Ryan Thomas Philips

CONTACT INFORMATION	Section on Neurobiology of Fear & Anxiety, National Institute of Mental Health NIH 15K North Drive, Room 200 Bethesda, MD 20892-2670	*Personal:* (972) 215-9827 *E-mail:* ryan.philips@nih.gov *WWW:* https://www.nimh.nih.gov/research/research -conducted-at-nimh/research-areas/clinics-and- labs/snfa/staff-directory.shtml

RESEARCH INTERESTS

Neural models, reinforcement learning, self organizing maps, neuro-astrocyte-vessel coupling, neuroplasticity, emotions and motivations, mood disorders

EDUCATION

Indian Institute of Technology Madras (IITM), Chennai, Tamil Nadu india

Ph.D. Computational Neuroscience, February 2017

- Dissertation Topic: "Investigating the development and interdependence of orientation and retinotopic maps in the primary visual cortex (V1), using self organizing models."
- Advisor: Prof. V. Srinivasa Chakravarthy
- Major Courses: Principles of Neuroscience, Computational Neuroscience, Machine Learning, Computer Vision, Pattern Recognition, Dynamical Systems, Biomedical Signals and Systems.

Vidyalankar Institute of Technology, University of Mumbai, India

B.E., Biomedical Engineering, June 2010

HONORS AND AWARDS

Half Time Teaching/Research Assistantship (HTRA), Ministry of Human Resource Development (MHRD), Government of India. (2011-2017)

Travel award for the Big Data Neuroscience Workshop: Organized by the Advanced Computational Neuroscience Network (ACNN) (2017)

Secured 3rd place in a MATLAB organized event SimChamp (2013)

Travel award for the Indo-German Workshop on Neurobionics, Jawaharlal Institute of Post-Graduate Medical Education and Research (2013)

Finished in the Top 20 in a Kaggle hosted gesture recognition contest: CHALEARN Gesture Challenge 2 (2012).

Travel award for the Brain and Cognition Workshop, Indian Institute of Science, Bengaluru (2011)

All India Rank : 535, in the Graduate Aptitude Test in Engineering (GATE) (2010)

ACADEMIC EXPERIENCE

National Institute of Mental Health, Bethesda, MD, USA

Postdoctoral Research Associate   **Sep, 2018 - Present**

- Mentors: Dr. Christian Grillon, Dr. Monique Ernst

University of Texas at Dallas, Dallas, TX, USA

Postdoctoral Research Associate   **April, 2017 - Aug 2018**

- Mentor: Prof Xiaosi Gu

Indian Institute of Technology Madras, Chennai, Tamil Nadu, India

Teaching Assistant   **2011-2017**
Shared responsibility for lectures, exams, homework assignments, and grades.

- Computational Neuroscience
- Principles of Neuroscience
- Analysis and Interpretation of Biological Data

PUBLICATIONS

Ernst, Monique, Joshua L. Gowin, Claudie Gaillard, Ryan T. Philips, and Christian Grillon. "Sketching the Power of Machine Learning to Decrypt a Neural Systems Model of Behavior." Brain sciences 9, no. 3 (2019): 67.

Philips, Ryan T., Mriganka Sur, and V. Srinivasa Chakravarthy. "The influence of astrocytes on the width of orientation hypercolumns in visual cortex: A computational perspective." PLoS computational biology 13.10 (2017): e1005785.

Philips, Ryan T., and V. Srinivasa Chakravarthy. "A global orientation map in the primary visual cortex (V1): Could a self organizing model reveal its hidden bias?." Frontiers in neural circuits 10 (2017): 109.

Philips, Ryan T., Karishma Chhabria, and V. Srinivasa Chakravarthy. "Vascular Dynamics Aid a Coupled Neurovascular Network Learn Sparse Independent Features: A Computational Model." Frontiers in neural circuits 10 (2016): 7.

Philips, Ryan T., and V. Srinivasa Chakravarthy. "The mapping of eccentricity and meridional angle onto orthogonal axes in the primary visual cortex: An activity-dependent developmental model." Frontiers in computational neuroscience 9 (2015): 3.

PAPERS IN PREPARATION

Philips, Ryan T., Shikha Prashad, Francesca Filbey, and Xiaosi Gu. "Bayesian craving prediction errors encoded in the brain: model-based fMRI evidence."

CONFERENCE PRESENTATIONS

The role of accessible and inaccessible rewards in eliciting emotional states such as happiness and anger. [Submitted] (Society for Neuroscience (SFN), San Diego, 2018)

The potential contribution of astrocytes in the development of orientation maps in the primary visual cortex (V1) (Asia Pacific Conference on Vision, Perth, 2016)

A computational model of astrocyte induced modulation of synaptic plasticity and normalization (Society for Neuroscience (SFN), San Diego, 2016)

A simple model of astrocytic modulation of synaptic plasticity (International Conference on Cognition, Brain and Computation, Gandhinagar, 2015)

Could the prior development of the retinotopic map account for the radial bias in the orientation map in V1? (CNS, Prague, 2015)

An auto-encoder network realizes sparse features under the influence of desynchronized vascular dynamics (CNS, Prague, 2015)

An activity-dependent computational model of development of the retinotopic map along the dorsoventral axis in the primary visual cortex (CNS, Quebec, 2014)

RESEARCH EXPERIENCE

- Investigating the role of accessible and inaccessible goals in eliciting emotional states using an interactive game and reinforcement learning model. (April 2017-)
- Using a model based fMRI framework to investigate craving prediction errors in substance users. (April 2017-)

- Investigating the role of astrocytes in modulating synaptic plasticity and its consequence on cortical maps. [This work was done in collaboration with Prof. Mriganka Sur, Massachusetts Institute of Technology](May 2015 - Jan 2017)
- Developed a model that simulates the development of the radial bias using a self organizing mechanism. (May 2014 - January 2016)
- Developed a model that speculates the plausible role of vascular dynamics in aiding a coupled neuronal network learn sparse features. [This work was done in collaboration with Ms. Karishma Chhabria, Indian Institute of Technology Madras] (January 2014 - May 2015)
- Developed a self organizing model that simulates the development of a retinotopic map, that maps eccentricity and meridional angle onto orthogonal axes. (January 2012 - January 2014)
- Designed and conducted an eye tracking experiment in order to investigate the presence of a systemic bias involved in producing saccades to mimic the orientation of a line shown earlier to the subject.[This work was done in collaboration with Mr. Anuj Garg and Prof. Bapi Raju of Hyderabad Central University.] (January 2012 - May 2012)
- Designed and conducted an EEG experiment to investigate whether the phase of the theta rhythm could be used to discriminate the orientation of a grating shown to the subject. [This work was done in collaboration with Mr. Rajesh Patel and Dr. Janwadkar of IGCAR,Kalpakkam.] (May 2012 - May 2013)

PROFESSIONAL SERVICES

Review Editor for Frontiers in Computational Neuroscience

RESEARCH SKILLS
- Coding Languages: MATLAB, Javascript, JAVA, Python, C++
- Applications: Amazon Mechanical Turk, Statistical Parametric Mapping (SPM), EEGLAB, Topographica, Psychtoolbox LaTeX
- fMRI: Recruiting and screening subjects, interfacing with psychtoolbox and conducting the experiment, analysis and modeling of data using SPM, using parametric modulators derived from modeling behavioral data, ROI analysis.
- Algorithms: Reinforcement Learning, Neural Networks, Self organizing maps (SOM), Neural modeling, Bayesian modeling