Nicholas M. Blauch, B.S.

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I am a graduate student interested in understanding how the primate brain supports 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. Candidate in Neural Computation**
              Center for the Neural Basis of Cognition
              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 Research Assistant**
              Co-advised by Marlene Behrmann and David Plaut
              Behrmann Lab and Plaut Lab
              Center for the Neural Basis of Cognition
              Carnegie Mellon University

2017 - 2018   **Lab Manager**
              Advised by Rosemary A. Cowell
              Computational Memory and Perception Laboratory
              University of Massachusetts, Amherst

2015 - 2017   **Undergraduate Researcher**
              Advised by David E. Huber
              Cognitive Experiments, Models, and Neuroscience Laboratory
              University of Massachusetts, Amherst

Summer 2016   **Research Fellow, Program in Neural Computation**
              Advised by Michael J. Tarr and Elissa Aminoff
              TarrLab
              Center for the Neural Basis of Cognition
              Carnegie Mellon University

Summer 2015   **Research Fellow, Summer Undergraduate Research Program**
              Advised by Denis G. Pelli
              Pelli Lab
              Center for Neural Science
              New York University

Publications

Articles in Preparation

- Blauch, N., Cowell, R.A. (in prep). Modulation of Cortical Face Information through Differential Task Demands and Stimulus Normalization.
- Blauch, N., De Avila Belbute Peres, F., Faroqui, J., Chaman Zar, A., Plaut, D., Behrmann, M. (in prep). 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.*

Archival

- Blauch, N. (2017) Testing the Memory Retrieval Model of Grid Cells: Are Physical Space and Perceptual Color Space Efficiently Represented Using a Common Consolidation Algorithm? *Undergraduate Honors Thesis, University of Massachusettts, Amherst.* Committee chair: David E. Huber, committee member: Rosie A. Cowell.

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., 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.

- *Altholz, J., *Blauch, N., Pelli, D.G. (2015) Using Noise to Study Letter Identification: Evidence for Four Types of Spatial Interaction. *NYU Diversity Conference*. New York, NY.

* equal contribution

Awards and Honors

- Multidisciplinary Honors with Great Distinction, Commonwealth Honors College, University of Massachusetts Amherst.
- Cum Laude, 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

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 BASH, R, and Java.
- 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.
- Machine learning approaches for classification and regression, including use of Scikit-Learn and associated Python modules.
- Training and simulations of network models of visual recognition using PyTorch.