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Paper Title:	Brain Function Analysis Using EEG Evidence: New Insights into English Paper-Based versus Computer-Based Tests
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#### Abstract

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In today's disruptive era, where digital systems and the internet are central, assessment methods are transitioning from paper-based to computer-based tests. As digital technology becomes more accessible, there is growing interest in determining whether these new formats provide more effective means of evaluating learning outcomes. To investigate this, we examined performance and objective measures of brain function during both computer-based and paper-based reading comprehension tests. This study focuses on brain function analysis of computer-based and paper-based tests measured by EEG signals. Five healthy students at the B1 CEFR level voluntarily participated in two experimental conditions: paper-based testing (PBT) and computer-based testing (CBT). During the tests, EEG signals were recorded and analyzed using MATLAB to identify various features of brain activity. The results indicate that participants who performed better on paper-based tests showed greater familiarity with the test format. The power spectral density of EEG recordings, along with the average frequency of alpha and beta waves, were positively correlated with test familiarity. Specifically, the correlation coefficients were as follows: CBT-difficult ( $r = 0.82$ ,  $p < 0.05$ ), CBT-easy ( $r = 0.82$ ,  $p < 0.05$ ), PBT-difficult ( $r = 0.82$ ,  $p < 0.05$ ), and PBT-easy ( $r = 0.65$ ,  $p < 0.05$ ).

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