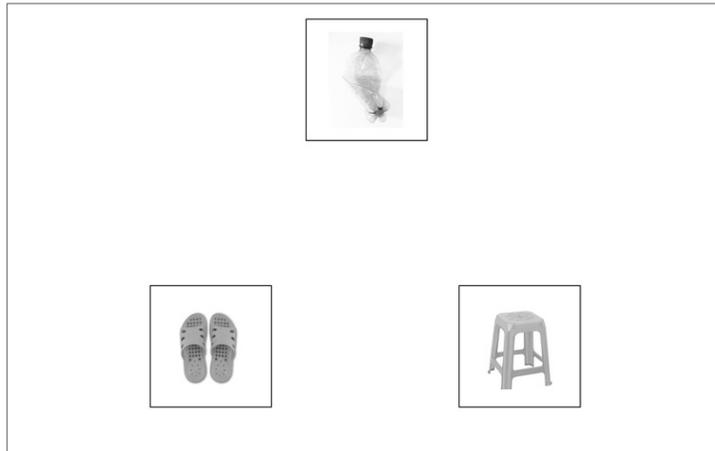
One of the most discussed phenomena in Mandarin Chinese is the so-called *bǎ*-construction. Besides other functions, the marker *bǎ* changes the canonical word order S-V-O to S-*bǎ*-O-V; it marks the noun to which it belongs as the direct object (cf. Yang & van Bergen 2007), and it signals that the corresponding referent (in a transitive sentence) must be interpreted as having changed from one state to another (cf. Li & Thompson 1981). The quality of the referent's initial and resultant state is specified by the sentence-final verb. Given this, the *bǎ*-construction offers a unique case to study the online comprehension of structural meaning (temporal and causal relations) independent of content meaning. Can referent states be activated before they are qualitatively specified? Previous studies revealed that, while listening, people use the current linguistic input to predict upcoming discourse (cf. Altmann & Kamide 1999). It is assumed that this is due to the comprehension processor attempting the fullest interpretation possible at all times (cf. Altmann & Mirković 2009, Crocker et al. 2010). We hypothesized that the function word *bǎ* triggers predictions about the referent following it as an affected object.

In a visual world paradigm, we measured the start time of saccades directed to target objects under 2 conditions: In the critical condition, an auditorily presented target noun followed *bǎ*, whereas in the control condition it followed *de*, a possessive marker in our context. This yielded sentence pairs such as *tā bǎ xiǎoshuō sī huài le/tā de xiǎoshuō bèi sī huài le* ('He *bǎ* novel rip apart' / 'He *de* (=His) novel was ripped apart'). Auditory onset times of the target (*xiǎoshuō* 'novel'), the respective markers (*bǎ/de*), and the pronoun (*tā* 'he/she') were kept constant in all trials. The visual stimuli always showed three objects, one of which was unambiguously depicted in a resultant state, e.g., a torn book or a deformed plastic bottle (see Fig. 1). There were 12 *bǎ/de* stimulus pairs in total and 12 fillers. 26 Mandarin native speakers participated in the experiment. Two experimental lists ensured that every subject encountered only one pair-partner, 6 from each condition (but all fillers). The participant's task was to click on the object mentioned in the sentence. Our analysis focused on the cumulative frequency of target-saccades in the 50-ms-time bins after *bǎ/de*-onset and before target-onset. Results revealed a reliable effect: There were significantly more pre-noun target-saccades in the critical condition (*bǎ*) compared to the control condition (*de*). Furthermore, the cumulative proportions of first target-saccades increased significantly more rapidly (see Fig 2).

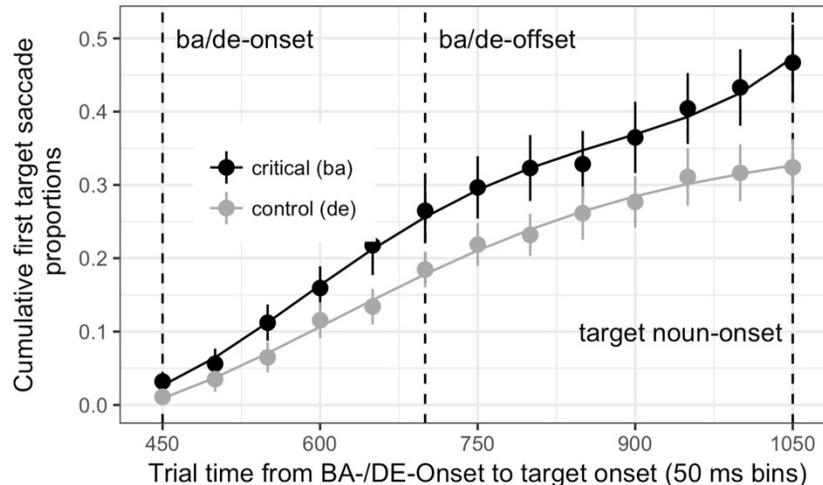
Results of a second experiment confirm these findings and rule out alternative explanations. Only sentences like those in the critical condition in experiment 1 were used (He *bǎ* noun ...). The nouns matched a visual target that this time was not depicted in a second state. Instead an irrelevant visual second-state competitor (torn book) was either present (critical), or not (intact book) (control). Participants looked faster to the target if the second-state competitor was not present. In addition, more and longer looks were registered to the competitor in the critical condition than in the control condition.

Our results suggest that processing *bǎ* activates an abstract, that is, a qualitatively unspecified representation for an affected object in the comprehender's situation model. This representation interacts with the *visual* input, and leads to predictions about the *linguistic* input. We interpret predictions on the basis of such type of structural information as a special kind of incremental processing which has not been reported previously.

## Figures



**Fig. 1:** Example stimulus: bottle = second-state target object (flip-flops/stool = distractors); Note the position of targets varied over different trials



**Fig 2:** Cumulative first target-saccade proportions over time between the onset of the marker (ba/de, 450ms after stimulus onset in all trials) and the onset of the auditorily presented target nouns (1050ms after stimulus onset in all trials); dots show mean proportion values; vertical lines going through the dots show SE; curved lines visualize the fit of our growth curve analysis (Mirman, 2014)

## References

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