

# PO-CHEN KUO, M.D.

[✉ fredpckuo@gmail.com](mailto:fredpckuo@gmail.com) [✉ pckuo@uw.edu](mailto:pckuo@uw.edu) [in po-chen-kuo](https://www.linkedin.com/in/po-chen-kuo) [pckuo](https://github.com/pckuo) [pckuo.github.io](https://github.com/pckuo)

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## SUMMARY

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Physician scientist, computational neuroscience Ph.D. candidate at University of Washington, and visiting scientist at Allen Institute for Neural Dynamics. Studying how biological and artificial intelligence adapt under uncertainty, with a focus on reinforcement learning, Bayesian inference, and meta-learning. Strong background in medicine, physics, and machine learning. Passionate about the synergy between neuroscience and artificial intelligence research - how AI sheds light on the algorithmic basis of brain computation and how neural mechanisms inspire enhanced learning systems. My long-term career goal is to translate the scientific discovery of computational and systems neuroscience to improve our understanding and treatment of neuropsychiatric disorders.

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## EDUCATION

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### University of Washington

Seattle, WA

*Ph.D. Candidate in Neuroscience*

*Sep. 2021 – Jun 2026 (Expected)*

*Visiting Scientist at Allen Institute for Neural Dynamics*

*Sep. 2022 – Present*

- Advisor: Dr. Edgar Y. Walker
- Committee: Drs. Karel Svoboda, Fred Rieke, Adrienne Fairhall, Nick Steinmetz
- Research: adaptive behavior under uncertainty, reinforcement learning, Bayesian inference, meta-learning, probabilistic graphical models, representation learning, information theory, time series analysis

### National Taiwan University

Taipei, Taiwan

*M.D., GPA 4.15/ 4.30*

*Sep. 2012 – Jun. 2020*

*B. Sc. in Physics, GPA 4.23/ 4.30*

*Sep. 2015 – Jun. 2020*

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## PUBLICATIONS

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### Journal Articles

- **Kuo, P.-C.**, Cheng, H.-Y., Chen, P.-F., Liu, Y.-L., Kang, M., Kuo, M.-C., ... & Chuang, J.-H. (2020). [Assessment of Expert-Level Automated Detection of \*Plasmodium falciparum\* in Digitized Thin Blood Smear Images](#). *JAMA network open*, 3(2), e200206-e200206.

### Conference Proceedings

- Brenner, M., Hess, F., Mikhaeil, J. M., Bereska, L. F., Monfared, Z., **Kuo, P.-C.**, & Durstewitz, D. (2022). [Tractable Dendritic RNNs for Reconstructing Nonlinear Dynamical Systems](#). In *International Conference on Machine Learning* (pp. 2292-2320). PMLR 162:2292-2320.
- Cheng, H.-T., Yeh, C.-F., **Kuo, P.-C.**, Wei, A., Liu, K.-C., Ko, M.-C., ... & Liu, T.-L. (2020). [Self-similarity student for partial label histopathology image segmentation](#). In *Computer Vision—ECCV 2020: 16th European Conference*, Glasgow, UK, August 23–28, 2020, Proceedings, Part XXV 16 (pp. 117-132). Springer International Publishing.

### Preprints

- Yeh, C.-F., Cheng, H.-T., Wei, A., Chen, H.-M., **Kuo, P.-C.**, Liu, K.-C., ... & Liu, T.-L. (2020). [A cascaded learning strategy for robust covid-19 pneumonia chest x-ray screening](#). *arXiv preprint arXiv:2004.12786*.

### Book Chapters

- [Prize-winning Works of National Taiwan University Student Laureate for Philosophical Treatise, Vol. 3](#). Lee H. C. *National Taiwan University Press*. 2016.

## CONFERENCE PRESENTATIONS

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- (Jun 2024) [AREADNE 2024, Research in Encoding And Decoding of Neural Ensembles](#) [Poster, Abstract] **Kuo, P.-C.** and Walker, E. Y. "An information-theoretical approach to optimize task design for distinguishing probabilistic codes in neural populations"
- (Mar 2024) Hendrickson Trainee Symposium, University of Washington School of Medicine [Poster, Abstract] **Kuo, P.-C.** and Walker, E. Y. "Bayesian reinforcement learning for the computational basis of dynamic foraging"
- (Feb 2024) [Janelia Conference, Bridging Diverse Perspectives on the Mechanistic Basis of Foraging](#) [Poster, Abstract] **Kuo, P.-C.** and Walker, E. Y. "Bayesian reinforcement learning as a mechanistic model for dynamic foraging behavior"
- (Oct 2020) Neuromatch 3.0 [Talk, Abstract] Brenner M., Bereska, L., **Kuo, P.-C.**, and Durstewitz, D. [Fast and scalable learning of generative models for chaotic dynamical systems and neural data.](#)

## INVITED TALKS

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- (Feb 2024) University of Washington, NEUSCI 403 Lecture (Computational Models For Cognitive Neuroscience). "Adaptive learning under uncertainty: learning to reinforcement learn with actor-critic recurrent neural networks"
- (Aug 2023) Allen Institute for Brain Science, Summer Workshop on the Dynamic Brain. "[What gives rise to neural variability and dynamics?](#)"
- (Apr 2022) University of Washington Computational Neuroscience Center Tutorial Series. "CNC Tutorial: Recurrent Neural Networks."

## AWARDS AND HONORS

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|  |                        |
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| <b>Neuroscience Top-Off Award</b> , University of Washington                                       | 2021                   |
| <b>Graduate Program Neuroscience Fellowship</b> , University of Washington                         | 2021                   |
| <b>Presidential Award for Academic Excellence</b> , National Taiwan University                     | 2015, 2016, 2018, 2019 |
| <b>Hsiu-Shan Fully Funded Scholarship for Medical Students</b> , National Taiwan University        | 2015-2018              |
| <b>JASSO Scholarship</b> , Ministry of Education, Culture, Sports, Science and Technology of Japan | 2018                   |
| <b>First Prize, 5th National Taiwan University Student Laureate for Philosophical Treatise</b>     | 2015                   |
| <b>Second Prize, Physiology Quiz in Japan 2018</b>   | 2018                   |

## RESEARCH EXPERIENCE

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| <b>Allen Institute for Neural Dynamics</b>   | Seattle, WA                |
| <i>Rotation — Dr. Karel Svoboda</i>  | <i>Apr 2022 — Jun 2022</i> |
| • Investigated the multi-region neural dynamics dynamics of value-based decision-making in mice. |                            |
| <b>University of Washington, Physiology and Biophysics</b>                                       | Seattle, WA                |
| <i>Rotation — Dr. Edgar Y. Walker</i>  | <i>Jan 2022 — Mar 2022</i> |
| • Investigated the neural basis of probabilistic computation in primate primary visual cortex.   |                            |
| <b>University of Washington, Physiology and Biophysics</b>                                       | Seattle, WA                |
| <i>Rotation — Dr. Adrienne Fairhall</i>  | <i>Sep 2021 — Dec 2021</i> |
| • Investigated the biophysical mechanism of reassembly of hydra nervous system.                  |                            |
| <b>National Taiwan University, Electrical Engineering</b>  | Taipei, Taiwan             |
| <i>Research Assistant — Dr. Shyh-Kang Jeng</i>   | <i>Dec 2019 — Aug 2020</i> |
| • Developed algorithms for closed-loop deep brain stimulation for Parkinson's disease.           |                            |

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| <b>National Taiwan University, Physics</b><br><i>Research Assistant – Dr. Jiunn-Wei Chen</i>  | Taipei, Taiwan<br><i>Jan 2020 – Jun 2020</i>    |
| <ul style="list-style-type: none"> <li>• Researched and implemented quantum algorithms using Qiskit for simulation of quantum systems.</li> </ul>   |   |
| <b>Heidelberg University, Central Institute of Mental Health</b><br><i>Research Intern – Dr. Daniel Durstewitz</i>  | Mannheim, Germany<br><i>Jun 2019 – Aug 2019</i> |
| <ul style="list-style-type: none"> <li>• Developed recurrent neural networks for nonlinear dynamical systems reconstruction.</li> </ul>   |   |
| <b>Taiwan AI Labs</b><br><i>Machine Learning Researcher</i>   | Taipei, Taiwan<br><i>Sep 2017 – Jul 2020</i>    |
| <ul style="list-style-type: none"> <li>• Developed deep learning algorithms for digital pathology, echocardiography, brain MRI, and chest CT.</li> <li>• Spearheaded R&amp;D partnership with Taiwan Centers of Disease Control to build DL malaria diagnostics.</li> </ul> |   |
| <b>Academia Sinica, Institute of Information Science</b><br><i>Research Intern – Dr. Da-Wei Wang</i>  | Taipei, Taiwan<br><i>Jul 2017 – Aug 2017</i>    |
| <ul style="list-style-type: none"> <li>• Developed disease onset prediction models using recurrent neural networks.</li> </ul>  |   |
| <b>Academia Sinica, Institute of Physics</b><br><i>Research Intern – Dr. Tsz-King Wong</i>  | Taipei, Taiwan<br><i>Jul 2013 – Aug 2013</i>    |
| <ul style="list-style-type: none"> <li>• Conducted experiments to investigate the phenomena and theory of sono-luminescence.</li> </ul>   |   |

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## CLINICAL EXPERIENCE

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| <b>National Taiwan University Hospital</b><br><i>Resident Physician, Post-Graduate Year</i><br><i>Intern Physician</i> | Taipei, Taiwan<br><i>Aug 2020 – Jul 2021</i><br><i>Jun 2018 – May 2019</i> |
| <b>Osaka Medical College Hospital</b><br><i>International Rotation Program</i>   | Osaka, Japan<br><i>Apr 2018 – May 2018</i>                                 |
| <b>University of Rochester, Strong Memorial Hospital</b><br><i>Clinical Elective Internship, Neurology</i>             | Rochester, NY<br><i>Mar 2018 – Apr 2018</i>                                |
| <b>Icahn School of Medicine, Mount Sinai Hospital</b><br><i>Clinical Observer, Neurosurgery</i>                        | New York, NY<br><i>Feb 2018 – Mar 2018</i>                                 |

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## TEACHING AND MENTORSHIP

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| <b>NEUSCI 403: Computational Models For Cognitive Neuroscience</b><br><i>Teaching Assistant</i> | University of Washington<br><i>Jan 2024 - Mar 2024</i> |
| <b>Summer Workshop on the Dynamic Brain</b><br><i>Teaching Assistant</i>                        | Allen Institute for Brain Science<br><i>Aug 2023</i>   |
| <b>Neuroscience Undergraduate Reading Program</b><br><i>Graduate Mentor</i>                     | University of Washington<br><i>2022</i>                |

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## SCHOOLS AND WORKSHOPS ATTENDED

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| <b>Neuromatch Academy - Deep Learning</b><br><i>Interactive Track</i>  | Virtual<br><i>Aug 2021</i>      |
| <b>8th Tokyo Medical and Dental University International Summer Program</b><br><i>Medical Innovation Beyond 2020</i> | Tokyo, Japan<br><i>Jul 2019</i> |

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## CERTIFICATIONS

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| <b>Physician Certification</b> , Taiwan Ministry of Health and Welfare | Jul 2020 |
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## LEADERSHIP AND VOLUNTEERING

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**Boston Consulting Group, Strategy Consulting: Approach & Practice**

*Consultant Trainee*

Taipei, Taiwan

*Sep 2019 - Jan 2020*

**Baseball Varsity Team, College of Medicine, National Taiwan University**

*Captain*

Taipei, Taiwan

*Sep 2016 - Aug 2017*

**MatchMarrow**

*Co-founder and Officer of Public Relations*

Taipei, Taiwan

*Sep 2014 - Jun 2015*

- Initiated the first student-run program in Taiwan to promote bone marrow donation for patients with hematological diseases.

**International Federation of Medical Students' Associations 63rd August Meeting**

*Organizing committee and Visa Coordinator*

Taipei, Taiwan

*Sep 2013 - Aug 2014*

## TECHNICAL SKILLS

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**Languages:** Python, C/C++, Matlab, SQL

**Developer Tools:** Git, Github, VS Code, Docker, Kubernetes, Slurm

## RELEVANT COURSEWORK

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- Information Theory
- Stochastic Modeling of Scientific Data
- Cognitive and Integrative Neurobiology
- Biophysics of Nerve, Muscle, and Synapse
- Quantitative Methods in Neuroscience
- Computational Cognitive Neuroscience
- Neuroanatomy
- Mind and Brain