

Accepted Manuscript

Research Paper

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Anmin Gong, Jianping Liu, Fangbo Li, Fangyi Liu, Changhao Jiang, Yunfa Fu

PII: S0306-4522(17)30744-3

DOI: <https://doi.org/10.1016/j.neuroscience.2017.10.016>

Reference: NSC 18081

To appear in: *Neuroscience*

Received Date: 17 May 2017

Accepted Date: 13 October 2017

Please cite this article as: A. Gong, J. Liu, F. Li, F. Liu, C. Jiang, Y. Fu, Correlation between Resting-state Electroencephalographic Characteristics and Shooting Performance, *Neuroscience* (2017), doi: <https://doi.org/10.1016/j.neuroscience.2017.10.016>

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Correlation between Resting-state Electroencephalographic Characteristics and Shooting Performance

Anmin Gong^{a,*}, Jianping Liu^a, Fangbo Li^a, Fangyi Liu^a, Changhao Jiang^b, Yunfa Fu^c

^a School of science, Engineering University of Chinese People's Armed Police Force

^b Key Laboratory of sports performance evaluation and technical analysis, Capital Institute of Physical Education

^c School of Automation and Information Engineering, Kunming University of Science and Technology

* Corresponding author.

E-mail address: gonganmincapf@163.com

Abstract: According to the theories of neural plasticity and neural efficiency, professional skill training improves performance by strengthening the underlying neural mechanisms. Therefore, subjects trained professionally may exhibit changes in resting-state neurophysiological characteristics closely related to performance. To test this notion, the resting-state electroencephalogram (EEG) was measured from 35 rifle shooters after the same training regimen, and resting-state EEG characteristics were analyzed for correlations with shooting performance. The results showed a significant linear correlation between shooting performance and the coherence of electrode channels C3 and T3 in the beta1 band ($r = 0.74$, $P < 4.2 \times 10^{-6}$). There was also a significant linear correlation between the characteristic path length of the resting-state theta band brain network and shooting performance ($r = 0.56$, $P < 0.0005$). This study identifies potential neural mechanisms underlying successful shooting and a new method for predicting and evaluating performance based on EEG characteristics.

Key words: electroencephalogram; shooting; coherence; correlation analysis

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