Predicting the Negative: Investigating the Comprehension of Negated Sentences in an Event-related Potential Study

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It is widely agreed that prediction is a key feature of language comprehension (e.g. De Long et al., 2005; Pickering and Garrod, 2007) leading to the question of what we predict once we encounter a negation in a sentence. Negative sentences have been claimed to be harder to process due to (i) their higher (morpho-)syntactical complexity and (ii) the need to suppress positive information and to eventually represent the negated state of affairs (i.e. the affirmative counterpart) on a first step before representing the actual state of affairs (e.g. Just & Carpenter, 1971; Kaup et al., 2006). Accordingly, negative sentences have been shown to elicit different behavioral and neurocognitive responses than their affirmative counterparts, such as for example higher error rates, longer response times (e.g. Just & Carpenter, 1971), but also different ERP (e.g. Fischler et al., 1983; Lüdtke et al., 2008) and fMRI patterns (e.g. Bahlmann et al., 2011). Measuring ERPs, we addressed the questions (i) whether negation can be processed incrementally or whether a multistep process is necessary (ii) how prediction influences the comprehension of negated sentences and (iii) whether processing differences between negative and affirmative sentences are correlated with individual personality or cognitive traits. We argue that our results do not necessarily reflect different representational steps but rather a difficulty in the prediction process, as prediction involves computations that may require different amounts of time (e.g. Chow et al., 2016). Furthermore, our results show that the observed effect is stronger for subjects with high working memory capacities indicating that they seem to predict a higher number of possible scenarios, possibly in a graded or probabilistic way. Finally, it is argued that we should take into account language-specific differences, as different languages vary with regard to their (default) relative weighting of top-down and bottom-up information sources (e.g. MacWhinney et al., 1984; Tune et al., 2014).

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