
Nature of the P600 in semantically anomalous sentences: Evidence from ERP source localization

Weilin Shen^{*†1}, Nicole Fiori^{*1}, and Frederic Isel^{*1}

¹Laboratoire Vision-Action-Cognition (VAC) – Université Paris Descartes – 71 Av Edouard Vaillant
92774 Boulogne-Billancourt, France

Abstract

Previous event-related potentials studies of sentence comprehension have usually associated syntactic repair/reanalysis processes with the P600 component. However, the functional significance of the P600 was recently questioned based on the observation of P600 effects in response to the processing of semantically anomalous sentences (e.g. ‘*The stone which is in the swimming pool is sleeping.’ Isel & Shen, 2011). In the present study, we investigated the functional significance of the ‘semantic P600’. Using a source localization analysis, we tested three alternative hypotheses concerning the function of the P600: 1) a syntactic function, 2) a semantic function, and 3) an executive function. We assumed that three distinct neuronal generators should reflect each of these functions. While the syntactic generators are expected to be mainly located in the left inferior frontal gyrus, the semantic generators should be observed in the left superior temporal gyrus as well as in the right anterior prefrontal cortex (semantic retrieval); moreover, the generator of executive function (conflict monitoring) should be found in the anterior cingulate cortex (ACC). Critically, we defined a dipole model using six dipoles whose four of them were placed in the three regions of interest corresponding to our hypotheses, namely syntactic, semantic and executive regions. Our data showed the P600 effect was only significant in the ACC and left superior temporal gyrus / right anterior prefrontal cortex. This finding suggests that the P600 might reflect more general mechanisms of conflict monitoring and semantic retrieval rather a ‘pure’ syntactic processes.

*Speaker

†Corresponding author: shen_wei_lin@hotmail.com