

## Grammatical Illusions in Locative constructions

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**Introduction:** Sentence comprehension is often susceptible to erroneous licensing of ungrammatical structures, which is sometimes called *grammatical illusion* (Wagers et al., 09). For example, readers erroneously accept ungrammatical subject-verb agreement in which agreement morphology on a verb is controlled by a linearly local but grammatically inaccessible non-head noun (*The key to the **boxes** are on the table*: Bock et al., 1991). Through an acceptability rating experiment, this study shows a new type of grammatical illusion, in which ungrammatical arguments in the locative construction gives rise to illusory acceptability in a VP-coordination context illustrated in (1a), and this illusory acceptability is seen only when there is another verb which can grammatically license the arguments.

(1)a. John **dumped** and **crammed** [<sub>NP</sub> the container] [<sub>PP</sub> with chocolates].

(1)b. \*John **dumped** and **scooped** [<sub>NP</sub> the container] [<sub>PP</sub> with chocolates].

In (1a) the verb *dump* is grammatically incompatible with the argument NP and PP (i.e., \**John dumped* [<sub>NP</sub> the container] [<sub>PP</sub> with chocolates]), while *cram* is. Thus (1a) has an ungrammatical structure. However, compared to (1b), where both of the verbs are grammatically incompatible with the arguments, (1a) is more acceptable. We argue that these verbs (*locative verbs*) specify argument role information and category information of the arguments, and in the coordination context, if one of the verbs licenses the arguments, then another verb erroneously licenses the ungrammatical arguments due to the repair process which does not respect the structural restriction.

**Locative Constructions:** Certain verbs (*locative verbs*) encode the relationship between a moving object -the “figure”- and a location -the “ground”- (the terminology we adopt from Kim & Phillips 99) in specific grammatical structures (the *locative construction*). In locative constructions, the figure and the ground roles are linked to an NP and specific type of PP (e.g., *John crammed* [<sub>NP<sub>ground</sub></sub> the container] [<sub>PP<sub>Figure</sub></sub> with chocolates]). Locative constructions fall into at least three different syntactic subclasses (Kim and Phillips 99). One class of verbs tolerates the argument alternation (alternating verbs: *cram*, *load*, etc.), but the other class does not (non-alternating verbs: *dump*, *fill*, etc). Non-alternating verbs are divided into two classes: Figure non-alternating verbs (e.g., *dump*, *spill* etc.), which tolerate only *V*-[<sub>NP<sub>Figure</sub></sub> Figure]-[<sub>PP<sub>Ground</sub></sub> Ground] configuration (e.g., *John dumped chocolates into the container*), and Ground non-alternating verbs (e.g., *soak*, *fill*, etc.), which tolerate only *V*-[<sub>NP<sub>Ground</sub></sub> Ground]-[<sub>PP<sub>Figure</sub></sub> figure] configuration (e.g., *John filled the glass with water*). Thus, locative verbs convey three different types of information: the meaning of the arguments (Figure and Ground), the linking information (which grammatical category the figure or the ground is linked to), and the alternation information (whether the alternation is tolerated or not).

**Processing Locative Constructions:** Previous studies have suggested how ungrammatical structures are erroneously licensed during sentence comprehension. When faced with an ungrammatical construction, the parser employs certain repair-driven processes in order to salvage the parse, and this strategy employs non-structural processes that may erroneously license ungrammatical structures (e.g., ungrammatical subject-verb agreement: Wagers et al., 09, Phillips et al., 11, Dillon 14). We argue that a similar reanalysis and licensing of ungrammatical structures take place in the comprehension of locative constructions, which is reflected in acceptability judgments. As we have stated, locative verbs can provide three types of information: argument roles, linking and alternation. To understand how the information provided from locative verbs can impact the comprehension of locative constructions, consider (2b). In sentences like (2b), the reader can recognize that *dump* is a non-alternating verb which is compatible only with *V*-[<sub>NP<sub>Figure</sub></sub> Figure]-[<sub>PP<sub>Ground</sub></sub> Ground]. Upon encountering the coordinated verb *cram*, the reader can recognize that it is an alternating verb and compatible with *V*-[<sub>NP<sub>Figure</sub></sub> Figure]-[<sub>PP<sub>Ground</sub></sub> Ground] as well as *V*-[<sub>NP<sub>Ground</sub></sub> Ground]-[<sub>PP<sub>Figure</sub></sub> Figure]. However, because these two verbs are in a coordination context and *dump* is a non-alternating verb, the reader may be biased toward one of the argument structures of *cram*, namely *V*-[<sub>NP<sub>Figure</sub></sub> Figure]-[<sub>PP</sub>

*Ground*]. An ungrammatical parse is recognized when the reader encounters the [<sub>PP</sub> *Figure*] constituent, which is incompatible with the previously projected structure. Encountering the ungrammaticality, the reader may first attempt to reanalyze the argument structure of the verb *dump* from *V*-[<sub>NP</sub> *Figure*]-[<sub>PP</sub> *Ground*] to *V*-[<sub>NP</sub> *Ground*]-[<sub>PP</sub> *Figure*] in order to accommodate the figure argument. Second, as has been suggested in previous studies, the repair process may ignore structural information, and thus the comprehender may refer to the argument roles that *dump* specifies without recourse to the structure/linking information, resulting in illusory acceptability. Thus, under this story, we predict that sentences like (2a/b), in which a verb that is incompatible with the arguments (ungrammatical verb) is coordinated with a verb that is compatible with the arguments (grammatical verb), will give rise to higher acceptability as compared to sentences like (2c) in which ungrammatical verbs are coordinated, and thus there is no possibility of reanalysis of the argument structure.

- (2) a. John **crammed** and **dumped** the container quickly with copious amounts of chocolates.  
 b. John **dumped** and **crammed** the container quickly with copious amounts of chocolates.  
 c. John **dumped** and **scooped** the container quickly with copious amounts of chocolates.

**Experiment:** An acceptability rating experiment (N=112: 7-point scale: 1=totally unacceptable, 7=totally acceptable) was conducted, in which grammatical compatibility of the locative verb and the PP-argument (e.g., *cram and stuff with* vs. *cram and dumped with* vs. *scooped and dumped with*) x the order of the verb (e.g., *crammed and stuffed* vs. *stuffed and crammed*) were manipulated in a 3x2 factorial design. We label condition a/b as *Grammatical Conditions*, condition c/d as *Mixed Conditions* (where one verb licenses one of the arguments but another verb does not), and condition e/f as *Ungrammatical Conditions*. Thus, our items were designed in a way that the Verb-NP sequence is grammatical, but Verb-NP-PP sequence is ungrammatical in the *Mixed* and *Ungrammatical* Conditions. Moreover, in order to avoid the possibility of the PP being the modifier of the NP (e.g., [<sub>NP</sub> *the pillow* [<sub>PP</sub> *with a lot of feathers*]]), we inserted an adverb between the NP and the PP. Note that the in *Mixed* and *Ungrammatical* Conditions, the ungrammatical verbs are always non-alternating verbs.

- (3) John {a: crammed and stuffed/                    b: stuffed and crammed}                    (*Grammatical conditions*)  
           {c: crammed and dumped/                    d: dumped and crammed}                    (*Mixed conditions*)  
           {e: scooped and dumped/                    f: dumped and scooped}                    (*Ungrammatical conditions*)

[<sub>NP\_Ground</sub> the container] [<sub>PP\_Figure</sub> with copious amount of chocolates].

We found a significant main effect, such that Grammatical Conditions were judged more acceptable than Mixed or Ungrammatical Conditions, and Mixed Conditions were judged significantly more acceptable than Ungrammatical Conditions ( $\chi^2(4)=53.686$  p<0.05). This result (Mixed Conditions > Ungrammatical Conditions) suggests ungrammatical arguments are erroneously licensed in Mixed Conditions. Furthermore, we found a main effect of Verb Order ( $\chi^2(1)=9.767$  p<0.05), as well as an interaction between Verb Order and Grammaticality ( $\chi^2(2)=23.19$  p<0.05). Pairwise comparisons revealed that Verb Order affected acceptability only in the mixed conditions (c: 4.99 vs. d: 5.47: t= -5.03 p<0.05). These results show that if one of the verbs licenses the arguments, then another verb erroneously licenses the ungrammatical arguments due to the repair process. We contend that, because the repair-driven process may ignore structural information, the readers only checked the compatibility of the meaning of the arguments and the verb.

**Conclusion:** Taken together, this study shows that the reanalysis of argument roles and linking of argument roles to the syntactic structure leads to illusory licensing of ungrammatical structures in the comprehension of locative constructions. Sentences where an ungrammatical verb is coordinated with a grammatical verb exhibit higher acceptability ratings compare to those with ungrammatical verbs. We suggest the illusion in locative constructions results from readers deploying repair-driven mechanisms when the verb's argument structure mismatches the arguments (NP and PP) in a sentence.

**References:** Dillon. 14. Language and Linguistics Compass. Kim & Phillips. 99. Proceedings of the 23rd annual BUCLD. Wagers et al., 09. JML. Phillips et al.,13. Experiments at the Interfaces. Syntax & Semantic.