Tuning Up the Old Brain with New Tricks: Attention Training via Neurofeedback.

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Abstract

Neurofeedback (NF) is a form of biofeedback that uses real-time (RT) modulation of brain activity to enhance brain function and behavioral performance. Recent advances in Brain-Computer Interfaces (BCI) and cognitive training (CT) have provided new tools and evidence that NF improves cognitive functions, such as attention and working memory (WM), beyond what is provided by traditional CT. More published studies have demonstrated the efficacy of NF, particularly for treating attention deficit hyperactivity disorder (ADHD) in children. In contrast, there have been fewer studies done in older adults with or without cognitive impairment, with some notable exceptions. The focus of this review is to summarize current success in RT NF training of older brains aiming to match those of younger brains during attention/WM tasks. We also outline potential future advances in RT brainwave-based NF for improving attention training in older populations. The rapid growth in wireless recording of brain activity, machine learning classification and brain network analysis provides new tools for combating cognitive decline and brain aging in older adults. We optimistically conclude that NF, combined with new neuro-markers (event-related potentials and connectivity) and traditional features, promises to provide new hope for brain and CT in the growing older population.