INSTITUTE FOR LEARNING & BRAIN SCIENCES

UNIVERSITY of WASHINGTON

Postdoc Position in the Yeatman Lab – Neurobiology of Reading and Dyslexia
University of Washington, Institute for Learning & Brain Sciences

The Yeatman Lab has an opening for a postdoc with exceptional computational skills and an interest in the neurobiological underpinnings of learning to read. The lab combines diffusion MRI, functional MRI, MEG and behavioral measurements to model how changes in brain structure relate to changes in cortical computation and behavior. Much of the current work in the lab uses intensive educational intervention programs as a means to study plasticity and learning. Our goal is to understand how education shapes brain development and explore the utility of neuroimaging as a tool to predict learning differences (e.g., in children with dyslexia). The lab is a highly collaborative environment that tackles scientific questions with relevance for education. More information on the Brain Development & Education Lab can be found on our website: http://BrainAndEducation.com

This postdoc position would focus on one of three potential projects:

1) **Plasticity in the reading circuitry.** Much of our recent work has used intensive reading intervention programs to understand how education shapes brain development. This work is highly interdisciplinary and collaborative, as we are designing, organizing and delivering tightly controlled educational interventions, while collecting longitudinal MRI, MEG and behavioral data. We have multiple intervention studies in preparation, all of which focus on reading, but span different age ranges (including pre-reading 5-year-olds and school-aged children with dyslexia) and employ a variety of neuroimaging (MEG and MRI) and behavioral measures (psychophysics and normative assessments). This project would involve working with a team to design experiments probing the neurobiological underpinnings of learning and develop predictive models to characterize differences in learning outcomes. Related work: Huber et al., 2018. Rapid and widespread white matter plasticity during an intensive reading intervention. *Nature Communications*. ***Link***
2) **A Big Data approach to understanding the neurobiological underpinnings of reading disabilities.** With the emergence of public datasets containing tens of thousands of subjects (e.g., ABCD, Healthy Brain Network, Human Connectome Project, etc.) there are new opportunities to apply computational approaches to understanding the multivariate relationship between white matter development and reading skills. Beyond identifying correlations between a single behavioral measure and diffusion properties in a single white matter tract, we would like to progress towards a model characterizing how the interrelated developmental trajectories of the brain's many white matter connections relate to different components of academic development (e.g., reading, math, executive function). This project would involve working with large, publicly available datasets, and developing/applying new statistical approaches to relate measures of brain anatomy to cognitive skills. Related work: Yeatman et al., 2018. A browser-based tool for visualization and analysis of diffusion MRI data. *Nature Communications.* ***Link***
3) **The neural computations of skilled reading.** The visual word form area is a region of high-level visual cortex that selectively responds to written words and develops as children gain proficiency with reading. It is also at the heart of neurobiological differences found in children with dyslexia. We are working towards developing a computational model characterizing the VWFA as a function of bottom-up, stimulus-driven computations and interactions with the other interconnected regions of the reading circuitry. This project would involve conducting fMRI and diffusion MRI experiments aimed to elucidate the computations performed by the VWFA, its connectivity with other regions of the reading circuitry, and how it differs in children with dyslexia. Related work: Kay & Yeatman, 2017. Bottom-up and top-down computations in word- and face-selective cortex. *Elife*. ***Link***

Applicants should: (1) have strong computational skills and proficiency programming in MATLAB or Python; (2) experience conducting psychophysics, fMRI, diffusion MRI, or MEG experiments/analysis, (3) working in a fast-paced collaborative environment, (4) strong writing and communication skills.

Start date: January – December 2019.

To apply, please send:
1) A curriculum vitae
2) Contact information for three references
3) A two-paragraph letter (less than 1 page) describing: (1) a finding from you PhD (or previous postdoc) research that you are excited about and (2) a project you would like to tackle in the lab.

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