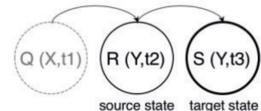
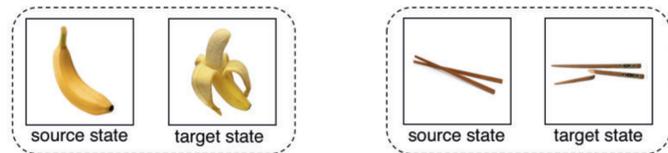


Predicting object states in Mandarin Chinese – insights from the bǎ-construction

Johannes Gerwien & Kexin Xi

Heidelberg University Language and Cognition Lab

Introduction



Structural properties of an event (structural meaning)

Q, R, S = qualities (clusters of features), X, Y = objects (arguments), t1, t2, t3 = time spans



Object qualities (content meaning)

(cf. Klein 2010)

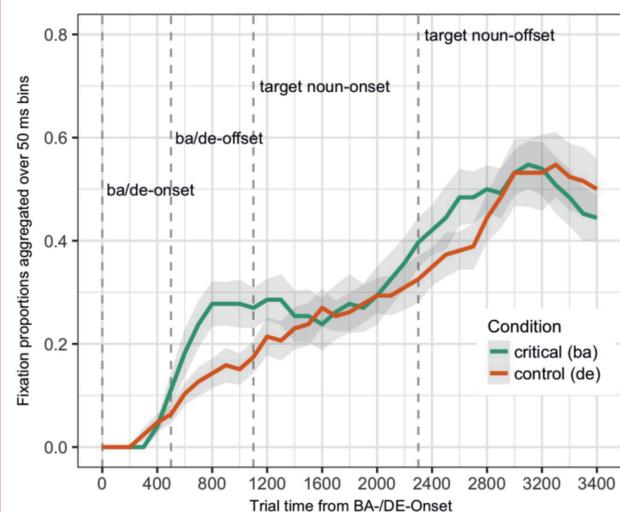
Mandarin Chinese offers an interesting case for studying how structural and content meaning is integrated in a comprehender's situation model. To explicitly express that an object affected by an action is in a resultant state, Mandarin speakers use the so called bǎ-construction (S-bǎ-O-V; canonical is S-V-O; cf. Li & Thompson 1981). Because the processor attempts the fullest interpretation possible at all times (Altmann & Mirković 2009), we may expect that the particle bǎ triggers visual attention to objects depicted in a resultant state even before that object is mentioned, or a verb specifies the quality of any object states.

Hypotheses:

Exp1: more anticipatory looks to the visual target object (resultant state) in the critical (bǎ) than in the control (de) condition.

Exp2: more attention to competitor in critical condition; later consistent attention to target in critical (resultant state competitor present)

Results Exp2



Experiment 1: Growth curve analysis (GCA) (Mirman 2014) reveals more and a faster increase of attention to targets in the time window before target noun onset in the critical condition (green line).

Method

Two visual world experiments with Mandarin native speakers N=26/N=20; students at Heidelberg University; low to medium knowledge of German

Materials Experiment 1 (Exp1): Sentence pairs (N=12) of the following type:

critical: tā bǎ xiǎoshuō sī huài le (He bǎ novel rip apart) /

control: tā de xiǎoshuō bèi sī huài le (He+de=His novel was ripped apart)

Visual stimuli showed 3 objects. The target was unambiguously depicted in a resultant state, e.g., a torn book, the other two were distractors. Positions of targets were counterbalanced.

Materials Experiment 2 (Exp2): Sentences (N=12) like those in the critical condition in Exp1

Visual stimuli showed 3 objects. The target was never depicted in a resultant state, instead, a resultant state competitor was present (critical), or not (control).



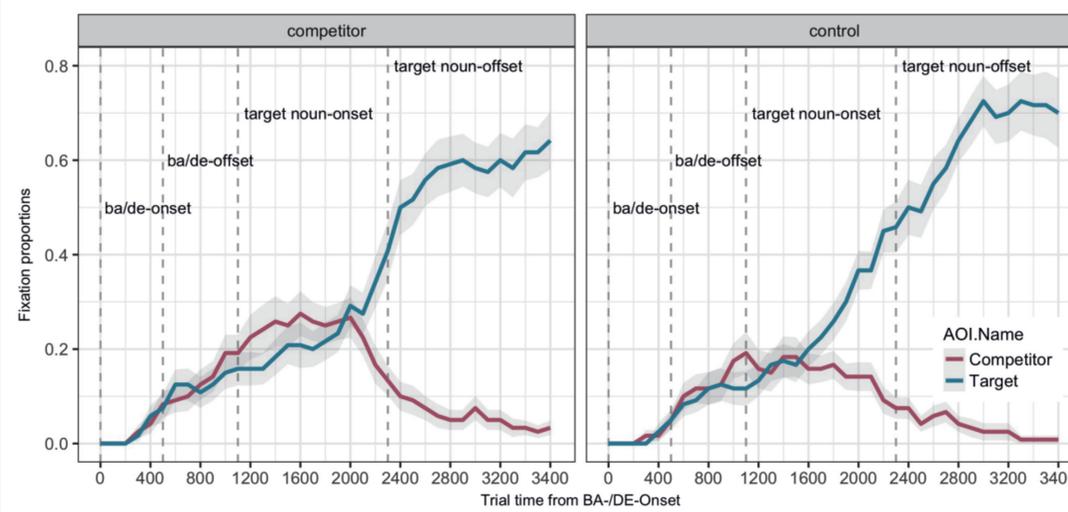
他把筷子折断了。He BA chopstick break LE.
他的筷子被折断了。(He+DE)=His chopstick BEI break LE.

他把箱子打开了。He BA chest open LE.



Design: Only one pair partner per (randomized) list (+ fillers). Subjects listened and clicked on targets (Exp1), or say whether the object in the sentence was present in the display, or not (Exp2).

Results Exp2



Experiment 2: GCA shows more attention to competitor (purple line) between marker onset and noun offset and a significant difference in curvature when comparing conditions. In addition, a difference in curvature was detected for attention to targets, suggesting a later peak in the critical condition.

Discussion

The particle bǎ clearly drives attention toward objects that visually appear in a resultant state. This shows as a prediction effect, if the noun following bǎ is the target (Exp1), as well as increased costs for integration, if the noun following bǎ is not the target (Exp2).

We interpret these findings to show that the structural properties of an event, at least partially, can be activated independently of specific objects and their qualities. Assuming that a resultant state is logically always preceded by a prior state, bǎ alone makes all abstract object states available that can be qualitatively specified by the main verb (later in the sentence).

Structural properties of an event may be conceptualized as a "grid" that binds individual objects, different states of the same objects (cf. Hindy et al. 2012), as well as the relations between different object states (temporal and causal).

Our findings demonstrate a special type of incremental processing in language comprehension, that has not been reported previously.

References

Altmann, Gerry T.M., and Jelena Mirković (2009). Incrementality and Prediction in Human Sentence Processing. *Cognitive Science* 33, 583-609.

Hindy, Nicholas C. and Altmann, Gerry T.M. and Kalenik, Emily and Thompson-Schill, Sharon L. (2012). The effect of object state-changes on event processing: do objects compete with themselves? *The journal of neuroscience*, 32, 5795-5803.

Klein, Wolfgang (2010): On times and arguments. *Linguistics*, 48, 1221-1253.

Li, Charles N., and Sandra A. Thompson (1981). *Chinese: A functional reference grammar*. University of California Press.

Mirman, Dan (2014). *Growth Curve Analysis and Visualization Using R*. Chapman and Hall/ CRC.

