

Adventures in Structural Priming: The Search for Effects of Argument Structure

A well-established method for exploring similarities and differences between linguistic structures is (syntactic) priming (Bock 1986, Branigan et al. 1995, Thothathiri & Snedeker 2008), and we should in principle be able to use priming paradigms to explore differences between classes of transitive and intransitive verbs. Psycholinguistic studies have used priming paradigms to study alternations like the dative alternation and active-passive alternations, but only to a lesser degree transitivity alternations, (e.g. object drop and causative inchoative alternations). The reason for this is mainly that the current paradigms rely on either semantic identity or close similarity between the two alternatives, which is fulfilled in dative alternations and passive-active pairs, but not in transitivity alternations, where the removal of an argument radically changes the interpretation of the sentence (c.f. “John ate” \neq “John ate an apple”, “John broke the cup” \neq “The cup broke”).

This paper reports on the results from four experiments in a novel priming paradigm that shows that (1) reading an intransitive version of an optionally transitive (OT) verb increases the possibility of assigning an initial intransitive parse to another OT verb in a following sentence, and (2) that the same priming effect is also seen between verbs within a sentence, even across other verbs, and finally (3) that reading an intransitive OT verb followed by an adverb (or PP) fully removes the priming effect, i.e., a verb followed by an adverbial gives the same reduced likelihood of an initial intransitive parse of a following verb as a verb followed by a direct object. We will discuss prosodic and syntactic explanations of these results, and argue that the results are unlikely to be triggered by underlying structural similarities between verb+adverbial and verb+DO, but are more likely to be grounded in prosody or surface structure.

Experiment 1 A self-paced reading experiment was carried out at the University of Edinburgh with adult first language English speakers ($N = 15$). The test items (12) were of the type exemplified in 1b, where an initial subordinate adjunct contained an optionally transitive verb, with the following argument always belonging to the main clause in the test condition. The experiment was set up so that the previously read sentence, the prime, always ended with a subordinate clause of the same type as the initial clause in the target. The prime was either transitive or intransitive (i.e., the information in parenthesis was only present in transitive condition):

- (1) a. PRIME: The cat threw up on the floor while the boy was cleaning (*his room*).
- b. TARGET: While the man was eating his best **friend entered the** restaurant.

Self-paced reading times for the region of syntactic disambiguation were reduced in the intransitive prime condition compared to the transitive prime condition ($\beta = -95$, $SE = 40$, $t = -2.36$). We assume that readers initially prefer a transitive reading in cases of transitive/intransitive ambiguity (Frazier & Rayner 1982, Mitchell 1987, van Gompel et al. 2006, Staub 2007), thus leading to an incorrect parse of the target in the normal case. Our results suggest that this preference can be altered due to the presence of an intransitive prime, leading to a higher probability of a correct and parse and shorter reading time. Initially this may suggest that a special vP structure (unergative/object drop) is activated in the prime, which influences the reader’s parse of the following vP.

Experiment 2 and 3: Follow-up experiments were conducted in Norwegian (24 participants, 12 items) and English (62 participants, 14 items, online via IbexFarm), where the prime and target were placed in the same sentence:

- (2) a. [PRIME The woman who was knitting (*a sweater*)] gave
- b. [TARGET the man who was eating a **flower bouquet for his birthday**].

The priming effect was seen in both English and Norwegian: the reading latencies for the disambiguating region were shorter in the intransitive compared to the transitive prime condition (Nor: $\beta = -144$, $SE = 63$, $t = -2.28$, Eng: $\beta = 48.93$, $SE = 23.89$, $t = 2.048$). In addition an effect was found in the region directly after the initial relative clause: a slow-down took place in the intransitive prime condition (a strong tendency in Norwegian, significant difference in English: $\beta = 46.70$, $SE = 23.17$, $t = 2.016$). Following above cited literature (especially van Gompel et al. 2011) we assume that the intransitive/object drop version is the marked option, leading to a surprisal effect at the following verb.

Experiment 4 In a final experiment we asked whether the two effects found in experiment 2 and 3 were due to argument structure properties, or higher level syntactic or even prosodic properties of the prime. The set-up was similar to experiment was similar to experiment 2 and 3, and run in English via IbexFarm (N= 58, items = 14), but the intransitive primes now included an adverbial following the verb. The adverbials were in most cases frame-setting temporal or locative adverbials, and were unlikely to be interpreted as an argument of the verb:

- (3) a. [PRIME The woman who was knitting *a sweater/in the kitchen*] gave
- b. [TARGET the man who was eating a **flower bouquet for his birthday**].

We found no difference between the two conditions in this experiment, neither on the disambiguating region or the region following the initial relative clause.

Discussion The results from experiment 4 suggest that the effect found in experiment 1-3 were not triggered by a pre-activation of a specific verb frame, but rather an increased expectation of a verb final clause. This may be a linear surface structure expectation, grounded in prosody: assign phrasal stress to the verb and not the following DP (see Fodor 2002 for prosodic effects in reading). This will facilitate the parsing of the following temporarily ambiguous structure, as the DP following the verb would start a new prosodic phrase:

- (4) a. (The woman who was KNITTING) (gave the man who was EATING) (a flower bouquet for his BIRTHDAY).
- b. (The woman who was knitting A SWEATER) (gave the man who was eating a FLOWER BOUQUET) (for his BIRTHDAY).
- c. (The woman who was knitting in the KITCHEN) (gave the man who was eating a FLOWER BOUQUET) (for his BIRTHDAY).

Based on these results we will discuss alternative paradigms that may access representations below the surface structure, and also re-evaluate previous priming studies in the light of such a proposed prosodically guided priming mechanism.