The Focus Showcasing System of Mindball

Introduction

Founded in 2002 under the name *Interactive Productline*, The Mindball Company was the first to commercialize an EEG-based device designed for applications beyond the clinical and medical fields. Through the use of neurotechnology, Mindball introduced an interactive platform that allows users to observe and experience the mental state of focus in a hands-on, engaging way.

This scientific product brief presents *Mindball*, an interactive system informed by neuroscience, created to demonstrate how focus works, both as a general cognitive process and as a personalized feedback experience. The system's central concept is simple yet powerful: be more focused than your opponent to move the ball toward their goal and win the game. By turning brainwave data into physical and visual outcomes, Mindball transforms abstract neural activity into a vivid, memorable experience.

EEG Hardware and Signal Processing

Mindball's hardware includes a proprietary headband with a single-channel EEG setup composed of three sensors: an EEG electrode, a reference electrode, and a ground electrode. Positioned over the frontal cortex, this configuration is optimized to capture brain signals related to attentional processes while maintaining user comfort and ease of use in public and educational environments.

The system's algorithm is based on well-established neurophysiological models for measuring focus, specifically analyzing the ratio between low beta (13–21 Hz) and theta (4–7 Hz) brainwave activity. This ratio is widely recognized in cognitive neuroscience as an indicator of attentional control[1]. The algorithm has been iteratively developed over more than two decades, drawing on expert knowledge in neuroscience to ensure its relevance and consistency. EEG data is sampled at 250 Hz.

User Experience and Feedback Mechanism

Mindball is designed to be as intuitive as it is educational. Its gameplay model, where the more focused player drives the ball toward the opponent's goal, makes neurofeedback instantly understandable for players and spectators alike.

In parallel with the physical movement of the ball, graphical interfaces display each player's real-time focus and relaxation levels, offering layered insight into their cognitive performance.

The presentation of the outcome from the algorithm, being the ball's movement and the graphics, is made in real time, i.e., within one second from the time it was measured.

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[1] https://link.springer.com/article/10.3758/s13415-013-0238-7
https://academic.oup.com/edited-volume/44425/chapter-abstract/374614182?redirectedFrom=fulltext

Each player receives a Focus Score after every game, serving as a quantifiable measure of their attentional performance. This score can be used for self-reflection, tracking personal development, or comparing results with others, even if they have not competed directly. While not a comprehensive training metric, the Focus Score provides indicative, neuroscience-informed feedback that supports deeper engagement with the concept of focus.

Conclusion

Mindball offers an innovative, neuroscience-inspired way to make cognitive focus visible, measurable, and interactive. Its primary role is educational: to introduce users, particularly children and young adults visiting science centers, to neuroscience through active participation and experiential learning.

Though not intended as a full-fledged cognitive training tool—since effective training requires regular, repeated practice—Mindball provides meaningful insight into users' mental states. In specific contexts, such as schools or workplace wellness programs, the system may however serve as an introductory platform for structured focus training.

By combining rigorous EEG technology with playful, intuitive interaction, Mindball bridges the worlds of science and entertainment. It enables users to explore their cognitive abilities in a tangible and motivating way, laying the groundwork for curiosity, self-awareness, and a deeper understanding of the human brain.

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