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Inside our heads: an investigation into visual analysis and detection using the EEG

Fowler, Ashleigh

2016-02-19
http://hdl.handle.net/10539/19603

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Abstract

The aim of this research is to examine the neurological processes involved in visual analysis tasks in terms of networks within the brain. It aims to examine these processes while considering the antecedents of visual analysis skills; specifically concentration spans, properties of the target, and signal detection characteristics such as the hit rate and reaction time. It posited that detection is positively associated with neural activity.

A Pseudo quasi-experimental, cross sectional, within subject's design that utilises a quantitative method of investigation was undertaken in order to determine whether this postulation held any merit. The study involved the participation of 8 volunteer students; each participant completed a demographic questionnaire as well as the New General Self-Efficacy Scale. They then underwent EEG recording while completing a 30 minute visual analysis task – ScanX.

Results drawn from this research indicate that there is some association between neural activity and detection within the Alpha 1 and Theta frequency band. Time on task results in decreased neural activity in the Alpha 1, Alpha 2 and Beta 1 frequency band. False alarms had no significant associations with neural activity; yet neural activity indicated an association with misses. Self-efficacy was assessed in terms of reaction time and this yielded no significant result.

Limitations, as well as theoretical and practical implications, of this study are considered. Finally, the study suggests further possible lines of research that could elaborate on the relationship between detection and neural activity.