

Patrick Beukema

Education

- 2013 – 2018 **Ph.D.**, *Neuroscience*, University of Pittsburgh.
Thesis: Algorithms supporting skill consolidation
- 2009 – 2011 **M.S.**, *Logic*, Carnegie Mellon University.
Thesis: Causal inference with a recurrent neural network
- 2006 – 2009 **B.A.**, McGill University.

Experience

- 2013 – 2017 **Predoctoral fellow**, *University of Pittsburgh & Carnegie Mellon*.
Sample projects:
- "Amyloid Beta Peptides Block New Synapse Assembly..."
 - Wrote Ca^{2+} signal detection software to enable automatic imaging analysis.
 - "Parcellating the internal and external globus pallidus using diffusion based clustering"
 - Developed high-resolution visualization of pathway critical to Parkinson's disease.
 - "Stable cortical representations of individual effectors"
 - Dissociated uni-variate and multi-variate brain responses for decoding plasticity.
 - Center for the Neural Basis of Cognition student representative
 - Led machine learning seminar for neuroscientists at CMU and U. Pitt
- 2017 – **Data Science consultant**, *Penda Health*.
Provide statistics consulting for longitudinal data analysis of healthcare delivery systems for Kenyan healthcare startup.
- Summer 2016 **Neuroscience consultant**, *Pittsburgh Pirates*.
Designed [this experiment](#) to evaluate dynamic speed vision.
- Summer 2015 **Project manager**, *4th River Solutions*.
Managed team of three Ph.D. student consultants to conduct cost analysis on a novel drug delivery mechanism to improve women's reproductive health in Sub-Saharan Africa.
- 2012 – 2013 **Research assistant**, *Carnegie Mellon University*.
Wrote signal detection software to quantify immunoreactivity in large sections of neural tissue, increasing throughput by many factors.

Projects

- NeuroHack** Team leader, machine learning meets neuroscience hackathon at CMU
- LabHacks** Open source software and other educational resources for neuroscientists
- DeadSalmon** Talk on neuroscience's low statistical power and what to do about it
- SayAlphaAgain** Replication of [Ioannidis](#) simulations with $\alpha = 0.005$ instead of $\alpha = 0.05$
- VRBrainJam** Codesigned winning virtual reality neuro research with GameTheory
- LabTv** Science outreach to get highschoolers excited about biomedical research

Technical Skills

Languages Python, Bash, R, Java

Expertise Multimodal neural data analysis using statistical and machine learning methods

Publications

- 2018 **Sequence learning networks are segregated**, P. Beukema, T. Verstynen, (in prep).
- 2018 **Binding during sequence learning does not alter cortical representations of individual actions**, P. Beukema, J. Diedrichsen, T. Verstynen, [bioRxiv](#).
- 2018 **TrpM8-mediated somatosensation in mouse neocortex**, P. Beukema, K. Cecil, E. Peterson, V. Mann, M. Matsushita, Y. Takashima, S. Navlakha, and A. Barth, J. Comp. Neurology [pdf](#).
- 2018 **Predicting and binding: algorithms supporting the consolidation of sequential motor skills**, P. Beukema, T. Verstynen, Co, 20:98–103 [pdf](#).
- 2017 **Differentiating visual from response sequencing during long-term skill learning**, B. Lynch, P. Beukema, T. Verstynen, J. Cog Neuro, 2017 29:1, 125-136 [pdf](#).
- 2017 **Amyloid Beta Peptides Block New Synapse Assembly by Nogo Receptor Mediated Inhibition of T-Type Calcium Channels**, Y. Zhao, S. Sivaji, M.C. Chiang, H. Ali, M. Zukowski, S. Ali, B. Kennedy, A. Sklyar, A. Cheng, Z. Guo, A. K. Reed, R. Kodali, J. Borowski, G. Frost, P. Beukema, Z. P. Wills, Neuron 96(2) [pdf](#).
- 2015 **In vivo characterization of the connectivity and subcomponents of the human globus pallidus**, P. Beukema, T. Verstynen, NeuroImage, 120(15), 382–393 [pdf](#).
- 2011 **Multiple links between species diversity and temporal stability in bird communities across North America**, G. M. Mikkelsen, B. J. McGill, S. Beaulieu, P. Beukema, Evolutionary Ecology Research, 2011, 13: 361–372 [pdf](#).

Conference Presentations

- 2018 **Sequence learning networks are segregated**, *Janelia*, Ashburn, VA .
- 2018 **Dissociable cortical networks encode cue and movement sequences**, *Cosyne*, Denver, CO [pdf](#).
- 2017 **Decoding single finger movements versus movement sequences**, *University of Pittsburgh Brain Institute*, Pittsburgh, PA [pdf](#).
- 2017 **Dissociable local and global plasticity resulting from motor sequence learning**, *Center for Neuroscience Retreat*, West Virginia [pdf](#).
- 2016 **Reorganization of cortical motor representations after long term sequential skill learning**, *Organization for Human Brain Mapping*, Geneva, Switzerland [pdf](#).
- 2016 **Long-term sequence training alters movement representations in primary motor cortex**, *Society for Neuroscience*, San Diego, [pdf](#).

- 2015 **Long-term skill learning is associated with a reorganization of cortical motor representations**, *MR Community Imaging Retreat*, Pittsburgh [pdf](#).
- 2014 **Parcellating the internal and external globus pallidus using diffusion based clustering**, *Society for Neuroscience*, Washington, D.C. [pdf](#).
- 2013 **Menthol stimulation induces c-fos expression in s2 and granular insular cortex**, *Society for Neuroscience*, San Diego, [pdf](#).

Honors

- MNTP Multimodal neuroimaging training program, full tuition & stipend
- NIH National Institute of Health training grant, full tuition & stipend
- CMU Carnegie Scholar, awarded half-tuition
- Lewis & Clark Trustee Scholar, awarded half-tuition