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Key Actuation Force and Brain Waves: Effects on Productivity and Accuracy during Typing Based Tasks

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Abstract

In this research, the researcher looked to examine the relationship between beta wave activity in the motor cortex and keyboard actuation force, along with the effect these have on typing speed and accuracy during typing-based tasks. To examine these relationships, electroencephalography was used to measure subjects' (n=4) brain activity while they completed typing tests on keyboard of differing actuation forces. The motor cortex was monitored on points C3 and C4. The hypotheses were H_o: The mean beta wave activity for mechanical keyboards is equal to the mean beta wave activity for membrane keyboards; H_a: The mean beta wave activity for mechanical keyboard is not equal to the mean beta wave activity for membrane keyboards. The data were analyzed using a matched pairs design to compare the subjects' performance against themselves. A matched pairs T-Test and correlation calculations were performed, and it was concluded that there is no statistically significant evidence to suggest a consistent link between the magnitude of beta wave activity and key actuation force in the motor cortex contralateral to the dominant hand of the keyboard user, but a relationship was identified between the mean and median beta wave activity and key actuation force ipsilateral to the dominant hand of the keyboard user. Additionally, there appears to be no significant correlation between typing speed or accuracy and beta wave activity, but there is evidence to suggest that an actuation force near 35 grams produced higher median typing speeds and accuracies compared to an actuation force of 65 grams.

Keywords: Beta Waves, Brain, BCI, Key Actuation, Motor Cortex