There's something happening here: Lexical verb use underlies a fundamental distinction in the processing of spatial relations

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Are there universal principles that govern how humans perceive and describe spatial relations? One potential principle is a distinction between universal "Core" relations (e.g. support-from-below) and "Non-core" relations that additionally involve complex force dynamics (e.g. support via adhesion, embedding, hanging, or point-attachment; Landau, 2020). Cross-linguistically, speakers tend to describe Core relations using Basic Locative Constructions or BLCs (Levinson & Wilkins, 2006; e.g. "The cup is on the plate") and Non-core relations with additional lexical verbs (e.g. "the cup is *hanging* on the hook" (Johannes et al., 2016). We investigate the source of this linguistic distinction, and hypothesize that it arises because Non-core relations require additional encoding of events to 'explain' the state of affairs, while Core relations constitute a default state that does not require additional information to be encoded linguistically.

In Experiment 1, we tested whether adult participants (N=58) would judge Non-core spatial relations as containing events more often than they would for Core spatial relations. Participants viewed individual still images depicting items in Core or Non-core relationships, and were asked "Is something happening here?" (Figure 1). Images were controlled so that every pair contained the same figure and ground objects, with the minimal difference that images in the Core condition were in a support-from-below relationship (e.g. a magnet sitting on top of a refrigerator) while images in the Non-core condition were in one of four Non-core relationships (e.g. a magnet adhered to the side of a refrigerator). Condition varied within subjects, but each participant saw each item in only one condition. A mixed-effects logistic regression analysis on participant responses confirmed that participants were significantly more likely to say that something was happening (i.e. 'yes' response) for Non-core images than for Core ones ($p<.05$, Figure 2). These results may help explain prior findings that adults tend to describe Core images with BLCs, while they describe Non-core images with additional lexical verbs. As suggested by Johannes et al. (2016) and Landau (2018), speakers may include lexical verbs in their descriptions of Non-core configurations in an effort to describe the events which have led to the observed configuration. If this is true, then people should describe the images from Experiment 1 in quite distinct ways– with 'Core' images described using the BLC and Non-core images described primarily using lexical verbs in addition to the spatial prepositions.

We tested this hypothesis directly in Experiment 2. We asked a new set of participants (N=60) to describe the images from Experiment 1, one at a time, and measured the extent to which a lexical verb was used to describe the locations of the figure objects in Core and Non-core relationships. We further measured whether lexical verb use in Experiment 2 correlated with participants' judgements in Experiment 1 that 'something was happening' in the images. Participants were told to complete a sentence to describe where the figure object was, as shown in Figure 3. Condition (Core vs. Non-core) again varied within-subjects, but each participant saw each item in only one condition. Responses were coded for basic locative clause continuations (e.g. "The magnet…is on the refrigerator") vs. inclusion of additional lexical verbs (e.g. "The magnet…is sitting on/stuck to the refrigerator"). Irrelevant responses were excluded from analysis (e.g. "The magnet…is red"). A mixed-effects logistic regression analysis on participants' lexical verb use found that they were significantly more likely to use lexical verbs to describe Non-core items than Core items ($p<.001$, Figure 4). Further, participants' lexical verb use correlated with the likelihood of saying "Yes [something is happening]" in Experiment 1 ($p<.01$ Figure 5).

These results suggest that Non-core relations may indeed be more closely tied to event perception specifically to provide more information about how the configuration came about. Thus, Non-core relationships may be built from more primitive, potentially universal 'Core' relations by incorporating the force dynamics of events via lexical verbs.

Figure 1: Example trials of Experiment 1

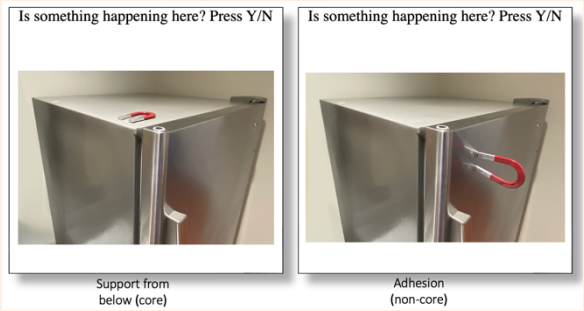


Figure 2: Experiment 1 results

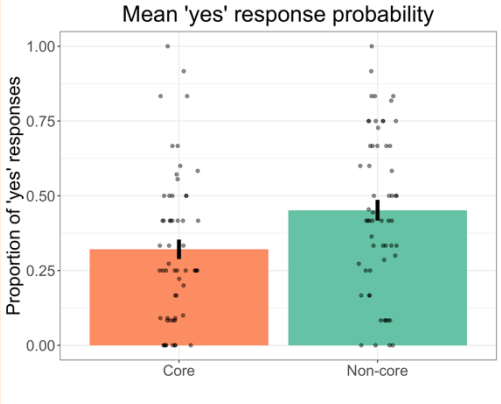


Figure 3: Example trial of Experiment 2

Figure 4: Experiment 2 results

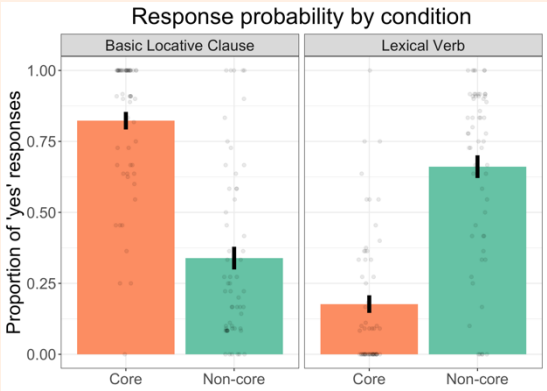
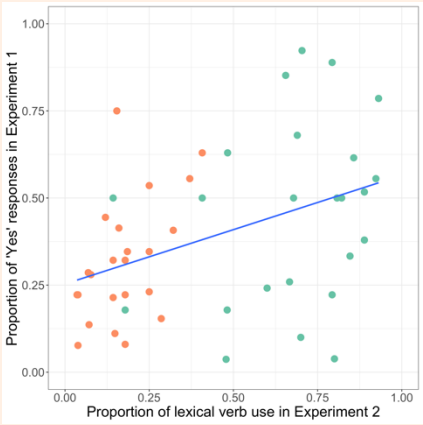


Figure 5: Correlation of Exp. 1 and 2 results



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