Light Verbs Make Heavy Work

Eva Wittenberg¹,²,³, Martin Paczynski¹, Heike Wiese², Ray Jackendoff³, Gina Kuperberg¹,⁴,⁵

¹ Department of Psychology, Tufts University; ² Potsdam University, Germany; ³ Department of Philosophy, Tufts University; ⁴ MGH/MIT/HMS Atkinson A. Martinos Center for Biomedical Imaging; ⁵ Department of Psychiatry, Massachusetts General Hospital;

Introduction

- Assumption in many linguistic theories: each noun phrase maps onto a single semantic role. But consider the Light-Verb Construction (LVC) “Henry gave a kiss to Elsa”: the direct object (“kiss”) does not carry its own argument structure. Rather, it forms a complex predicate together with the verb (“to give”), such that the subject (“Henry”) is not only the Agent of the verb, but also the Agent of the direct object (“kiss”).
- LVCs: mismatch between syntactic and semantic argument structure
- Resolving the mismatch in LVCs:
  1. LVCs are stored as a single unit [1].
  2. The syntactic structures of LVCs are simpler than their non-light counterparts [2].
  3. Both the verb and the deverbal direct object project their argument structures onto the subject, leading to the computation of a shared argument structure through semantic combination [3].
- Event-related potentials (ERPs) examining online neural processing costs associated with LVCs during word-by-word reading.

Prediction

Based on Hypothesis [3], which was supported by previous behavioral data [4, 5], as well as based on recent neurophysiological studies examining other types of complex semantic composition [6, 7, 8, 9], we predicted that LVCs will evoke larger negativity than non-LVCs.

Methods

- 18 German native speakers read SOV sentences, presented word-by-word (450ms, 150ms ISI).
- Full counterbalancing.
- Context sentence, presented as a whole, precedes each critical sentence.
- Task: Naturalness judgments.
- 40 items per condition, 80 fillers.
- Cloze probabilities after the direct object: Exact matches with verbs in 52% of LVCs, 21% of non-light sentences, 0% of Anomalous LVCs (F (2, 24) = 114.9; p < 0.001).

Stimuli Examples

The critical verb to which ERPs were recorded is underlined:

Context sentence: Das Flugzeug war bereits hoch über den Wolken.
The airplane was already high in the sky.

Non-Light: Als die Stewardess einen Kaffee machte…
When the stewardess a coffee made…

LVC: Als die Stewardess eine Ansage machte…
When the stewardess an announcement made…

Anomalous LVC: Als die Stewardess ein Gespräch machte…
When the stewardess a conversation made…

(ungrammatical in German) *When the stewardess a conversation made…

Continuation: …ging gerade die Sonne auf.
…was just rising the sun.

Results to Critical Verbs

500-900ms:
Sustained Negativity for LVC, Positivity for Anomalous LVC

- Light Verb Constructions:
  - Large sustained negativity
  - Widely distributed effect

- Anomalous LVCs:
  - Large positivity in the P600 time window.

Conclusions

- Light Verb Constructions induce prolonged neural costs during online comprehension.
- Both the effect’s scalp distribution and prolonged duration suggest that argument sharing processes may be distinct from lexico-semantic processing as reflected by the N400.
- Consistent with theoretical architectures which argue that semantic combination is linked to, but independent of syntactic combination [3].

References