

# Yongjie Zhu

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## EDUCATION

- Ph.D. Mathematical Information Tech., University of Jyväskylä, Finland, 12/2020  
Supervisors: Tapani Ristaniemi and Fengyu Cong
- M.S. Biomedical Engineering, Dalian University of Technology, China, 6/2016  
Supervisor: Tianshuang Qiu
- B.S. Biomedical Engineering, Dalian University of Technology, China, 6/2013

## ACADEMIC APPOINTMENTS

- 2021– University of Helsinki, Finland  
Postdoctoral Researcher, Department of Computer Science  
Supervisor: Aapo Hyvärinen

## RESEARCH INTEREST

My research focuses on unsupervised machine learning, mainly nonlinear ICA, tensor component analysis, and disentangled representations, applicable to analyze brain imaging data especially recorded during natural stimuli. Specifically, I would like to develop a computational model/method to examine the spatiotemporal dynamics of functional networks and associate them with behavioral roles. I'm also interested in applying unsupervised learning to disentangle the underlying cognitive stages/processes in order to better understand the principles of information processing in the brain

## PUBLICATIONS

### Preprints

- 2020 Ye, C., Xu, Q., Hu Z., Astikainen, P., **Zhu, Y.**, Liu X., Liu, Q. "Individual Differences in Working Memory Capacity Are Unrelated to the Magnitude of Benefits from Object-and Dimension-Based Retro-Cues." *PsyArXiv*. [doi:10.31234/osf.io/jzyfr](https://doi.org/10.31234/osf.io/jzyfr)

### Peer-Reviewed Journals

- 2021 **Zhu, Y.**, Wang X., Mathiak K., Toiviainen P., Ristaniemi T., Xu J., Chang Y., Cong F. "Altered EEG Oscillatory Brain Networks During Music-Listening in Major Depression." *International Journal of Neural Systems* x (x), 2150001. [doi:10.1142/S0129065721500015](https://doi.org/10.1142/S0129065721500015).  
[\[pdf\]](#) [\[code\]](#)
- 2020 Liu, J., **Zhu, Y.**, Sun, H., Ristaniemi, T., Cong, F. "Sustaining Attention for a Prolonged Duration Affects Dynamic Organizations of Frequency-Specific Functional Connectivity." *Brain topography* 33(6), 677-692. [doi:10.1007/s10548-020-00795-0](https://doi.org/10.1007/s10548-020-00795-0). [\[dataset\]](#)

- 2020 Ye, C., Liang, T., Zhang, Y., Xu, Q., **Zhu, Y.**, Liu, Q. "The two-stage process in visual working memory consolidation" *Scientific Reports*, 10(1), 1-11. [doi:10.1038/s41598-020-70418-y](https://doi.org/10.1038/s41598-020-70418-y)
- 2020 Liu, J., Zhang, C., **Zhu, Y.**, Liu, Y., Sun, H., Ristaniemi, T., ... and Parviainen, T. Wegmann, and J. Jiao. "Dissociable effects of reward on P300 and EEG spectra under conditions of high vs. low vigilance during a selective visual attention task." *Frontiers in human neuroscience*, 14, 207. [doi:10.3389/fnhum.2020.00207](https://doi.org/10.3389/fnhum.2020.00207).
- 2020 **Zhu, Y.**, Liu, J., Ye, C., Mathiak, K., Astikainen, P., Ristaniemi, T., Cong, F. "Discovering dynamic task-modulated functional networks with specific spectral modes using MEG." *NeuroImage* 116924. [doi:10.1016/j.neuroimage.2020.116924](https://doi.org/10.1016/j.neuroimage.2020.116924). [pdf] [code]
- 2020 **Zhu, Y.**, Liu, J., Ristaniemi, T., Cong, F. "Distinct patterns of functional connectivity during the comprehension of natural, narrative speech. International journal of neural systems." *International Journal of Neural Systems* 30(03), 2050007. [doi:10.1142/S0129065720500070](https://doi.org/10.1142/S0129065720500070). [pdf]
- 2020 **Zhu, Y.**, Zhang, C., Poikonen, H., Toiviainen, P., Huottilainen, M., Mathiak, K., ... and Cong, F. "Exploring Frequency-Dependent Brain Networks from Ongoing EEG Using Spatial ICA During Music Listening." *Brain Topography* 33, 289-302. [doi:10.1007/s10548-020-00758-5](https://doi.org/10.1007/s10548-020-00758-5). [code]
- 2020 Liu, J., Zhang, C., **Zhu, Y.**, Ristaniemi, T., Parviainen, T., Cong, F. "A Multi-Scale Analysis of 27,000 Urban Street Networks: Every US City, Town, Urbanized Area, and Zillow Neighborhood." *Computer Methods and Programs in Biomedicine* 184, 105120. [doi:10.1016/j.cmpb.2019.105120](https://doi.org/10.1016/j.cmpb.2019.105120)
- 2019 **Zhu, Y.**, Liu, J., Mathiak, K., Ristaniemi, T., Cong, F. "Deriving electrophysiological brain network connectivity via tensor component analysis during freely listening to music." *IEEE Transactions on Neural Systems and Rehabilitation Engineering* 28(2), 409-418. [doi:10.1109/TNSRE.2019.2953971](https://doi.org/10.1109/TNSRE.2019.2953971). [code]
- 2018 Wang, D., **Zhu, Y.**, Ristaniemi, T., Cong, F. "Extracting multi-mode ERP features using fifth-order nonnegative tensor decomposition." *Journal of neuroscience methods* 308, 240-247. [doi:10.1016/j.jneumeth.2018.07.020](https://doi.org/10.1016/j.jneumeth.2018.07.020). [dataset]
- 2017 Luan, S., Qiu, T., Yu, L., Zhang J., Song A., **Zhu, Y.** "BNC-based projection approximation subspace tracking under impulsive noise." *IET Radar, Sonar and Navigation* 11(7), 1055-1061. [doi:10.1049/iet-rsn.2016.0267](https://doi.org/10.1049/iet-rsn.2016.0267)
- 2016 Luan, S., Qiu, T., **Zhu, Y.**, Yu, L. "Cyclic correntropy and its spectrum in frequency estimation in the presence of impulsive noise." *Signal Processing* 120, 503-508. [doi:10.1016/j.sigpro.2015.09.023](https://doi.org/10.1016/j.sigpro.2015.09.023)

#### Peer-Reviewed Conference papers

- 2019 **Zhu Y.**, Li X., Ristaniemi T., and Cong F. "Measuring the task induced oscillatory brain activity using tensor decomposition." In: *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 8593-8597. [doi:10.1109/ICASSP.2019.8682355](https://doi.org/10.1109/ICASSP.2019.8682355). [Poster]
- 2019 Wang D., Wang X., **Zhu Y.**, Toiviainen P., Huottilainen M., Ristaniemi T., and Cong F. "Increasing stability of EEG components extraction using sparsity regularized tensor decomposition." In: *International Symposium on Neural Networks*, (pp. 789-799). [doi:10.1007/978-3-319-92537-089](https://doi.org/10.1007/978-3-319-92537-089)

## Dissertation

- 2020 **Zhu Y.** “Identifying task-related dynamic electrophysiological brain connectivity.” *University of Jyväskylä*. Finland. [\[pdf\]](#)
- 2016 **Zhu Y.** “Research on Key Technologies of Interventional Surgery Navigation Guided by Ultrasound Images.” *Dalian University of Technology* Dalian, China. [\[link\]](#)

## Manuscripts in Peer Review

- 2021 Li X., **Zhu Y.**, Ruohonen E., Ye C., Astikainen P. “Decreased intersubject synchrony in frontal EEG alpha asymmetry and valence ratings of negative movie content in dysphoric individuals.” Under review.
- 2021 Liu J. **Zhu Y.**, Chang Z., Hämäläinen T., Cong F. “Congruency and vigilance produce separable changes in the late positive complex during a Flanker task.” Under review.

## CONFERENCE ACTIVITY

- 2020 Workshops on the 2020 CCN GAC, Virtual Conference. Oct 15–23.
- 2020 Virtual summer school on “Pattern Recognition in Neuroimaging”, Vienna, Austria. Sep 14–18.
- 2019 The 44th IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP2019), Brighton, UK. May 12–17.
- 2019 MEG Nord 2019. Jyväskylä, Finland. May 8–10.
- 2018 The 6th Annual Research Seminar of CIBR. Jyväskylä, Finland. Dec 13.
- 2018 Seminars on Artificial Intelligence. Jyväskylä, Finland. February 21–22.
- 2017 The 27th Jyväskylä International Summer School in Finland. Aug 07–18.
- 2017 “Understanding Learning in the Brain.” CIBR Conference, Jyväskylä, Finland. Jun 12–16.

## GRANTS AND AWARDS

### Awards and Honors

- 2016 Toshiba Medical Research and Development Center Scholarship of DUT
- 2016 Outstanding Graduate of Liaoning Province, China (Master)
- 2013 Outstanding Graduate of Liaoning Province, China (Bachelor)

### Grants and Fellowships

- 2020 Grant for Doctoral study within University of Jyväskylä, 10–12/2020
- 2019 Conference travel grant for ICASSP Conference in Brighton, UK
- 2019 Mobility Grant grant for visiting to Medical faculty, RWTH University Aachen, Germany, 7–10, 2019
- 2016 China Government Scholarship, 10/2016–09/2020

## **TEACHING EXPERIENCE**

### **Dalian University of Technology**

2014      TA. in “Biomedical signal processing.” and “Signals and Systems.”

## **SERVICE**

### **AD-HOC Peer Review**

*Journal of Neural Engineering*

*Machine Learning: Science and Technology*

*IEEE Access*

*Journal of Neuroscience Methods*

## **MEMBERSHIPS**

IEEE student member

Updated January 2021