The psychological reality of Construction Grammar: A Visual World eye-tracking study investigating the semantic processing of argument structure

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We will present a Visual World eye-tracking study investigating how argument structure knowledge is put to use in on-line comprehension.

In Construction Grammar, argument structures are considered autonomous constructions, i.e. form-meaning pairings, independent of their lexical content [1]. Earlier research has shown that argument structure is a valid factor in a variety of off-line interpretation tasks [2,3]. However, it remains unclear whether argument structure constructions were only effective in meta-linguistic reasoning, or whether they play a vital role in on-line sentence comprehension.

We invented 20 verbs derived from German nouns (e.g. "korben", *engl:* "*to basket*"), which do not have any systematic dependencies on specific constructions, along the lines of [2]. Each of these verbs was embedded in a *resultative* (1) and a *caused-motion* sentence (2).

    (1) Petra korbt einen Schneemann kaputt.
       Petra baskets a snowman apart.

    (2) Petra korbt Weintrauben in die Wanne.
       Petra baskets grapes into the tank.

40 participants heard one sentence type per verb, while looking at visual stimuli comprised of three scenes, depicting *i.* a resultative event, *ii.* a caused-motion event and *iii.* an unrelated distractor event. Additionally, we varied whether the matching scenes depicted the exact content of the spoken sentence arguments (e.g. *snowman* or *grapes*), or just events that where compatible with the sentence's construction type but with no overlap in lexical content, e.g. someone tearing a sheet of paper to pieces (*resultative*), or someone shoving a ladder through a window (*caused-motion*). After each trial participants were asked to choose the picture most closely resembling the meaning of the sentence. We hypothesized that if argument structure knowledge is used during sentence comprehension to construct sentence meaning, participants attention should be attracted by pictures illustrating a possible instance of the construction's abstract meaning (*resultative* vs. *caused motion*).

We found reliably more looks to the compatible scenes than to incompatible scenes for both construction types in a time window of 500 to 2000 msec after the onset of the disambiguating sentence segment (e.g. *apart* or *into the tank*) in trials with construction depictions lacking lexical overlap (see figure 2). A linear mixed effects model analysis of the correctly identified constructionally compatible pictures revealed significant positive interaction effects of the sentences' construction type and the corresponding compatible visual scene on looking proportions (empirical logits) in a time window of 500 to 1000ms to the different interest areas (p-values < 0.001). This result suggests that abstract (i.e. de-lexicalized) construction knowledge is applied in sentence processing at an early stage of comprehension, further supporting the assumption that abstract construction knowledge plays a vital role in sentence comprehension.
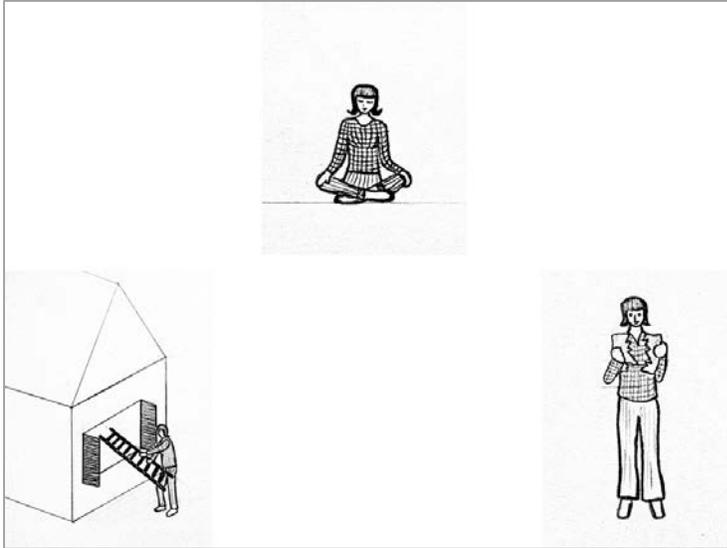
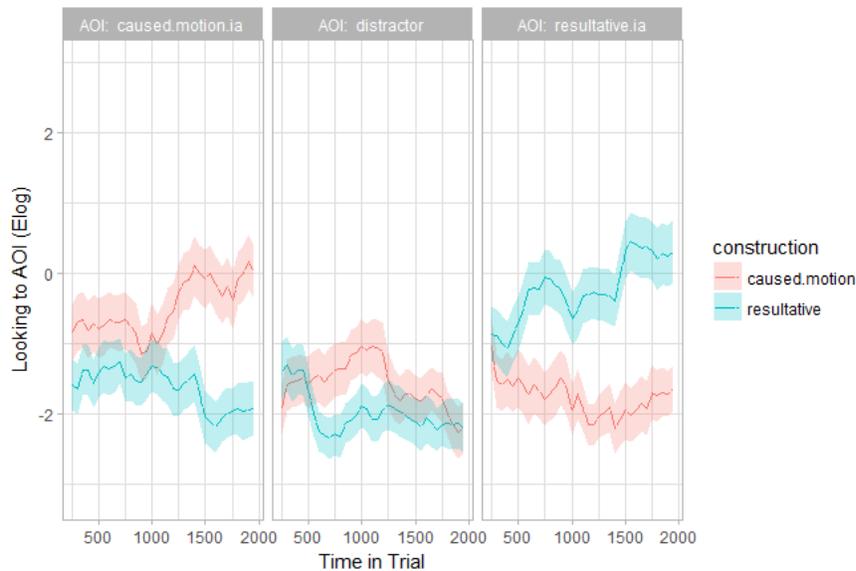*Figure 1.* Visual World Example.

Figure 2. Empirical logits of fixations to the three interest areas as a function of time, and the argument structure of the presented sentence.

References

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