Inference-based incremental processing of semantic roles and event structure: minimality vs. contextual enrichment

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An essential part of sentence comprehension is interpreting the meaning of the verbal predicate, its semantic roles and event structure. There is growing evidence that the verb's lexical meaning is not the only factor in determining semantic roles and event structure. We present an event-related potential (ERP) study that addresses the experimentally understudied question of how inferences pertaining to semantic roles and event structure) interact with each other before encountering the verb's meaning (Philipp et al., submitted). We investigated the incremental processing of an animate or inanimate subject argument followed by a locative (atelic) or goal (telic) phrase and a semantically flexible verb of motion, as in (1). Specifically, we examined how different types of information available before the verb lexeme are integrated step-by-step into the meaning of the clause.

(1) *Dass der Gleitschirmflieger / das Ahornblatt über dem Fluss / auf den Acker*
That the paraglider / the maple leaf above the river / to the ground

geschwebt ist/hat, faszinierte den Fußgänger.
floated is/has, fascinated the pedestrian.

'That the paraglider / the maple leaf floated above the river/ to the ground fascinated the tourist.'

On the clause-initial subject, inanimates evoked an N400 effect vis-à-vis animates. One way of explaining this effect would be to assume that it indicates the violation of the preference for subjects to be animate agents (e.g. Weckerly and Kutas, 1999; Næss, 2007; Muralikrishnan, 2011), since an inanimate subject does not conform to this preference. This type of explanation relies on contextual enrichment: the interpretation of an animate subject is enriched with agent features if nothing in the context prevents this. By contrast, Paczynski and Kuperberg (2009) suggest that animacy is insufficient for role identification in English. They found an N400 on an initial inanimate subject in both active and passive clauses and no interaction between voice and animacy on the verb. If the animate-inanimate opposition would have been interpreted as an agent-patient contrast, inanimate patient subjects should have had a processing advantage against animate subjects in the passive, but this was not the case. This means that an animacy distinction is not fully interpreted in terms of semantic roles. This assumption is in line with the processing principle of minimality or simplicity (e.g. Hawkins, 2004; Bornkessel-Schlesewsky and Schlesewky, 2009). The fact that inanimates evoked an N400 can be explained in our view as follows. Animate subjects are compatible with virtually all semantic roles, while it is more difficult or even impossible to interpret inanimates as e.g. volitional agents, experiencers or self-propelled movers. So we assume that when encountering an inanimate subject the processing system has to eliminate agentive specifications as an option. In contrast, for animate subjects, most options are still available, i.e. no role specifications are needed, and hence the processing of their putative semantic role is less demanding.

Which line of explanation is more appealing can only be evaluated after taking the results at the adverbial phrase into consideration. At the adverbial phrase, we found an N400 effect for the animate-telic, inanimate-telic and inanimate-atelic (vs. animate atelic) condition.

In sum, inanimate or telic conditions increase the processing effort. Regarding the disadvantage of the telic conditions, it is most adequately explained by minimality, i.e. simplicity. A goal phrase in the telic condition adds specifications to the sentence in terms of argument structure, since it is a syntactic and semantic argument, and also in terms of event structure, by adding a change of location component (Maienborn, 1994). This means that an additional argument and an additional event structure specification have to be processed. On the other hand, locative phrases in the atelic conditions correspond syntactically to an adjunct and act semantically as a modifier (Maienborn and Schäfer, 2010), so they do not increase complexity in terms of argument- and event-structure and hence do not lead to additional processing costs.

Regarding the disadvantage for inanimates, the enrichment hypothesis fails to explain why it occurs in both telic and atelic contexts. By contrast the minimality hypothesis predicts that the animate-atelic condition is the least complex one, while the three other conditions enhance complexity in terms of role specifications or event structure. This prediction is borne out by our data. In sum, minimality would be the most parsimonious explanation for the results at the subject and the adverbial. Under the minimality assumption, an animate subject does not lead to an enriched agent-subject interpretation for the data under discussion. This is preliminary evidence that minimality of role specifications may win over their contextual enrichment (e.g. Klein 2012) under certain circumstances.

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