WILLIAM MAYNER

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RESEARCH INTERESTS

Neural correlates of consciousness; perception; computational neuroscience; integrated information theory; philosophy of mind; causation and causal analysis; complex systems; neural networks; artificial intelligence

EDUCATION

University of Wisconsin–Madison   2016–present
PhD student, Neuroscience Training Program   *Madison, WI*
Advisor: Giulio Tononi, MD, PhD

Brown University   2009–2013
Sc.B. Mathematics–Computer Science   *Providence, RI*

PUBLICATIONS

- **Mayner, W. G. P.**, Marshall, W., Albantakis, L., Findlay, G., Marchman, R. & Tononi, G. PyPhi: A toolbox for integrated information theory. *PLoS Computational Biology* **14,** e1006343 (July 2018).

- **Mayner, W. G. P.**, Billeh, Y., Marshall, W., Arkhipov, A., Tononi, G. & Koch, C. Differentiation of neurophysiological responses to naturalistic stimuli in mouse visual cortex. *In preparation.*

- Findlay, G., Marshall, W., Albantakis, L., **Mayner, W. G. P.** & Tononi, G. Can computers be conscious? Dissociating functional and phenomenal equivalence. *In preparation.*

SOFTWARE

- **PyPhi**: A toolbox for integrated information theory (IIT). Primary tool for theoreticians working on IIT.

- **vPhi**: An online visual interface to PyPhi.

- **PyAnimats**: Python software for evolving virtual organisms and investigating their dynamics and integrated-information-theoretic properties.

- **PyEMD**: A Python wrapper around a C++ library to compute the Earth Mover's Distance.

- **integratedinformationtheory.org**: A website for learning about integrated information theory.

- **centerforsleepandconsciousness.med.wisc.edu**: The web presence of the Center for Sleep and Consciousness.

RESEARCH EXPERIENCE

Center for Sleep and Consciousness   2014–2016
Research assistant and programmer · *Advisor:* Giulio Tononi, MD, PhD   *University of Wisconsin–Madison*

- Designed and implemented software to calculate integrated information and other quantities and structures of interest in integrated information theory.
- Developed web-based visualization tools for exploring integrated-information-theoretic properties of networks.
- Implemented genetic algorithms for evolving virtual organisms.
- Developed mathematical formalisms for measuring the correspondence between environmental and internal causal structure in evolved virtual organisms.

Summer Program in Computational Mathematics   May – June 2012
Undergraduate researcher · *Advisor:* Greg Fasshauer, PhD   *Illinois Institute of Technology*

- Studied a novel 2-parameter family of kernel functions for data interpolation.
- Performed numerical experiments in Matlab.
- Conducted theoretical investigations of closed forms for Green's functions.
- Funded by NSF grant DMS-1115392.

PRESENTATIONS

June 26–29 2018	Poster ("*PyPhi: A toolbox for integrated information theory*") at the 22nd meeting of the Association for the Scientific Study of Consciousness. *Jagiellonian University, Kraków, Poland.*
June 6–11 2016	Talk ("*Matching: Using integrated information theory to measure correspondence between internal and external causal structure in animats*") at the "PHIfest: A Symposium on Integrated Information Theory". *University of Wisconsin–Madison, Madison, WI.*
March 9 2013	Poster ("*A 2-Parameter Family of Kernels for Data Interpolation*") at the Brown University Symposium for Undergraduates in the Mathematical Sciences. *Brown University, Providence, RI.*
January 9–12 2013	Poster ("*A 2-Parameter Family of Kernels for Data Interpolation*") at the Joint Mathematics Meetings. *San Diego, CA.*
July 27–29 2012	Poster ("*A 2-Parameter Family of Kernels for Data Interpolation*") at the Young Mathematicians Conference. *The Ohio State University, Columbus, OH.*

TECHNICAL STRENGTHS

Languages	Python (expert), R (proficient), Matlab (proficient), C++ (basic), shell (proficient), Javascript (proficient), HTML & CSS (expert)
Skills	Software engineering, distributed computing, Unix/Linux system administration, full-stack web development
Libraries	`numpy, scipy, NEST, scikit-learn, condor, dask, docker`
Tools	git (expert), Vim (expert), LaTeX (proficient)