JULES LITMAN-CLEPER

Evolutionary neuroscience | biological computation | Critical Simulation Studies

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RESEARCH PROFILE

Interdisciplinary researcher studying how sensing, memory, and information processing evolve across living systems and scales, from cellular signaling to complex cognition. Combines computational modeling, comparative evolutionary neuroscience, and Science and Technology Studies to examine when similar biological capacities share information-processing principles, when they arise through distinct mechanisms, and what scientific models reveal or omit about those mechanisms.

Current work: Computational simulation of sensory-memory dynamics and developmental organization in *Physarum polycephalum*; Critical Simulation Studies of biological models.

Long-term goal: Develop comparative methods - including perturbation-based tests and system-specific null models - for characterizing computation across cellular, neural, collective, and artificial systems.

EDUCATION

University of California, Davis | Davis, CA **2025-present**

PhD Candidate, Performance Studies | ***Philosophy and biological computation***

Focus: Critical Simulation Studies; Designated Emphasis in Science and Technology Studies; advisor: Joe Dumit

Affiliation: Center for Artificial Intelligence and Experimental Futures (CAIEF)

University of California, Davis | Davis, CA **2022-2024**

Master of Science in Psychology | ***Center for Neuroscience; Krubitzer Lab for Evolutionary Neurobiology***

Thesis: *Cortical Field Complexity: A comparative analysis of cortical field sizes in relation to ethology and sensory specialization across six clades of mammals*

Advisors: Leah Krubitzer, Stuart Wilson, and Randy O'Reilly

Massachusetts Institute of Technology | Cambridge, MA **2014-2016**

Master of Science in Architecture Studies (SMArchS) | ***Design and Computation***

Thesis: *Situated Mappings: Augmented-Reality Clay and Adaptive Interfacing*

Advisors: Terry Knight; Ruth Rosenholz, Brain and Cognitive Sciences and CSAIL

University of California, Davis | Davis, CA **2008-2011**

Bachelor of Arts in Studio Art | ***Minor in Creative Writing; Science and Technology Studies***

RESEARCH EXPERIENCE

University of California, Davis | Davis, CA **2025-present**

Doctoral Researcher | ***Biological computation and philosophy of modeling***

- Models feedback between sensory information and memory, asking how these dynamics could contribute to the evolution of different forms of memory.
- Uses *Physarum polycephalum* to study changes in information processing as uninucleate amoebae develop into a multinucleate, networked plasmodium and then differentiate into multicellularity.
- Developing Critical Simulation Studies research on how model failures under perturbation can reveal mismatches between predictive outputs and underlying biological dynamics.

Krubitzer Lab for Evolutionary Neurobiology | UC Davis **2022-2024**

Graduate Researcher | ***Comparative evolutionary neuroscience***

- Conducted a cross-species analysis of cortical field size and complexity across six mammalian clades in relation to ethology and sensory specialization.
- Integrated comparative neurobiology, cortical organization, and evolutionary interpretation in the master's thesis project.

METHODS AND TECHNICAL SKILLS

Computational and quantitative: R and RStudio; Python; information theory; dynamical systems; generative algorithms

Interactive: Unity; C#; open Frameworks; machine vision; augmented and virtual reality; physical computing; embedded sensors; data sonification

SELECTED RESEARCH AND TECHNICAL EXPERIENCE

OpenAI - Projects Elephant and Lion | Remote **2024**
Biology Expert Trainer
- Developed expert questions, reference answers, and evaluation criteria grounded in evolutionary neuroscience and psychology.
- Recognized as a top performer on biology expert evaluation for Project Lion.

MIT Design and Computation / BCS / CSAIL | Cambridge, MA **2014-2016**
Graduate Researcher
- Designed an augmented-reality clay interface to investigate adaptive mappings between physical manipulation and digital representation.

Nokia Bell Labs | Sunnyvale, CA **2020**
Artist in Residence, Research and Development
- Investigated ecological communication systems through the project Earth-Centered Communication Technology.

Universe Sandbox | San Francisco, CA **2018**
Sound Designer
- Created data-driven sonification of space-physics simulations using Unity and C#.

Windchimes Electronics | Richmond, CA **2017**
Machine Vision Specialist
- Implemented Eulerian video magnification using openFrameworks.

Virtual Reality Installation, Historical Museum of New Orleans | New Orleans, LA **2016**
Motion-Capture Workflow Consultant
- Supported a Unity- and Kinect-based virtual-reality installation workflow.

Exploratorium | San Francisco, CA **2011-2014**
Tactile Dome Specialist and Exhibit Technician
- Prototyped touch-based interactive installations, conducted visitor research and survey analysis, and supported exhibit fabrication and maintenance.

SELECTED TEACHING

University of San Francisco | San Francisco, CA **2023**
Lecturer in Art and Architecture | ***Interaction Design***

San Francisco State University | San Francisco, CA **2021**
Lecturer of New Media and Interactive Arts | ***Physical computing with embedded sensors***

California State University, East Bay | Hayward, CA **2019-2021**
Adjunct Professor of Multimedia Art
- Taught interaction design, 3D foundations and digital fabrication, time-based media, and graduate experiments in art and technology.

Massachusetts Institute of Technology | Cambridge, MA **2016**
Teaching Assistant and Lead Teacher
- Supported rapid prototyping, urban energy-flow modeling, CNC fabrication, architecture studio, and an augmented-reality and dance course.

SELECTED HONORS AND AWARDS

Massachusetts Institute of Technology: Merit Scholarship; Louis C. Rosenberg Travel Fellowship
University of California, Davis: Dean's Honors List (three times); Wayne Thiebaud Family Scholarship (twice); New York Studio School Scholarship; Yale/Norfolk nomination; Nettie Weber Scholarship
Augmented Reality World Expo: Award for EmForm, a browser-connected augmented-reality collective sculpting project