

Gabriel Fajardo

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EDUCATION

Boston College, Morrissey College of Arts and Sciences, Chestnut Hill, MA

May 2023

Bachelor of Science, *cum laude*

Major: Neuroscience | Double Minor: Computer Science and Mathematics | GPA: 3.70/4.00

RESEARCH EXPERIENCE

Columbia University | Social Cognitive and Neural Sciences Lab | *Lab Manager*

August 2023 - Present

Advisor: **Dr. Jon Freeman**, Associate Professor, Department of Psychology

- Explore the neural basis of categorical vs. individuated processing via behavioral paradigms, functional magnetic resonance imaging (fMRI) data, and multivariate pattern analysis (MVPA)
- Use MVPA classification to investigate the relationship between conceptual representations of personality traits and facial stereotypes
- Challenge classical and recent models of face perception by utilizing a diverse set of stimuli, computational modeling, and representational similarity analysis to convey a data-driven and high-dimensional trait space
- Mentor research assistants through the completion of their Honors Thesis projects
- Improve the lab infrastructure by creating an fMRI analysis pipeline, streamlining online study creation, and managing day-to-day lab logistics

Columbia University | Business School | *Summer Intern*

May 2023 - July 2023

How hidden and shared identities impact the formation of professional network ties

Advisor: **Dr. Paul Ingram**, Kravis Professor of Business, Management Division

- Analyzed Identity Maps, network representations of personal identities that convey a comprehensive view of one's identities, to explore questions related to identity concealment, tie formation, and shared identities
- Utilized computer vision models to convert subject identity maps into an analyzable format; employed NLP word embeddings to analyze the stigma and social class associations of identity items
- Investigated hidden identities and identified factors that increased the probability of an identity being hidden

Harvard University | Vision Lab | *Research Assistant*

June 2022 - August 2022

Artificial vision model features most predictive of neural data: an analysis of the veRSA weight space

Advisor: **Dr. George Alvarez**, Associate Professor, Department of Psychology

- Investigated the weight space of voxel-wise encoding representational similarity analysis (veRSA) and defined metrics for identifying model features that significantly predicted neural fMRI responses
- Analyzed the geometric representations and accuracies of computer vision models with varying degrees of dropout, and compared model activations to neural activations
- Ideated a study for using 'dropout' as a tool to systematically manipulate sparse vs. distributed coding

Boston College | Social & Cognitive Computational Neuro Lab | Research Assistant May 2021 - May 2023

Advisor: **Dr. Stefano Anzellotti**, Assistant Professor, Department of Psychology and Neuroscience

Distinct Brain Regions Combine Auditory Representations with Different Visual Streams

- Used univariate fMRI analyses to find auditory regions of interest (ROIs) in the brain, and used an anatomical probability atlas to define visual ROIs
- Conducted multivariate statistical dependence analyses based on neural networks (MVPN) to identify brain regions responsible for multi-modal integration from responses in auditory cortex, the posterior ventral stream, and the posterior lateral stream

SELECTED COURSES

Neuroscience and Psychology: Cognitive and Neural Bases of Person Knowledge, fMRI, Cognitive Neuroscience, Research Practicum in Artificial Intelligence, Current Topics in Moral Psychology, Computational Models of Cognition, Mentalizing, Social Neuroscience

Computer Science: Data Science, Biomedical Image Analysis, Computer Vision, Natural Language Processing

Mathematics/Statistics: Multivariable Calc, Linear Algebra, Probability, Statistics, Math & Machine Learning

PUBLICATIONS (In Press)

Fajardo, G., Fang, M., Anzellotti, S. (In Press). Distinct Brain Regions Combine Auditory Representations with Different Visual Streams. Paper in preparation. [[Preprint](#)]

PRESENTATIONS

Prince, J.S., **Fajardo, G.,** Alvarez, G.A., Konkle, T. (August, 2023). Dropout as a tool for understanding information distribution in human and machine visual systems [[Poster](#)] [[Submission](#)]

Fajardo, G., Alvarez, G.A., Konkle, T., Prince, J. (August, 2022). Artificial vision model features most predictive of neural data. Poster presented at the 2022 Leadership Alliance National Symposium. [[Poster](#)]

TEACHING EXPERIENCE

- Boston College Teaching Assistant in the CS course *Biomedical Image Analysis* Jan 2023 - May 2023

HONORS AND AWARDS

- Boston College Honors Program in Psychology and Neuroscience 2021 - 2023
- Dean's List 2nd Honors 2020 - 2023

COURSE PROJECTS

How Latent and Perceptual Features Jointly Shape Social Group Inference

Constructed a Bayesian computational model of cognition to analyze how perceptual features and latent trait attributions are combined to form inferences about which social group an agent belongs to.

Political Twitter Sentiment Analysis

Trained deep and statistical ML sentiment analysis classifiers, and applied them to tweets about political candidates in an attempt to predict the Senatorial election results. We found that Democrats tweeted more positively than Republicans, and that the winners of the election had more positive tweets than the losers.

Reliable Comparison Between DNN Models and the Brain

Attempted to match the subject-to-subject variability of fMRI data for artificial vision models by training models with identical architectures and different initial weights. We generated a distribution of the model's performance, and identified which of the models most accurately represented neural data.

Convolutional Neural Network Perception of Global and Local Facial Features

Trained a convolutional neural network to classify faces and then tested this network using "scrambled faces" that were perturbed in global features but unperturbed in local features. We found that classification performance dropped to chance for scrambled faces, suggesting that the model relied on global facial features.

Anatomical and Behavioral Correlates of Dementia

Used logistic regression, KNN, gaussian naive-bayes, and decision tree classification to identify subjects with dementia from anatomical fMRI and behavioral data.

RELEVANT SKILLS

Programming: Python, Java, R, HTML, CSS, JavaScript, jsPsych, WebPPL, GitHub, HPCs, PsychoPy, Bash

Data Science/Machine Learning: Pytorch, TensorFlow, SKlearn, Scipy, Pandas, Matplotlib, NetworkX

Cognitive Neuroscience: Nibabel, Nilearn, NLTools, FSL, SPM, SnPM, Connectome Workbench, fMRIPrep, PyMVPA, PyMVPD, Optseq, AFNI

Languages: English (Fluent), Spanish (Fluent), French (Intermediate Proficiency)