**NEUROFEEDBACK TRAINING RECOMMENDATIONS BASED ON EEG ANALYSIS**

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**INTRODUCTION**

In high-performance sports, precision and focus are often the defining factors between victory and defeat. Neurofeedback training, which leverages brainwave activity to enhance cognitive and motor functions, has gained traction in optimizing athletic performance. This analysis investigates how different brainwave frequencies correlate with shooting accuracy in curling athletes. Using EEG data, we aim to identify the brain regions and frequency bands that can be targeted to improve shot precision and overall consistency.

**KEY FINDINGS**

1. **Theta Power and Performance:**
   * High theta power in the **left frontal lobe** is linked to poor shot accuracy, suggesting it hampers focus and precision.
   * The **right frontal lobe** plays a lesser role in performance outcomes.
   * Overall, **excessive theta activity** appears detrimental to high-focus tasks
2. **Alpha Power and Performance:**

* **Moderate alpha power in the left hemisphere** supports relaxed focus and better accuracy.
* The **right hemisphere alpha power** shows no strong relationship with performance, indicating a more localized effect.

1. **Beta Power and Performance:**

* **Balanced beta power in the left frontal lobe** enhances executive function and motor control.
* **Excessive beta power in the right hemisphere** may lead to cognitive overload and performance anxiety.

**NEUROFEEDBACK RECOMMENDATIONS**

1. Decrease Theta Power in the Left Frontal Lobe: Given the strong correlation between high theta power and poorer accuracy, neurofeedback training should focus on reducing theta activity in this region to enhance concentration and decision-making.

2. Optimize Alpha Power in the Left Hemisphere: Since moderate alpha levels correlate with better performance, training should focus on stabilizing rather than significantly increasing or decreasing alpha power in this hemisphere.

3. Regulate Beta Power for Cognitive and Motor Control: Maintaining moderate beta levels in the left hemisphere can enhance precision and focus, while avoiding excessive beta stimulation in the right hemisphere can prevent overstimulation and stress responses.

**ALIGNMENT WITH LITERATURE**

Research in sports neuroscience suggests that theta waves are typically linked to deep relaxation and reduced attentional control, which can harm performance in high-precision tasks. Studies have shown that lowering theta activity while optimizing alpha and beta levels improves focus, reaction time, and motor execution. Furthermore, beta waves are associated with cognitive engagement and motor processing, but excessive beta can contribute to performance anxiety. Our findings align with these studies, supporting the idea that reducing theta and carefully balancing beta activity can improve athletic performance.

**CONCLUSION**

Based on the EEG data, neurofeedback training for curling athletes should emphasize reducing theta power in the left frontal lobe, stabilizing alpha activity in the left hemisphere, and maintaining balanced beta power to optimize focus and precision. By implementing these strategies, athletes may enhance their cognitive control, motor coordination, and overall shot accuracy, ultimately improving competitive performance.