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## Comparison of cortical activation evoked by volitional vergence and saccade eye movements

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Eye movements may be elicited reflexively by stimuli appearing in visual periphery, and voluntarily by endogenous cognitive control processes. Although the neural circuits of saccades are well understood, it is still difficult to identify clearly the differences between reflexive and volitional vergences. The aim of this study was to increase our understanding of volitional eye movement preparation by measuring cortical activation related to different two types of pure saccades and pure vergences. Nine LEDs were located at eye level on three isovergent circles at near (20 cm) middle (35cm) and at far (1 m) distance. The eccentricity of the lateral LEDs was 10° for all distances. The subject was instructed to look at the target LED in accordance with the indication (color of the middle LED) as quickly and precisely as possible. The electroencephalogram was registered from 64 active electrodes (brain products). The differences between vergences and saccades were observed 120 ms before the eye movement. Both, convergence and divergence evoked significantly more positive ERP than saccade on C1/C2 channels. Moreover, on the frontal lateral areas (F7/F8) registered potential associated with convergence was more negative than for saccade. On temporo-parietal region (TP7/TP8) ERP was in turn, more negative for saccade than for convergence. Just before the eye movement ERP for saccade was also more negative than for vergences on temporo-parietal areas, whereas divergence was more negative than saccade on the frontal area (AF3/4, AF7/8, F1/F2, F3/F4 and F7/F8). The obtained results suggest that preparation of different types of volitional eye movements is characterized by different neural circuitries, where vergences, particularly divergence caused strong response of frontal areas, whereas saccade engaged central, temporo-parietal and parieto-occipital areas.

### Biography

Monika Wojtczak-Kwaśniewska is a PhD candidate from Adam Mickiewicz University of Poznań, Poland. She is interested in neuronal aspects of Binocular Vision, especially the Eye Movements. She is an Optometrist and a Vision Therapist.

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