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The two sides of prediction error in reading: on the relationship between eye movements and the N400 in sentence processing

Franziska Kretzschmar¹, Phillip M. Alday^{2,3}

¹University of Cologne, Cologne, Germany;

²University of South Australia, Adelaide, Australia;

³MPI for Psycholinguistics, Nijmegen, Netherlands

franziska.kretzschmar@uni-koeln.de

There is evidence that domain-general principles like predictive coding explain sentence processing better than linguistic accounts. Instead of linking N400 and fixation measures via linguistic subdomains, the domain-general approach postulates that N400 and eye movements result from prediction error (Bornkessel-Schlesewsky et al. 2016; Friston et al. 2012). This predicts that both measures correlate only if they follow the same prediction error, without targeting a particular eye movement measure. To test this hypothesis, we re-analysed data from two eye-movement studies (N=116) and one ERP study (N=37) that investigated animacy-based prediction errors of actor prototypicality with identical stimuli. The experiments replicated previous results for unpredicted atypical actors by revealing larger N400 amplitudes, longer go-past time and nil effects for first-pass time. To assess whether reading times and N400 correlate, we aggregated one measure across participants to provide a numeric predictor for the other with mixed-effects models. Overall, the "design" models with experimental manipulations provided the best model fit. For the ERP data, aggregate go-past time provided a better fit than first-pass time. For the eyetracking data, aggregate N400 responses provided a better fit for go-past time than first-pass time. This supports the domain-general approach and emphasises the feasibility of cross-methods statistical modelling.