Sonification enhanced neurofeedback training: alpha waves regulation and discrimination

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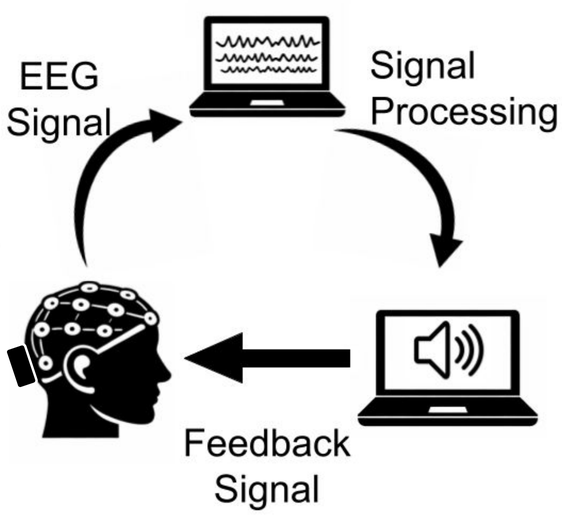
INTRODUCTION

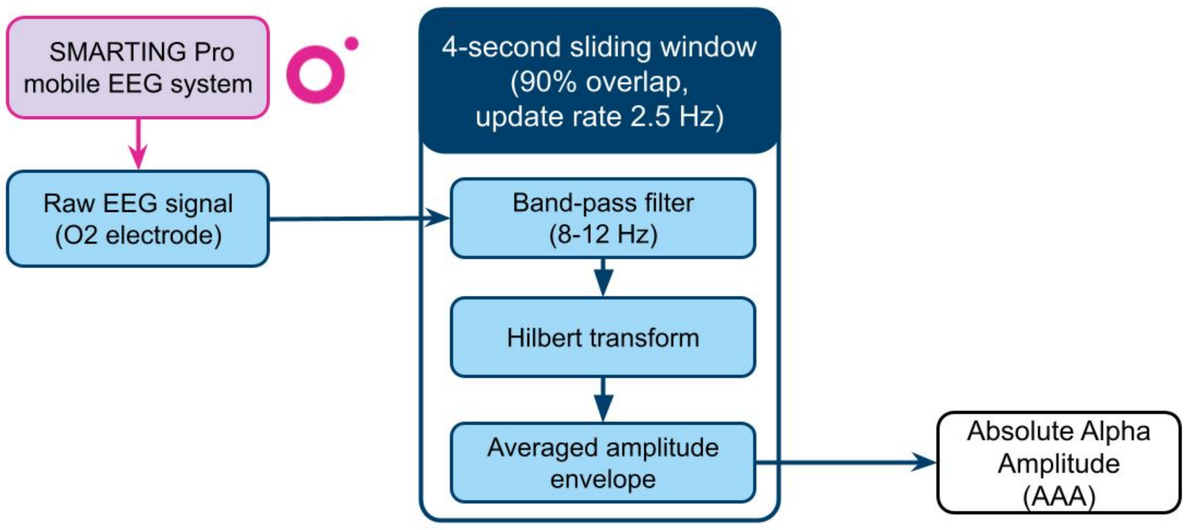
Individuals can learn to regulate and discriminate their own alpha activity through neurofeedback [1]. Real-time sonification provides continuous auditory information of alpha amplitude fluctuations [2].

Does real-time sonification improve alpha regulation and discrimination?

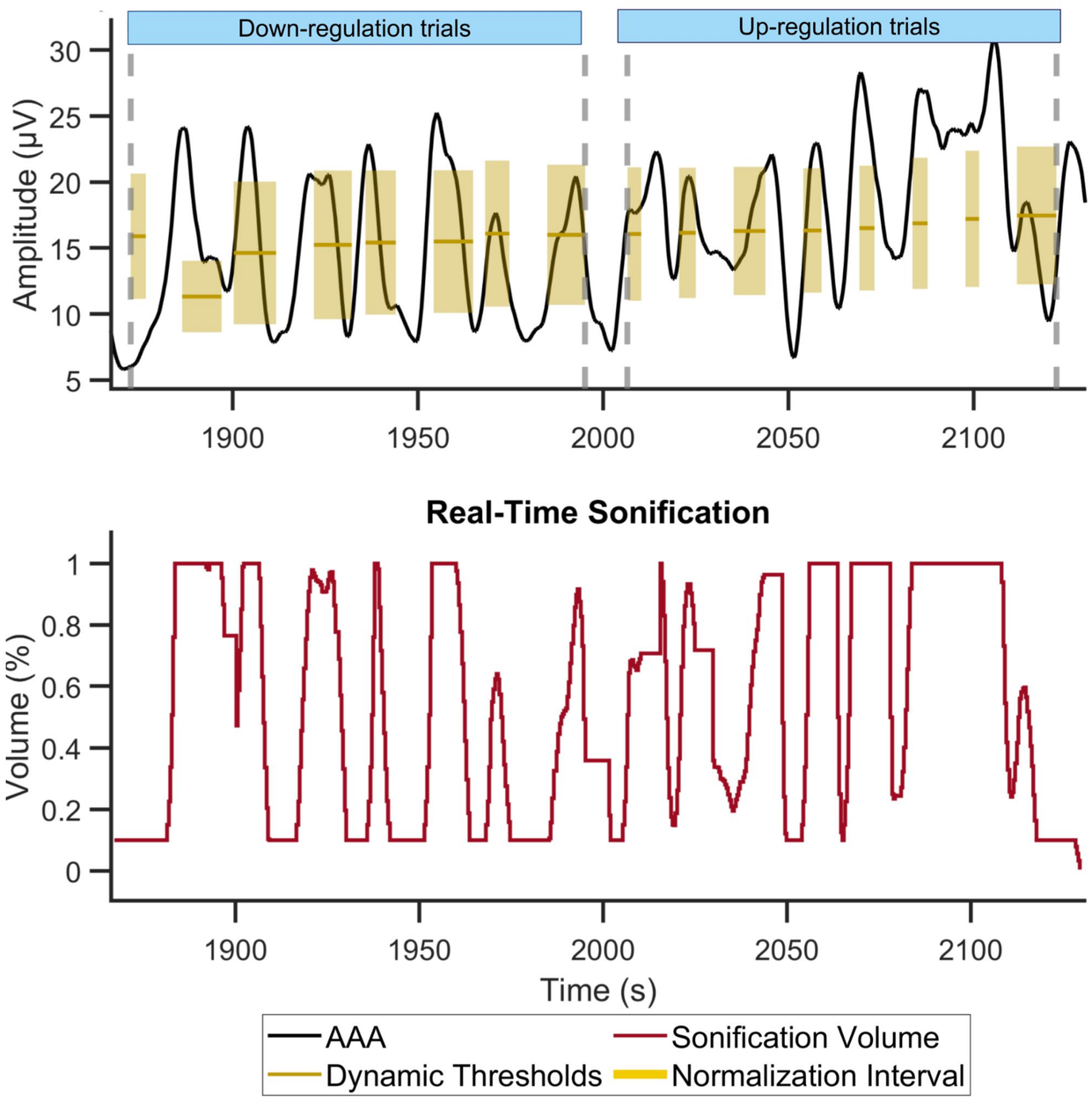


METHODS

Online signal processing and alpha amplitude extraction

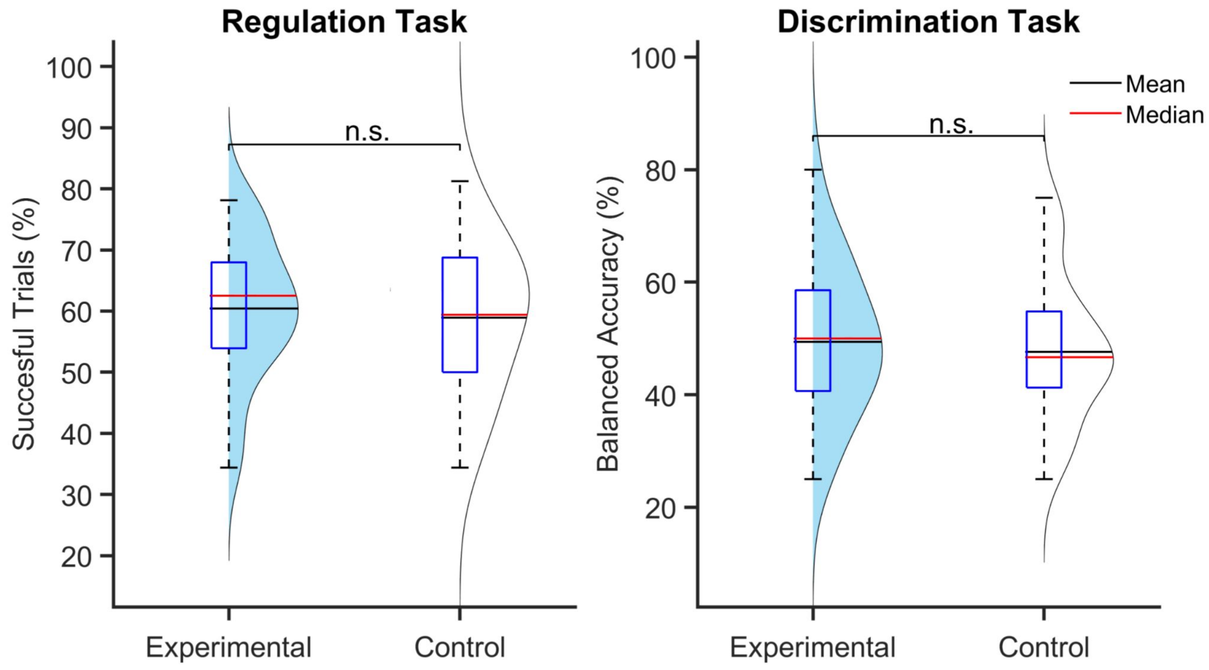


Online alpha-state classification and sonification mapping

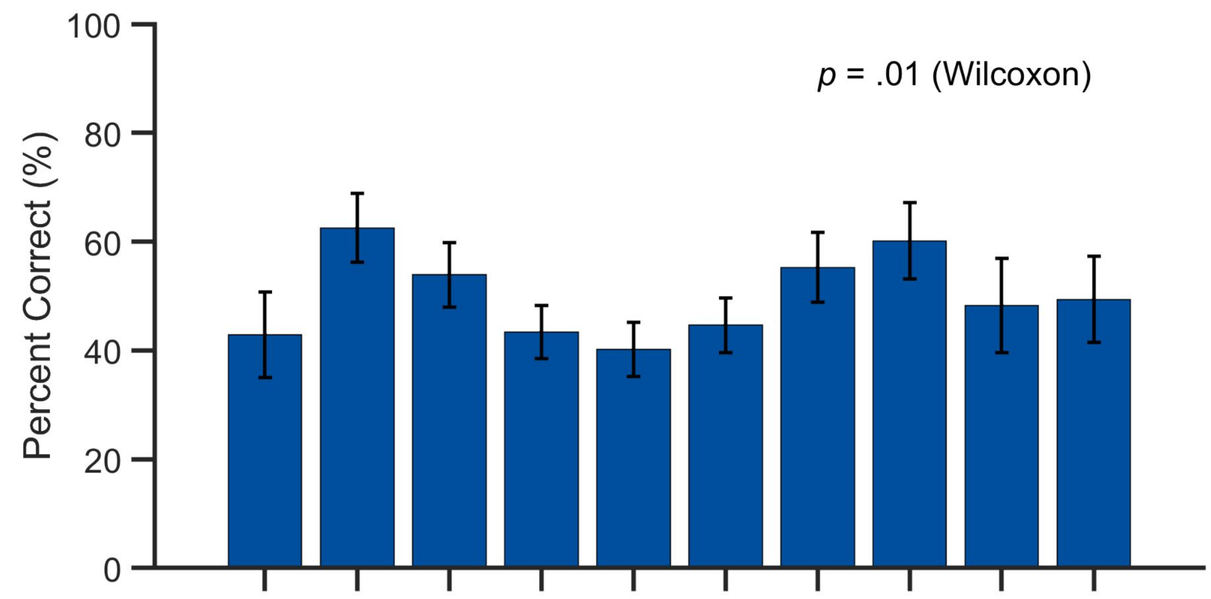


RESULTS

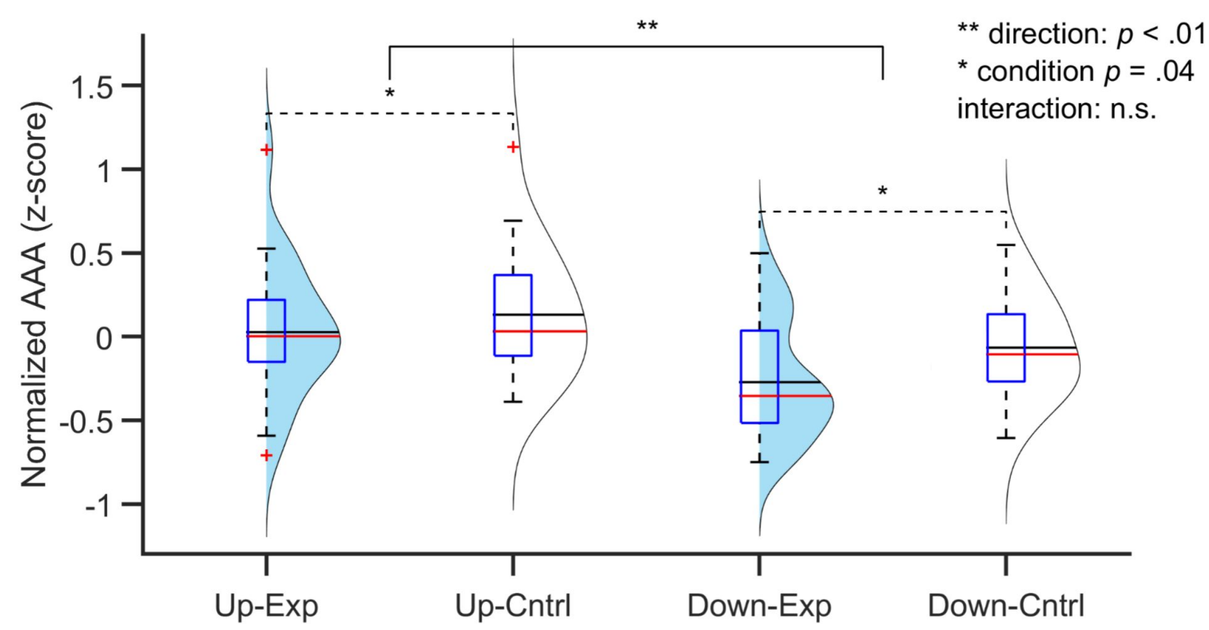
Participants performance in both tasks by condition



Discrimination accuracy correlated positively with amplitude extremity [3]



Effect of direction and condition in alpha amplitude



DISCUSSION

- Sonification did not improve performance.
- Group-level performances were consistent with the first session of prior studies [4].
- Auditory feedback may have increased cognitive load [5].
- Participants likely need more time to build stable associations between feedback and alpha states [5].

DEPARTMENT OF PSYCHOLOGY
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[1] Kamiya, J. (2011). Journal of Neurotherapy. [2] Steffert (2017), The Open University [3] Frederick, J. (2012). Consciousness and Cognition. [4] Frederick, J., Heim, A. S., Dunn, K. N., Powers, C. D., & Klein, C. J. (2016). Consciousness and Cognition. [5] Johnson, K. A., Hartwell, K., LeMatty, T., Borckardt, J., Morgan, P. S., Govindarajan, K., Brady, K., & George, M. S. (2012). Journal of Neuroimaging.