Nicholas M. Blauch, B.S.

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I am a Ph.D. student interested in understanding how primate brains support diverse computations for perception and cognition. My research examines neural systems for object, scene, and face recognition, utilizing visual psychophysics, neuroimaging, machine learning, and deep neural network modeling.

Education

2018 -	**Ph.D. Student in Neural Computation** Advisors: Marlene Behrmann, David Plaut Center for the Neural Basis of Cognition and Neuroscience Institute Carnegie Mellon University
2013 - 2017	**B.S. in Individual Concentration: Cognitive Computational Neuroscience** Minor in Physics Commonwealth Honors College University of Massachusetts, Amherst

Research Positions

2018 -	**Graduate Researcher** Visual Cognition Group Carnegie Mellon University
2017 - 2018	**Lab Manager** Computational Memory and Perception (Cowell) Laboratory University of Massachusetts, Amherst
2015 - 2017	**Undergraduate Researcher** Cognitive Experiments, Models, and Neuroscience (Huber) Laboratory University of Massachusetts, Amherst
Summer 2016	**Research Fellow, Program in Neural Computation** TarrLab Center for the Neural Basis of Cognition, Carnegie Mellon University
Summer 2015	**Research Fellow, Summer Undergraduate Research Program** Pelli Lab Center for Neural Science, New York University

Publications

Articles in Preparation

- Blauch, N., Behrmann M., Plaut, D.C. Computational insights into human expertise for unfamiliar and familiar face recognition.
- Blauch, N., Cowell, R.A. Task demands modulate decodable information for faces in multiple human cortical areas.
- Blauch, N., Aminoff E., Tarr, M.J. Does the hierarchy of primate face-selective areas constitute a cortical module?
- Blauch, N., De Avila Belbute Peres, F., Faroqui, J., Chaman Zar, A., Plaut, D., Behrmann, M. Assessing the similarity of cortical object and scene perception with cross-validated voxel-encoding models.

Peer-Reviewed Conference Proceedings

- Blauch, N., Aminoff, E., Tarr, M.J. (2017). Functionally Localized Representations Contain Distributed Information: Insight from Simulations of Deep Convolutional Neural Networks. *Proceedings of the 39th Annual Meeting of the Cognitive Science Society.*

Commentaries/News & Views

- Blauch, N., Behrmann, M. (2019). Representing Faces in 3D. *Nature Human Behavior.*

Conference Talks
- Blauch, N., Aminoff, E., Tarr, M.J. (2017). Functionally Localized Representations Contain Distributed Information: Insight from Simulations of Deep Convolutional Neural Networks. *Proceedings of the 39th Annual Meeting of the Cognitive Science Society.* London, U.K.
- Blauch, N. (2017). On Modularity in Mind and Brain. *Massachusetts Undergraduate Research Conference.* Amherst, MA.

Conference Poster Presentations
- Blauch, N., Behrmann M., Plaut, D.C. (2019). Visual Expertise and the Familiar Face Advantage. *Third Annual Cognitive Computational Neuroscience Conference, 2019.* Berlin, Germany.
- Blauch, N., De Avila Belbute Peres, F., Faroqui, J., Chaman Zar, A., Plaut, D., Behrmann, M. (2019). Assessing the Similarity of Cortical Object and Scene Perception with Cross-Validated Voxel-Encoding Models. *Vision Sciences Society Annual Meeting.* St. Pete Beach, FL.
- Blauch, N., Cowell, R.A. (2018). Task Demands and Stimulus Normalization in Face Perception: an fMRI Study. *Second Annual Cognitive Computational Neuroscience Conference, 2018.* Philadelphia, PA.
- Blauch, N., Aminoff, E., Tarr, M.J. (2017). Understanding Cortical Face Selectivity. *First Annual Cognitive Computational Neuroscience Conference, 2017.* New York, NY.
- Blauch, N., Aminoff, E., Tarr, M.J. (2017). Functionally Localized Representations Contain Distributed Information: Insight from Simulations of Deep Convolutional Neural Networks. *Western Massachusetts Society for Neuroscience Conference.* Amherst, MA.

Awards and Honors
- Carnegie Mellon Neuroscience Institute Presidential Fellowship, 2019
- Cum Laude and Multidisciplinary Honors with Great Distinction, Commonwealth Honors College, University of Massachusetts Amherst.
- Excellence in Presentation, 2017 Chapter Meeting, Western Massachusetts Society for Neuroscience
- Dean's Scholar (2013-2017), University of Massachusetts, Amherst
- John and Abigail Adams Scholar (2013-2017)
- Dean's List (6x), University of Massachusetts, Amherst

Teaching
- Led Coding and Computation in Psychology and Neuroscience workshop at UMass Amherst
- TA for undergraduate Program in Neural Computation (uPNC), 2019
- Tutor at UMass Amherst Learning Resource Center, coursework in Math, Physics, and Computer Science

Service and Leadership
- Undergraduate Representative, Organizing Committee for the Western Massachusetts Society for Neuroscience (2016-2017).
- President (2015-2016) and Senior Advisor (2017-2018), Neuroscience Club, University of Massachusetts Amherst
- Historian (2016) and Scholarship Chair (2015), Theta Mu Chapter, Pi Kappa Phi Fraternity.

Research Techniques
- Programming languages: proficient in Python and MATLAB, experience with R and Java, and with shell-scripting primarily utilizing BASH.
- High-performance computing (HPC)
- Visual behavioral and neuroimaging experimentation with calibrated display properties. Stimulus generation in MATLAB and presentation using PsychToolbox. Generation of isoluminant color stimuli using DKL and Macleod-Boynton color spaces.
- Data analysis for fMRI with proficiency in Freesurfer, FMRIPREP, SPM, CoSMoMVPA, and NiLearn, and for MEG using MNE-Python. Approaches including multivariate searchlight decoding and representational similarity analysis,

behavioral target RDM regression, and standard univariate GLM analysis, along with temporal decoding and source space analyses for MEG.

- Interactive cortical surface visualization using PyCortex
- Machine learning approaches for classification and regression, including use of Scikit-Learn and associated Python modules.
- Deep learning approaches for computer vision (e.g. convolutional networks) and natural language processing (e.g. sequence-to-sequence networks employing RNNs, GRUs, LSTMs) using PyTorch, and simulations of these networks for applications in cognitive science and neuroscience.