Yuanning Li

Curriculum Vitae

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Shanghai, China 201210
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Education

2014–2018 **Ph.D.**, *Carnegie Mellon University, Pittsburgh, PA*.
Joint Neural Computation and Machine Learning Ph.D. program
Dissertation: Neural dynamics and interactions in the human ventral visual pathway
Committee: Avniel Singh Ghuman (co-advisor), Max G. G'Sell (co-advisor), Robert E. Kass, Christopher I. Baker

2011–2013 **M.S.**, *Carnegie Mellon University, Pittsburgh, PA*.
Electrical and Computer Engineering

2007–2011 **B.S.**, *Beihang University (BUAA), Beijing, China*.
Electrical Engineering, School of Advance Engineering (Honors College)

Work Experience

2022– **Assistant Professor**, *ShanghaiTech University*, Shanghai, China.
School of Biomedical Engineering

2021– **Visiting Investigator**, *Huashan Hospital*, Shanghai, China.
Neurosurgical Institute of Fudan University

2019–2022 **Postdoctoral Scholar**, *University of California*, San Francisco, CA.
Department of Neurological Surgery/Center for Integrative Neuroscience
Advisor: Edward Chang

2014–2018 **Graduate Research Assistant**, *Carnegie Mellon University*, Pittsburgh, PA.
Center for the Neural Basis of Cognition/Machine Learning Department
Advisors: Avniel Ghuman and Max G'Sell

2013–2018 **Graduate Research Assistant**, *University of Pittsburgh*, Pittsburgh, PA.
School of Medicine, Department of Neurological Surgery
Advisor: Avniel Ghuman

Research Interests

Neural basis of speech and language perception. Computational models of high-level sensory perception. Statistical machine learning for large scale neural data. Brain-computer interface.

Awards and Honors

2020 Outstanding Scholars in Neuroscience Award (OSNAP), National Institutes of Health (NIH)

2018 Trainee Professional Development Award (TPDA), Society for Neuroscience (SfN)

2018 Fellow of the Kavli Summer Institute in Cognitive Neuroscience, Lake Tahoe, CA

2015 Fellow of the Summer Institute in Cognitive Neuroscience, Santa Barbara, CA

2015 Multimodal Neuroimaging Training Program (MNTP, NIH training grant), CMU-Pitt

2014 R. K. Mellon Presidential Fellowship, CMU

2012 Carnegie Institute of Technology Dean's Fellowship, CMU

Research Funding

2022-2025 Computational cognitive neuroscience and brain-inspired artificial intelligence. NSFC Excellent Young Scientists Fund Program (Overseas). National Natural Science Foundation of China. Role: Principal Investigator. Total funding: CNY 1,000,000.

2022-2024 Neural basis of human language processing and neural encoding-decoding techniques. Shanghai Pujiang Talent Program, 22PJ1410500. Science and Technology Commission of Shanghai Municipality. Role: Principal Investigator. Total funding: CNY 300,000.

2022-2027 Brain computer interfaces for speech disorders in Mandarin. Sci-Tech Innovation 2030 Young Scientist Program, 2022ZD0212300. Ministry of Science and Technology of the People's Republic of China. Role: Co-Investigator (PI: Junfeng Lu). Total funding: CNY 5,000,000.

Publications

(# equal contributions, * corresponding author)

Preprints

Yuanning Li, Gopala K. Anumanchipalli, Abdelrahman Mohamed, Peili Chen, Laurel Carney, Junfeng Lu, Jinsong Wu, Edward Chang. Dissecting neural computations of the human auditory pathway using deep neural networks for speech. *Under review*, preprint doi: `https://doi.org/10.1101/2022.03.14.484195`

Yuanning Li#*, Huzheng Yang#, Shi Gu*. Upgrading Voxel-wise Encoding Model via Integrated Integration over Features and Brain Networks. *Under review*, preprint doi: `https://doi.org/10.1101/2022.11.06.515387`

Junfeng Lu#, **Yuanning Li#**, Zehao Zhao#, Yan Liu, Yanming Zhu, Ying Mao, Jinsong Wu, and Edward Chang. Neural Control of Lexical Tone Production in Human Laryngeal Motor Cortex. *Under review*

Peter Elliott, Matthew Boring, **Yuanning Li**, R. Mark Richardson, Avniel Singh Ghuman, Max G'Sell. Shrinkage Classification for Overlapping Time Series: An interpretable method for mapping stimulus-differentiated evoked response (Submitted, preprint doi: `https://doi.org/10.1101/733279`)

Matthew Boring, Elizabeth Hirshorn, **Yuanning Li**, Michael Ward, R. Mark Richardson, Julie Fiez, Avniel Singh Ghuman. The left midfusiform gyrus interacts with early visual cortex and the anterior temporal lobe to support word individuation (preprint doi: `https://doi.org/10.1101/411579`)

Published journal articles

2023 Emily P. Stephen, **Yuanning Li**, Sean Metzger, Yulia Oganian, Edward F Chang. Latent neural dynamics encode temporal context in speech. Hearing Research, vol.437 (2023). doi: https://doi.org/10.1016/j.heares.2023.108838

2023 Yan Liu, Zehao Zhang, Minpeng Xu, Haiqing Yu, Yanming Zhu, Jie Zhang, Linhao Bu, Xiaoluo Zhang, Junfeng Lu*, **Yuanning Li***, Dong Ming, and Jinsong Wu*. Decoding and synthesizing tonal language speech from brain activity. *Science Advances* , 9:23 (2023). doi: https://doi.org/10.1126/sciadv.adh0478

2021 **Yuanning Li#**, Claire Tang#, Junfeng Lu#, Jinsong Wu, and Edward Chang. Human cortical encoding of pitch in tonal and non-tonal languages. *Nature Communications* , 12:1161 (2021). doi: https://doi.org/10.1038/s41467-021-21430-x

2020 **Yuanning Li***, Michael Ward, R. Mark Richardson, Max G'Sell, and Avniel Singh Ghuman. Endogenous activity modulates neural tuning and predicts perceptual behavior. *Nature Communications*, 11:4014 (2020). doi: https://doi.org/10.1038/s41467-020-17729-w

2018 **Yuanning Li***, R. Mark Richardson, and Avniel Singh Ghuman. Posterior Fusiform and Midfusiform Contribute to Distinct Stages of Facial Expression Processing. *Cerebral Cortex*. 29, no. 7 (2018): 3209-3219. doi: https://doi.org/10.1093/cercor/bhy186

2017 **Yuanning Li***, R. Mark Richardson, and Avniel Singh Ghuman. Multi-Connection Pattern Analysis: decoding the representational content of neural communication. *NeuroImage*. 162 (2017) pp. 32-44. doi: https://doi.org/10.1016/j.neuroimage.2017.08.033

2017 Hassan Albalawi, **Yuanning Li**, and Xin Li. Training Fixed-Point Classifiers for On-Chip Low-Power Implementation. *ACM Transactions on Design Automation of Electronic Systems (TODAES)*. 22, no. 4 (2017): 69. doi: https://doi.org/10.1145/3057275

2016 Elissa Aminoff, **Yuanning Li**, John Pyles, Michael Ward, R. Mark Richardson, Avniel Singh Ghuman. Associative hallucinations result from stimulating left ventral temporal cortex. *Cortex*. 83, (2016): 139-144. doi: https://doi.org/10.1016/j.cortex.2016.07.012

2016 Elizabeth Hirshorn#, **Yuanning Li#**, Michael Ward, R. Mark Richardson, Julie Fiez, and Avniel Singh Ghuman. Decoding and disrupting left midfusiform gyrus activity during word reading. *Proceedings of the National Academy of Sciences*. 113, no. 29 (2016): 8162-8167. doi: https://doi.org/10.1073/pnas.1604126113

2014 Avniel Singh Ghuman, Nicolas Brunet, **Yuanning Li**, Roma Konecky, John Pyles, Shawn Walls, Vincent Destefino, Wei Wang, and R. Mark Richardson. Dynamic encoding of face information in the human fusiform gyrus. *Nature Communications*. 5:5672 (2014), doi: https://doi.org/10.1038/ncomms6672

Peer-reviewed conference proceedings

2021 Huzheng Yang, Shanghang Zhang, Yifan Wu, **Yuanning Li***, & Shi Gu*. (2021). Effective ensemble of deep neural networks predicts neural responses to naturalistic videos. Conference on Cognitive Computational Neuroscience (CCN 2021). doi: `https://doi.org/10.1101/2021.08.24.457581`

2014 Hassan Albalawi, **Yuanning Li**, and Xin Li. Computer-aided design of machine learning algorithm: training fixed-point classifier for on-chip low-power implementation. *Proceedings of the 51st ACM/EDAC/IEEE Design Automation Conference (DAC)*. 2014. doi: `https://doi.org/10.1145/2593069.2593110` (acceptance rate: 174/787 = 22.1%)

Book chapters

2020 Ashburn, S. M., *et al.* Toward a Socially Responsible, Transparent, and Reproducible Cognitive Neuroscience. In Poeppel, D., Mangun, G. R., & Gazzaniga, M. S. (Eds.). (2020). *The Cognitive Neurosciences* (6th Ed.). MIT Press.

Conferences and Workshops

Contributed talks

2018 **Yuanning Li**, Michael Ward, R. Mark Richardson, Max G G'Sell and Avniel Singh Ghuman, Endogenous pre-stimulus activity modulates category tuning in ventral temporal cortex and influences behavior, *48th Annual Meeting of Society for Neuroscience (SfN 2018)*, San Diego, CA, 2018

2018 **Yuanning Li**, Michael Ward, R. Mark Richardson, Max G G'Sell and Avniel Singh Ghuman, Endogenous oscillatory activity modulates category tuning in ventral temporal cortex, *Vision Sciences Society Eighteenth Annual Meeting (VSS 2018)*, St. Pete Beach, FL, 2018.

2018 Matthew Boring, Edward Silson, **Yuanning Li**, Michael Ward, Christopher Baker, R. Mark Richardson, and Avniel Singh Ghuman, Interdigitation of words and faces in the ventral visual stream: reevaluating the spatial organization of category selective cortex using intracranial EEG, *Vision Sciences Society Eighteenth Annual Meeting (VSS 2018)*, St. Pete Beach, FL, 2018. (Talk given by Matthew Boring)

2016 **Yuanning Li**, Michael Ward, Witold Lipski, R. Mark Richardson, and Avniel Singh Ghuman, Neurodynamics of expression coding in the core face network, *46th Annual Meeting of Society for Neuroscience (SfN 2016)*, San Diego, CA, 2016

Poster presentations

2021 Emily Stephen, **Yuanning Li**, Sean Metzger, Yulia Oganian, and Edward Chang, Multivariate temporal receptive fields in speech perception reflect low-dimensional dynamics. *Computational and Systems Neuroscience (Cosyne 2021)*, 2021

2019 **Yuanning Li**, Claire Tang, Junfeng Lu, Jinsong Wu, and Edward Chang, Lexical tone processing in human superior temporal gyrus, *49th Annual Meeting of Society for Neuroscience (SfN 2019)*, Chicago, IL, 2019

2018 **Yuanning Li**, Michael Ward, R. Mark Richardson, Max G G'Sell, and Avniel Singh Ghuman, Endogenous pre-stimulus activity modulates category tuning in ventral temporal cortex and influences perceptual behavior, *2018 Conference on Cognitive Computational Neuroscience (CCN 2018)*, Philadelphia, PA, 2018

2017 **Yuanning Li**, Michael Ward, Witold Lipski, R. Mark Richardson, and Avniel Singh Ghuman, Neurodynamics of expression coding in the core face network, *Vision Sciences Society Seventeenth Annual Meeting (VSS 2017)*, St. Pete Beach, FL, 2017. doi: 10.1167/17.10.821

2016 **Yuanning Li**, and Avniel Singh Ghuman. Distributed information processing across OFA and FFA represents individual face identities, *Vision Sciences Society Sixteenth Annual Meeting (VSS 2016)*, St. Pete Beach, FL, 2016. doi: 10.1167/16.12.1232

2016 Avniel Singh Ghuman, **Yuanning Li**, Elizabeth Hirshorn, Julie Fiez, and R. Mark Richardson. Information processing dynamics in human category-selective fusiform gyrus, *Vision Sciences Society Sixteenth Annual Meeting (VSS 2016)*, St. Pete Beach, FL, 2016. doi: 10.1167/16.12.254

2015 **Yuanning Li** and Avniel Singh Ghuman. Multi-connection pattern analysis (MCPA): multivariate discriminant analysis of functional connectivity between neural populations, *45th Annual Meeting of Society for Neuroscience (SfN 2015)*, Chicago, IL, 2015

2015 Elissa Aminoff, **Yuanning Li**, John Pyles, Michael Ward, Gena Ghearing, R. Mark Richardson, Avniel Singh Ghuman. Stimulating Associations, *45th Annual Meeting of Society for Neuroscience (SfN 2015)*, Chicago, IL, 2015

2015 **Yuanning Li**, Elizabeth Hirshorn, Michael Ward, Roma Konecky, Ellyanna Kessler, Breana Gallagher, R. Mark Richardson, Julie Fiez, and Avniel Singh Ghuman. Decoding the temporal dynamics of left mid-fusiform gyrus activity during word reading, *Seventh International Workshop on Statistical Analysis of Neuronal Data (SAND7)*, Pittsburgh, PA, 2015

2014 **Yuanning Li**, Nicolas Brunet, Ellyanna Kessler and Avniel Singh Ghuman. Spatiotemporal analysis of human face individuation. *19th International Conference on Biomagnetism (BIOMAG)*, Halifax, Canada, 2014

Invited Talks

2023 "Encoding and decoding of speech language information in the human brain with intracranial recordings", CLASS Advanced Methods School, City University of Hong Kong, Hong Kong, China

2023 "Encoding and decoding of speech language information in the human brain with intracranial recordings", Chinese Neuroscience Society Neuroimaging Annual Conference, Guangzhou, China

2023 "Encoding and decoding of speech language information in the human brain with intracranial recordings", Young Scholar Forum on Learning and Memory, Shanghai, China

2023 "Neural coding and computations underlying natural speech perception across languages", Invited seminar, Chinese Institute for Brain Research, Beijing, China

2023 "Neural coding and computations underlying natural speech perception across languages", Frontier of Life Science and Technology (FoLST2022), Shanghai, China

2022 "Dissecting neural computations of the human auditory pathway using deep neural networks for speech", Symposium on Biological Sensory and Sensory+, Shanghai, China

2021 "Understanding the neural computations in the human auditory pathway using deep neural networks", brAIn Seminar Series, Carnegie Mellon University, Pittsburgh, PA

2021 "Human cortical encoding of pitch in tonal and non-tonal languages", Xinqingnian Psychology Symposium, IDG/McGovern Institute, Peking University, Beijing, China (online)

2021 "Understanding the neural computations in the human auditory pathway using deep neural networks", Research Club Seminar, Department of Neurosurgery, University of Pittsburgh, Pittsburgh, PA (online)

2019 "Endogenous activity modulates stimulus and circuit-specific neural tuning and perception", Young Scholar Seminar Series, East China Normal University, Shanghai, China

2017 "Temporal dynamics of face and word processing in the human fusiform", Young Scholar Seminar Series, East China Normal University, Shanghai, China

Peer Reviewing

Ad-hoc Reviewer: IEEE Transactions on Biomedical Engineering, IEEE Transactions on Neural Systems & Rehabilitation Engineering (TNSRE), IEEE Journal of Biomedical and Health Informatics (JBHI), PLOS One, PLOS Computational Biology, NeuroImage, Journal of Neurophysiology, Science Advances, AAAI Conference on Artificial Intelligence (AAAI), Journal of Neuroscience Methods, Cerebral Cortex

Teaching

Spring 2023 **Instructor**, *ShanghaiTech University*, Shanghai, China.
BME1106 Biomedical Signals and Systems II (BME undergraduate course)

Fall 2022 **Instructor**, *ShanghaiTech University*, Shanghai, China.
BME2111 Neural Signal Processing and Data Analysis (BME graduate course)

Spring 2018 **Teaching Assistant**, *Carnegie Mellon University*, Pittsburgh, PA.
10-708 Probabilistic Graphical Models (Machine Learning Ph.D. core course)

Summer 2016 **Teaching Assistant**, *Center for the Neural Basis of Cognition, CMU-Pitt*.
Summer course for the undergraduate program in neural computation (uPNC)

Spring 2013 **Teaching Assistant**, *Carnegie Mellon University*, Pittsburgh, PA.
18-202 Mathematical Foundations of Electrical Engineering (ECE undergraduate course)

Programming Skills

Proficient in: Python, MATLAB, LaTeX

Capable in: C, C++, Java, R

References

Edward F. Chang, *edward.chang@ucsf.edu*.
Professor, University of California San Francisco

Avniel Singh Ghuman, *ghumana@upmc.edu*.
Associate Professor, University of Pittsburgh

R. Mark Richardson, *mark.richardson@mgh.harvard.edu*.
Associate Professor, Harvard Medical School

Max G. G'Sell, *mgsell@andrew.cmu.edu*.
Associate Professor, Carnegie Mellon University

Robert E. Kass, *kass@stat.cmu.edu*.
Professor, Carnegie Mellon University

Julie A. Fiez, *fiez@pitt.edu*.
Professor, University of Pittsburgh