

# Tom Earnest

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## EDUCATION

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*Doctor of Philosophy, Computational and Data Sciences* 2025 (expected)  
Division of Computational and Data Sciences  
Washington University in St Louis

*Master of Science, Psychiatric Research* 2017  
Institute of Psychiatry, Psychology, and Neuroscience  
King's College London

*Bachelor of Arts, Biology with Concentration in Neuroscience* 2016  
Grinnell College

## RESEARCH EXPERIENCE

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**Doctoral Research** 2020-current

Washington University in St. Louis

Advised by [Aristeidis Sotiras, Ph.D.](#)

- Used data-driven methods (especially non-negative matrix factorization) to define and evaluate a staging system for brain pathology in Alzheimer's Disease
- Applied supervised machine learning with nested cross-validation for prediction of cognitive decline in Alzheimer's Disease
- Managed storage and organization of three multimodal neuroimaging datasets in a high-performance computing cluster
- Developed code for preprocessing, analysis, and visualization of neuroimaging data from >1,000 subjects

**Research Technician II** 2019-2020

Washington University in St. Louis

Supervised by [Alexxai Kravitz, Ph.D.](#), and [Meaghan Creed, Ph.D.](#)

- Created two graphical user interfaces in Python for analysis and visualization of data from open-source rodent experimentation devices
- Developed code for visualization of rodent electrophysiological data
- Collected behavioral and neuroanatomical data to study reward and motivation circuits in rodents

## Postbac Program

2017-2019

National Institute of Dental and Craniofacial Research

Supervised by Hans Jürgen Solinski, Ph.D., and [Mark Hoon, Ph.D.](#)

- Learned programming to automate research tasks, such as experimental blinding and cell counting
- Ran behavioral experiments to study the neurobiology of sensorimotor circuits in mice
- Bred and genotyped transgenic mice
- Used confocal imaging to characterize neuronal populations involved in pain and itch

## Master's Research

2016-2017

Institute of Psychiatry, Psychology, and Neuroscience; King's College London

Supervised by Elizabeth Shephard, Ph.D., and Patrick Bolton, Ph.D.

- Primary researcher on a project using movement trackers to assess hyperactivity in a population of children and adolescents with tuberous sclerosis complex
- Traveled within England to administer psychometric assessments to individuals with varying levels of cognitive and behavioral impairment (~30 visits)
- Developed statistical analyses of motion tracking data to predict cognitive constructs

## Mentored Advanced Project

2015-2016

Grinnell College

Supervised by Nancy Rempel-Clower, Ph.D.

- Co-planned and ran a project studying the effects of stress on behavior and neurobiology in adolescent rodents
- Applied tests to study anxiety-like behavior in rats
- Conducted brain dissections to measure neuroanatomical changes correlated with behavioral differences

## PUBLICATIONS

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*Leading asterisk signifies preprint or submitted work.*

Bani, A., Ha, S. M., Xiao, P., **Earnest, T.**, Lee, J., & Sotiras, A. (2023). Scalable Orthonormal Projective NMF via Diversified Stochastic Optimization. In A. Frangi, M. de Bruijne, D. Wassermann, & N. Navab (Eds.), *Information Processing in Medical Imaging* (pp. 497–508). Springer Nature Switzerland. [https://doi.org/10.1007/978-3-031-34048-2\\_38](https://doi.org/10.1007/978-3-031-34048-2_38)

De Araujo Salgado, I., Li, C., Burnett, C. J., Rodriguez Gonzalez, S., Becker, J. J., Horvath, A., **Earnest, T.**, Kravitz, A. V., & Krashes, M. J. (2023). Toggling between food-seeking and self-preservation behaviors via hypothalamic response networks. *Neuron*, 111(18), 2899-2917.e6. <https://doi.org/10.1016/j.neuron.2023.06.006>

\* **Earnest, T.**, Bani, A., Ha, S. M., Hobbs, D. A., Kothapalli, D., Yang, B., Benzinger, T. L. S., Gordon, B. A., & Sotiras, A. (submitted). Data-driven decomposition and staging of flortaucipir uptake in Alzheimer's Disease. *Alzheimer's & Dementia*.

**Earnest, T.**, Shephard, E., Tye, C., McEwen, F., Woodhouse, E., Liang, H., Sheerin, F., & Bolton, P. F. (2020). Actigraph-Measured Movement Correlates of Attention-Deficit/Hyperactivity Disorder (ADHD) Symptoms in Young People with Tuberous Sclerosis Complex (TSC) with and without

Intellectual Disability and Autism Spectrum Disorder (ASD). *Brain Sciences*, 10(8), Article 8. <https://doi.org/10.3390/brainsci10080491>

\* Kumar, S., **Earnest, T.**, Payne, P. R. O., Sotiras, A., & Initiative, the A. D. N. (2023). *Analyse patient-level heterogeneity in Alzheimer's Disease using multimodal normative modelling* (p. 2023.08.15.553412). bioRxiv. <https://doi.org/10.1101/2023.08.15.553412>

Matikainen-Ankney, B. A., **Earnest, T.**, Ali, M., Casey, E., Wang, J. G., Sutton, A. K., Legaria, A. A., Barclay, K. M., Murdaugh, L. B., Norris, M. R., Chang, Y.-H., Nguyen, K. P., Lin, E., Reichenbach, A., Clarke, R. E., Stark, R., Conway, S. M., Carvalho, F., Al-Hasani, R., ... Kravitz, A. V. (2021). An open-source device for measuring food intake and operant behavior in rodent home-cages. *eLife*, 10, e66173. <https://doi.org/10.7554/eLife.66173>

Shephard, E., McEwen, F. S., **Earnest, T.**, Friedrich, N., Mörtl, I., Liang, H., Woodhouse, E., Tye, C., & Bolton, P. F. (2022). Oscillatory neural network alterations in young people with tuberous sclerosis complex and associations with co-occurring symptoms of autism spectrum disorder and attention-deficit/hyperactivity disorder. *Cortex*, 146, 50–65. <https://doi.org/10.1016/j.cortex.2021.10.007>

Slivicki, R. A., **Earnest, T.**, Chang, Y.-H., Pareta, R., Casey, E., Li, J.-N., Tooley, J., Abiraman, K., Vachez, Y. M., Wolf, D. K., Sackey, J. T., Kumar Pitchai, D., Moore, T., Gereau IV, R. W., Copits, B. A., Kravitz, A. V., & Creed, M. C. (2023). Oral oxycodone self-administration leads to features of opioid misuse in male and female mice. *Addiction Biology*, 28(1), e13253. <https://doi.org/10.1111/adb.13253>

Solinski, H. J., Dranchak, P., Oliphant, E., Gu, X., **Earnest, T. W.**, Braisted, J., Inglese, J., & Hoon, M. A. (2019). Inhibition of natriuretic peptide receptor 1 reduces itch in mice. *Science Translational Medicine*, 11(500), eaav5464. <https://doi.org/10.1126/scitranslmed.aav5464>

Solinski, H. J., Kriegbaum, M. C., Tseng, P.-Y., **Earnest, T. W.**, Gu, X., Barik, A., Chesler, A. T., & Hoon, M. A. (2019). Nppb Neurons Are Sensors of Mast Cell-Induced Itch. *Cell Reports*, 26(13), 3561–3573.e4. <https://doi.org/10.1016/j.celrep.2019.02.089>

Vachez, Y. M., Tooley, J. R., Abiraman, K., Matikainen-Ankney, B., Casey, E., **Earnest, T.**, Ramos, L. M., Silberberg, H., Godynuk, E., Uddin, O., Marconi, L., Le Pichon, C. E., & Creed, M. C. (2021). Ventral arkypallidal neurons inhibit accumbal firing to promote reward consumption. *Nature Neuroscience*, 24(3), Article 3. <https://doi.org/10.1038/s41593-020-00772-7>

## PRESENTATIONS

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**Earnest, T.**, Bani, A., Ha, S. M., Kothapalli, D., Yang, B., Lee, J., Sotiras, A. (2023, July). *Detecting flortaucipir signatures of Alzheimer's Disease with non-negative matrix factorization*. Poster at Organization for Human Brain Mapping 2023. Montreal, Canada.

**Earnest, T. W.**, Solinski, H. J., Kriegbaum, M. C., Tseng, P. Y., Gu, X., Barik, A., ... Hoon, M. A. (2019, May). *Nppb-neurons are sensors of mast cell-induced itch*. Poster at NIH Postbac Poster Day. Bethesda, MD.

**Earnest, T. W.,** Solinski, H. J., Kriegbaum, M. C., Tseng, P. Y., Gu, X., Barik, A., ... Hoon, M. A. (2019, April). *Nppb-neurons are sensors of mast cell-induced itch*. Poster at the NIDCR Fellows Retreat. Washington, DC.

**Earnest, T.** (2017, July). *Using actigraphy to measure ADHD symptoms in tuberous sclerosis complex*. Poster at the IoPPN Psychiatric Research MSc year end session. London, UK.

**Earnest, T.** (2016, February). *Behavioral and morphological effects of stress in adolescent rats*. Talk in the Biology Student Seminar Series at Grinnell College. Grinnell, IA.

**Earnest, T.,** Yetter, M. (2015, November). *Behavioral and morphological effects of stress in adolescent rats*. Talk in the Psychology Student Seminar Series at Grinnell College. Grinnell, IA.

Yetter, M., **Earnest, T.,** Rempel-Clower, N. (2015, October). *Acute corticosterone treatment increases anxiety and dendritic elongation and arborization in the orbitofrontal cortex in mid-adolescent but not early-adolescent rats*. Poster at the Faculty for Undergraduate Neuroscience at the Society for Neuroscience Annual Meeting. Chicago, IL.

**Earnest, T.** (2015, September). *Acute stress increases anxiety behaviors in mid-adolescent rats and may cause dendritic elongation & arborization in the orbitofrontal cortex*. Poster at Iowa State Neuroscience Research Day. Ames, IA.

## AWARDS

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- Outstanding Poster Award at NIH Postbac Poster Day (2019)
- NIH Postbaccalaureate Intramural Research Training Award (2017)
- Dean's Medal (2017): Best overall performance in all postgraduate taught programs in the Institute of Psychology, Psychiatry, and Neuroscience
- Sir Robin Murray Prize (2017): Best overall performance in the Psychiatric Research MSc
- Honorable Mention for poster presented at the Iowa State Neuroscience Research Day (2015)
- Dean's List for all semesters at Grinnell College (2012-2016)
- Trustee Honor Scholarship at Grinnell College (2012-2016)

## TECHNICAL SKILLS

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- Programming
  - Proficient: Python, R
  - Experienced: Bash
  - Familiar: MATLAB
- Software
  - Git/GitHub
  - SLURM
  - Graphpad Prism
  - SPSS
  - Microsoft Office