

# Laila C Johnston

## *Curriculum Vitae*

[lailacjohnston@gmail.com](mailto:lailacjohnston@gmail.com) | [twitter.com/lailacjohnston](https://twitter.com/lailacjohnston) | [linkedin.com/in/lailacjohnston](https://linkedin.com/in/lailacjohnston)

### Education

2018 – 2023 University of Central Florida (UCF) | Orlando, FL  
Bachelor of Science (B.S.) in Mathematics  
Minor in Computer Science, Minor in Philosophy

### Research Experience

- 2021 – present **Visiting Student**, *CoCoSci Group*, Massachusetts Institute of Technology  
Advisors: Dr. Joshua B. Tenenbaum and Dr. Tobias Gerstenberg
- Investigating how to build models that capture the compositional and probabilistic nature of concepts, and how they can form and reason with novel concepts
  - Learning and using WEBPPL to build probabilistic programs
- Summer 2021 **Research Fellow**, MSRP Bio/Neuro, Center for Brains, Minds, and Machines, *Computational Cognitive Neuroscience Lab*, Harvard University  
Advisor: Dr. Samuel J. Gershman
- Researched how to create models of human visual working memory
  - Investigated visual working memory in the domain of human faces
  - Learned SCALA to generate faces using the Basel Face Model
  - Designed a change-detection experiment, collected the data, and analyzed the results
- 2020 – 2021 **Researcher**, Carnegie Mellon University  
Advisor: Dr. David Danks
- Continued summer research on individual differences in causal learning
  - Modified existing data and results
  - Wrote and submitted a research paper to the 43<sup>rd</sup> Annual Conference of the Cognitive Science Society
  - Read paper reviews and edited paper accordingly
- Summer 2020 **Research Fellow**, Undergraduate Program in Neural Computation, *Center for the Neural Basis of Cognition*, Carnegie Mellon University  
Advisor: Dr. David Danks
- Investigated how certain causal learning models could best describe the ways individuals make causal inferences and individual differences in causal learning patterns
  - Collaborated on developing previously known causal learning models as computational models
  - Created seven novel causal learning models
  - Developed code in PYTHON to find and analyze causal learning models of best fit for a set of experimental data
- 2019 – 2020 **Undergraduate Research Assistant**, *Laboratory for Autonomy-Brain Exchange (LabX)*, University of Central Florida  
Advisor: Dr. Ben D. Sawyer
- Assisted in conducting a driving simulation experiment by ensuring informed consent from participants, explaining the procedures of the experiment, and recording data
  - Learned the foundations of coding an artificial neural network

- Explored representing and extending the O-Ring Theory of Economic Development as a computational simulation

## Publications

**Johnston, L.\***, Hillman, N.\*, Danks, D. (2021). [Individual Differences in Causal Learning](#). *Proceedings of the 43<sup>rd</sup> Annual Conference of the Cognitive Science Society*.

## Presentations

**Johnston, L.C.** (2021, September). Reasoning with Compositional Concepts. *M&N McNair Heartland Research Conference*. Oral presentation (15 minutes).

**Johnston, L.**, Bates, C.J., Egger, B., Gershman, S.J. (2021, August). Scaling Models of Visual Working Memory to Natural Images: A Case Study in Human Faces. *Center for Brains, Minds, and Machines Summer Research Poster Session*. Poster presentation.

**Johnston, L.**, Hillman, N., Danks, D. (2021, March). Individual Variation in Causal Learning. *UCF Student Scholar Symposium*. Poster presentation.

**Johnston, L.**, Hillman, N., Danks, D. (2020, August). Individual Variation in Causal Learning. *Center for the Neural Basis of Cognition Undergraduate Summer Research Showcase*. Poster presentation.

## Awards and Honors

2021	<b>Hispanic Heritage Scholarship Fund of Metro Orlando Scholar</b>
Summer 2021	<b>Massachusetts Institute of Technology Summer Research Fellow</b> (NSF Funded)
Summer 2021	<b>McNair Summer Research Institute Scholarship</b>
2020	<b>Ronald E. McNair Scholar</b>
2020	<b>Carolyn Euliano Endowed Scholarship in Mathematics</b> , University of Central Florida
Summer 2020	<b>Carnegie Mellon University Summer Research Fellow</b> (NIH Funded)
2018 – 2020	<b>Dean's List</b> (4 Semesters), University of Central Florida
2018	<b>EXCEL Scholar</b> , University of Central Florida
2018	<b>Pegasus Scholar</b> , University of Central Florida
2018	<b>Florida's Bright Futures Academic Scholar</b>
2018	<b>International Baccalaureate Diploma Recipient</b>

## Teaching and Mentorship

2021	<b>Pre-Grad Peer Advisor</b> , <i>The Office of Academic Advancement Programs</i> , University of Central Florida Supervisor: Dr. Natalia Toro <ul style="list-style-type: none"> <li>- Held individual meetings with students to discuss their academic goals, degree progress, and professional writing</li> </ul>
2020	<b>Undergraduate EXCEL Tutor</b> , University of Central Florida Supervisor: Sarah Evans <ul style="list-style-type: none"> <li>- Aided students in UCF's <i>EXCEL Program</i> in math and computer science topics</li> <li>- Guided and supported students on their current and future academic careers</li> </ul>

## Leadership

2020 – present	<b>Cognitive Sciences Club</b> , University of Central Florida Advisor: Dr. Luis Favela <b>President</b> (Dec. 2020 – present)
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- Schedule and supervise meetings, faculty and graduate student panels, and social events for the club
  - Delegate responsibilities to executive team
- Secretary** (July 2020 – Dec. 2020)
- Documented club meetings, discussions, and club attendance
  - Updated members through weekly emails about meetings, events, and opportunities for research and conferences in cognitive science

2020 – present **Artificial Intelligence Club**, University of Central Florida

**Vice President** (April 2021 – present)

- Oversee decisions, activities, event planning and scheduling of club events
- Coordinating a project collaboration with the Institute of Electrical and Electronics Engineers (IEEE) on creating a robot arm that can play chess using machine learning techniques

**Coordinator** (Feb. 2021 – April 2021)

- Co-planned meetings through discussing topic ideas and attended presentation rehearsals
- Answered questions on coursework, scheduling, and professional development opportunities

2018 – present **Member, Outlanders Club**, University of Central Florida

- Participate in outdoor activities such as hiking, camping, and kayaking
- Spread awareness of the importance of protecting the planet and spending time in nature

2019 – 2020 **Secretary, Collegiate Mathematical Society**, University of Central Florida

- Organized workshops, presentations, and events related to topics in mathematics
- Documented club meetings, discussions, and attendance
- Promoted the club by making flyers, sending emails, and tabling at expos

### Invited Talks, Workshops, and Conferences

Oct. 2021 **Attendee, Princeton Prospective Ph.D. Preview (P3) Conference**, Princeton University

- Attended workshops on the important elements of research, the graduate school application process, CV and resume writing, and professional development
- Networked with graduate students and learned about life at Princeton
- Visited the psychology, neuroscience, and computer science departments

Oct. 2021 **Undergraduate Research Student Panelist, The Undergraduate Research Committee**, San Diego State University

- Shared my experiences in undergraduate research
- Spoke about why research is important to me and why others should get involved in research
- Gave advice on how to apply and prepare for an undergraduate research experience

Jan. 2021 **Attendee, Quantitative Methods Workshop**, Massachusetts Institute of Technology  
Director: Dr. Mandana Sassanfar

- Networked with undergraduate students, graduate students, and professors
- Attended MATLAB workshops on machine learning, neural spike analysis, analyzing fMRI data using the General Linear Model, and calcium imaging data analysis
- Learned about and coded different data science techniques such as the k-means algorithm, support vector machine algorithm, peri/post-stimulus time histogram (PSTH), and z-scoring
- Attended lectures on quantifying genetic variants, computer vision, functional imaging of the human brain, and convolutional neural networks

Oct. 2020 **Summer Research Student Panelist, The Office of Academic Advancement Programs**, University of Central Florida

- Shared experiences from Carnegie Mellon University's summer Undergraduate Program in Neural Computation

- Advised prospective applicants on preparing for summer research programs
- Discussed the advantages and disadvantages of doing research virtually

Jan. 2019

**Attendee**, *Joint Mathematics Meetings*, Baltimore, MD

- Attended this conference as part of the *Collegiate Mathematical Society* at UCF
- Networked with professors, post-docs, and graduate and undergraduate students
- Learned about mathematical origami and created a stellated octahedron
- Attended lectures on graph theory, differential geometry, coding theory, and topology

### **Skills**

Programming PYTHON, WEBPPL, JAVA, C, MATLAB  
 Certifications CITI Program Human Subjects Research

### **Relevant Coursework**

Mathematics Calculus I – III, Ordinary Differential Equations I, Logic and Proof in Mathematics, Linear Algebra, Mathematical Foundations of Machine Learning and Artificial Intelligence, Probability Random Processes and Applications, Advanced Calculus I, Introduction to Topology  
 Comp Sci Computer Science I, Object Oriented Programming  
 Other Physics I, Formal Logic I, Philosophy of Love, Philosophy of Mind, Minds and Machines: Philosophy of Cognitive Science, Philosophy of Science