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Effect of NeuroBike cycling on EEG brain activity and mathematical performance: An intervention study

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Several studies identified an influence of cycling on cognitive processes. The NeuroBike is an instable system with balance movement similar to the cross-coat of the human due to the joint in the center of the bicycle frame. According to the manufacturer it leads to positive effects on brain function. In the present study we investigated effects of training on the NeuroBike on spontaneous EEG activity and on mathematical performance. Participants performed different trainings (NeuroBike, common bicycle, daily activity) for 20 minutes three times per week in a two-week intervention. Mathematical performance (algebra, geometry, arithmetics) was assessed before and after the intervention. Spontaneous EEG was recorded before, and after the training session at rest as well as during the mathematical tests before and after the two-week intervention. Behavioural data show slightly reduced mathematical performance in geometry after the NeuroBike and common bicycle intervention in comparison to daily activity. EEG data reveal increased temporal theta power, occipital theta, alpha and beta power and parietal beta power after the two week intervention without acute influence of NeuroBike cycling at rest. Repeated NeuroBike training leads to increased frontal power in all frequency bands and temporal theta and alpha power during algebra performance. Our results demonstrate that training on the NeuroBike fosters a beneficial brain state for learning at resting state, but does not lead to an optimum brain state for active spatial processing in mathematical problem solving.

Biography

John A is a Master of Education degree candidate in Sports and Mathematics. He is also working as an Assistant of the Department of Training and Movement Science at the University of Mainz, Germany.

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