Giovanni Callahan

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EDUCATION

Arizona State University | New College of Interdisciplinary Arts & Sciences
Bachelor of Science in Psychology | Expected May 2027 | Cumulative GPA: 4.00/4.00
Relevant coursework: Cognitive Science, Introduction to Statistics, Brief Calculus, Principles of Programming, Research Methods (in progress), Statistical Methods (in progress)

RESEARCH INTERESTS

Judgment and decision-making; cognitive control; resource-rational cognition and bounded rationality; computational modeling of human behavior; neural computation

RESEARCH EXPERIENCE

Undergraduate Researcher | Feghhi Lab, Arizona State University
Principal investigator: Dr. Iman Feghhi | March 2026–Present

Independent project: *Decision-Making under Simultaneous Cognitive and Physical Load*

- Independently designed a behavioral paradigm examining decision-making and potential heuristic strategy use under simultaneous cognitive and physical demands. Refined the task into a 2 × 2 within-subjects design with Williams counterbalancing for condition order and first-order carryover.
- Programmed the experiment in Python using PsychoPy, with automated arithmetic stimuli, condition-specific trial sequences, and structured behavioral data recording.
- Implemented four- and eight-number arithmetic judgments and varied mouse-confirmation distance to manipulate cognitive and physical demands.
- Built a two-stage response system separately recording initial keyboard decisions and mouse confirmations, enabling measurement of decision latency, confirmation time, accuracy, and response revisions.
- Added near-target (±1) diagnostic trials designed to detect satisficing, in which participants accept a sum close to the target instead of computing it exactly.
- Incorporated Qualtrics questionnaires assessing subjective effort and confidence after each condition, and an adapted Godin Leisure-Time Exercise Questionnaire at the end of the session.
- Tested and refined the task for compatibility with the lab's older PsychoPy installation; completed technical implementation, with a Fall 2026 feasibility pilot and Spring 2027 data collection planned.
- Guided research assistants in task development, experimental procedures, data collection responsibilities, and project objectives.
- Preparing Python analyses of reaction times, accuracy, response revisions, individual differences, and cognitive × physical demand interactions.

COMPUTATIONAL PROJECTS

Gyrafold: Interactive 3D Brain Atlas | Creator and Developer
Independent software project | Public release: November 2026 | gyrafold.com

- Created and publicly released Gyrafold, a free browser-based 3D atlas of 328 human brain structures with 62 cited lessons, guided tours, and quizzes for beginners and experts, on computers and phones.
- Developed a Python and VTK pipeline that converts the open SPL/NAC Brain Atlas into web-ready 3D models, and a Three.js viewer with cutting planes, structure isolation, and drill-down into each region's parts.
- Applied learning-science methods, including retrieval practice, Leitner spaced review, and confidence ratings, and linked each lesson claim to its published source.
- Used AI-assisted development workflows with IBM Bob and Claude to implement, test, and refine the application; released the source code under the MIT license.

CogViz Research Studio | Creator and Developer
Independent software project | Public release: November 2026 | giovannicallahan.github.io/cogviz

- Created and publicly released CogViz, a Python-based research application that guides researchers through five steps of experiment planning: question, design, analysis, predictions, and an exportable study plan.
- Implemented simulation-based power analysis from predicted condition means, a plan check that flags mismatches between variables and analyses, and a preregistration draft that follows the OSF template.
- Assembled a library of 21 computational models of perception, choice, response time, learning, and memory, each cited to its primary source in APA style.
- Used AI-assisted development workflows with IBM Bob, OpenAI Codex, and Claude to implement, inspect, and refine the application for continued public use.

LAB PRESENTATIONS

Callahan, G. (June 2026). *The 2 × 2 Beacon Calibration Paradigm: Mapping Heuristic Strategy Shifts under Simultaneous Physical and Cognitive Depletion.* Methodology presentation to the Feghhi Lab faculty and research team, Arizona State University.

TECHNICAL AND COMPUTATIONAL SKILLS

Programming and Experimental Development: Python; PsychoPy; pandas, SciPy, statsmodels, matplotlib; Streamlit, Plotly; behavioral task programming, automated stimulus generation, response-time measurement, structured data recording; Qualtrics surveys and questionnaire administration.

Statistical Analysis: Descriptive statistics; hypothesis testing; independent and paired-samples t-tests; ANOVA; linear regression; accuracy and reaction-time analysis; data visualization; JASP; Microsoft Excel.

Research Methodology: Within-subjects and factorial designs; Williams counterbalancing; behavioral measurement, experimental control, and questionnaires.

Ongoing Computational and Mathematical Study: Linear algebra, calculus, probability, optimization fundamentals, probabilistic models of cognition, and computational decision-making.

PROFESSIONAL EXPERIENCE

Advanced Engineer
General Dynamics Mission Systems | 2024–2025

- Soldered, operated, and calibrated radar and sonar circuit boards for naval warship systems.
- Tested boards on special test equipment (STE), performed documentation checks, and troubleshot faults using probes, technical manuals, and schematic diagrams.

Navigational Aids Technician (MOS 5952) and Mobile Team Member
United States Marine Corps | 2017–2022

- Assembled, calibrated, maintained, and troubleshot electromechanical navigational systems supporting aviation operations.
- Performed precision measurements and systematic troubleshooting under established operational and safety procedures.
- Qualified as a Collateral Duty Inspector (CDI), verifying that maintenance, repairs, and assemblies met strict technical specifications and signing off that equipment was safe and ready for use.
- Conducted mobile-team operations involving equipment transport, navigational calculations, and system setup under physical demands and time constraints.
- Selected for instructional and supervisory responsibilities based on technical proficiency and professional performance.
- Trained and mentored junior Marines in equipment assembly, calibration, generator operation, troubleshooting, and field procedures.

HONORS AND MEMBERSHIPS

Psi Chi, International Honor Society in Psychology | Inducted Spring 2026
Dean's List, Arizona State University | Spring 2023, Spring 2026