



Brain scanning and cognitive language assessment: An EEG analysis of vocabulary test

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Abstract

Recently, test developers and psychometricians have voiced concern over understanding/improving the language tests' psychometric qualities and brain cognition. The present study aimed to scrutinize the probable interconnection between cognitive load and vocabulary test items' difficulty estimates. To collect more profound data, the researchers employed a neuro-imaging/brain-scanning approach (via electroencephalography, EEG) on twelve high-school students (age range: 16-18) (i.e., four participants for each proficiency level: elementary, intermediate, and advanced). The researchers used a 21-channel EEG system (Mitsar-EEG-202-1, Russia) in a cognitive-laboratory (ATU) setting. The empirical data were collected via Cambridge Placement Test (CPT) and the international Vocabulary Size Test (140 items) (VST) (1), taken by all participants (selected via purposive sampling from among 60 high-school students) in a face-to-face setting. EEG was applied to right-handed students with no seizure history or head trauma. The data were analyzed through ANOVA and some t-tests to scrutinize the cognitive load imposed by VST. The current case study/brain-scanning quantitative research was conducted with the approval of the Ethics Committee in Biomedical Research of ATU with the approved code of IR.ATU.REC.1400.037. The obtained results demonstrated that EEG as a trustable indicator of cognitive load showed a noticeable difference between the elementary and intermediate levels in theta, beta, delta, and gamma powers, which were observed in all channels. Overall, this study provided some insights into students' cognitive load and VST, based on a model of the human brain's architecture and measuring students' cognition by brain-scanning technique.

Keywords: Brain-scanning, Cognitive load, Vocabulary test

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