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## Education

2021.09~Present, PostDoc Fellow, Center for Mind and Brain, University of California, Davis, United States.

Supervisor: Prof. Steven J. Luck

2019.03~2021.08, Doctor of Philosophy. Mathematical Information Technology, Faculty of Information Technology, University of Jyväskylä, Finland.

Supervisor: Prof. Tapani Ristaniemi, Prof. Timo Tiihonen and Prof. Fengyu Cong.

Thesis: Methods to extract multi-dimensional features of event-related brain activities from EEG data

2015.09~2018.06, M.E. Biomedical Engineering, School of Biomedical Engineering, Faculty of Electronic Information and Electrical Engineering, Dalian University of Technology, China.

Supervisor: Prof. Fengyu Cong.

Thesis: The Research on Extracting Quasi-time-locked and Non-phase-locked Brain Activity from Event-related Potential Data

2011.09~2015.06, B.E. Communication Engineering, School of Information Science and Engineering, Dalian Polytechnic University, China.

## Research Interest

Current research: Studies on developing advanced techniques in extracting event-related potentials (ERPs)/event-related fields (ERFs) from electroencephalogram (EEG)/MEG (magnetoencephalography) data. Aiming to the realization of multi-functional software toolboxes, which mainly concerned on:

1. ERP/EEG/MEG.
2. Spectral analysis: Fourier, Hilbert, and wavelet transforms.
3. Time-frequency analysis: Morlet continuous wavelet transform, short-time Fourier transform (STFT), Hilbert transform, matching pursuit algorithm, etc.
4. Matrix decomposition: Nonnegative matrix factorization (NMF), principal component analysis (PCA), and independent component analysis (ICA)
5. Tensor decomposition: Tucker decomposition (TD) and canonical polyadic decomposition (CPD)
6. Statistical analysis: ANOVA

## Matlab Toolbox

Name: Evoked ERP/EROv1.1 (from: <http://zhangg.net/publications/>).

Data type: Trial-averaged ERP data are collected from either the within-subject (one-factor, two-factor, three-factor) or between-subject (two-factor, three-factor) experimental designs.

Method: Conventional time-domain analysis, FFT, wavelet filter, time-frequency analysis, and PCA.

## Publications

- (1). Xiaoshuang Wang, **Guanghui Zhang**, Ying Wang, Lin Yang, Zhanhua Liang, and Fengyu Cong (2021). One Dimensional Convolutional Networks Combined with Channel Selection Strategy for

Seizure Prediction using Long-term Intracranial EEG. Accepted by International Journal of Neural Systems.

- (2). **Guanghui Zhang**, Chi Zhang, Shuo Cao, Xue Xia, Xin Tan, Lichengxi Si, Chenxin Wang, Xiaochun Wang, Chenglin Zhou, Tapani Ristaniemi, and Fengyu Cong (2020). Multi-domain Features of the Non-phase-locked Component of Interest Extracted from ERP Data by Tensor Decomposition. *Brain Topography*, 33(1), 37-47. DOI: 10.1007/s10548-019-00750-8.
- (3). **Guanghui Zhang**, Xueyan Li, and Fengyu Cong (2020). Objective Extraction of Evoked Event-Related Oscillation from Time-Frequency Representation of Event-Related Potentials, *Neural Plasticity*, vol. 2020, Article ID 8841354, 20 pages, 2020. DOI: 10.1155/2020/8841354.
- (4). Jiaxin Yu, Yan Wang, Jianling Yu, **Guanghui Zhang**, and Fengyu Cong (2020). Nudge for Justice: An ERP Investigation of Default Effects on Trade-offs between Equity and Efficiency. *Neuropsychologia*, 149, 107663. DOI: 10.1016/j.neuropsychologia.2020.107663
- (5). Shuo Cao, Yanzhang Wang, Huili Wang, Hongjun Chen, **Guanghui Zhang**, and Ada Kritikos (2020). A Facilitatory Effect of Perceptual Incongruity on Target-Source Matching in Pictorial Metaphors of Chinese Advertising: EEG Evidence. *Advances in Cognitive Psychology*, 16(1), 1. DOI: 10.5709/acp-0279-z.
- (6). Xiawen Li, **Guanghui Zhang**, Chenglin Zhou, and Xiaochun Wang. (2019). Negative Emotional State Slows Down Movement Speed: Behavioral and Neural Evidence. *PeerJ*, 7, e7591. DOI: 10.7717/peerj.7591.
- (7). Jiacheng Chen, Yanan Li, **Guanghui Zhang**, Xinhong Jin, Yingzhi Lu, and Chenglin Zhou (2019). Enhanced Inhibitory Control during Re-engagement Processing in Badminton Athletes: An event-related potential study. *Journal of Sport and Health Science*, 8(6), 585-594. DOI: 10.1016/j.jshs.2019.05.005.
- (8). Xueyan Li, Huili Wang, Pertti Saariluoma, **Guanghui Zhang**, Yongjie Zhu, Chi Zhang, Fengyu Cong, and Tapani Ristaniemi (2019). Processing Mechanism of Chinese Verbal Jokes: Evidence from ERP and Neural Oscillations. *Journal of Electronic Science and Technology*, 17(3), 260-277. DOI: 10.11989/JEST.1674-862X.80520017.
- (9). Xue Xia, **Guanghui Zhang**, and Xiaochun Wang (2018). Anger Weakens Behavioral Inhibition Selectively in Contact Athletes. *Frontiers in Human Neuroscience* 12 (2018): 463. DOI: 10.3389/fnhum.2018.00463.
- (10). **Guanghui Zhang**, Lili Tian, Huaming Chen, Peng Li, Tapani Ristaniemi, Huili Wang, Hong Li, Hongjun Chen, and Fengyu Cong (2018). Effect of Parametric Variation of Center Frequency and Bandwidth of Morlet Wavelet Transform on Time-frequency Analysis of Event-related Potentials. In *Chinese intelligent systems conference* (pp. 693-702). Springer, Singapore.
- (11). Yingying Wang, Qingchun Ji, Rao Fu, **Guanghui Zhang**, Yingzhi Lu, and Chenglin Zhou. Hand-related Action Words Impair Action Anticipation in Expert Table Tennis Players: Behavioral and Neural Evidence. *Psychophysiology*, e13942. DOI: 10.1111/psyp.13942.

## Manuscripts in Progress

- (1). **Guanghui Zhang**, Xueyan Li, Xiulin Wang, Wenya Liu, Yongjie Zhu, Xiaoshuang Wang, Reza Mahini, Rao Fu, Zheng Chang, Timo Tiihonen, and Fengyu Cong. Signal Processing Techniques for Event-related Potentials: from Single-way to Multi-way Component Analysis. **Submitted to Cognitive Neurodynamics**.
- (2). **Guanghui Zhang**, Xueyan Li, Yingzhi Lu, Zheng Chang, Timo Tiihonen, and Fengyu Cong. Single-trial-based Temporal Principal Component Analysis on Extracting Event-related Potentials of Interest for an Individual Subject. **Submitted to International Journal of Psychophysiology**.
- (3). Xiawen Li, **Guanghui Zhang**, Yu Zhou, Hongbiao Wang, Chenglin Zhou, and Xiaochun Wang. Behavioral and brain reactivity associated with drug-related and nondrug-related emotional stimuli in

methamphetamine abstiners. **Submitted to European Addiction Research.**

(4). Junfu Tian, Xia Shan, **Guanghui Zhang**, Yinyue Wang, and Yingzhi Lu. Expectancy of Movement Behavior Complexity Influences the Quality of Motor Performance Under Emotional Situations. **Submitted to Social Neuroscience.**

(5). Xueyan Li, Jiayi Sun, Qianru Xu, **Guanghui Zhang**, Xiaoshuang Wang, and Huili Wang. Dynamic Impact of Intelligence Quotient on Verbal-humor Processing Evidence from ERP and ERO. **Submitted to Journal of Neurolinguistics.**

## Academic activities

The 7th Annual Research Seminar of CIBR. December 11, 2019. Jyväskylä, Finland

MEG Nord 2019, May 8 ~ 10, 2019. Jyväskylä, Finland.

The 13th Chinese Intelligent Systems Conference, October 14~15, 2017, Mudanjiang, Heilongjiang, China.

Symposium of Liaoning Neuroscience Society, October 14~16, 2016, Shenyang, China.

The 3rd Symposium on brain imaging and EEG research and Application, July 16~19, 2016, Dalian, China.