Nicholas Davis, PhD

HUMAN–AI CO-CREATION · ENACTIVE INTELLIGENCE · INTERACTION DYNAMICS

Elyria, Ohio, USA • nicholas.davis10@gmail.com • nickmdavis.com • Enactive AI

RESEARCH PROFILE

Human-centered AI researcher with more than fifteen years of experience designing, implementing, and evaluating interactive intelligent systems that collaborate with people in real time. My work develops theories, analytical methods, and computational platforms for understanding how meaning, creativity, coordination, and regulation emerge through human–AI interaction.

Current research extends co-creative AI toward adaptive systems that remain coherent under drift, ambiguity, and changing conditions. This program integrates interaction-centered intelligence, enactive cognition, Cognitive Trajectory Modeling, empirical study, and real-time system design.

RESEARCH AREAS Human–AI Co-Creation • Cognitive Trajectory Modeling • Computational Creativity • Human-Centered AI • Enactive Cognition • Adaptive Regulation

Current Appointment

Independent Researcher and Consultant — **2022–present**

Co-Creative AI Consulting · Ohio, USA

- Develops theory, research platforms, and adaptive AI systems for human–AI co-creation, interaction analysis, and dynamic decision environments.
- Designed the AI Drawing Partner, Aether, Cognitive Trajectory Laboratory, Codix, and ConstructIT AI as working research and applied systems.
- Collaborated on co-creative AI publications and more than $1.2 million in National Science Foundation grant proposals.
- Current program includes Interaction-Centered Intelligence, Cognitive Trajectory Modeling, Enactive Regulation Theory, and quantified creative-process research.

Education

PhD, Human-Centered Computing — **2017**

Georgia Institute of Technology · Atlanta, Georgia

- Major: Cognitive Science; concentration: Computational Creativity; GPA: 4.0/4.0.
- Advisor: Brian Magerko; Co-Advisor: Ellen Yi-Luen Do. Presidential Fellowship.

BA, Cognitive Science — **2009**

Case Western Reserve University · Cleveland, Ohio

- Summa Cum Laude; GPA: 3.87/4.00; Cognitive Science Student of the Year; Phi Beta Kappa.

Research and Professional Experience

Assistant Professor of Human–Computer Interaction — **2017–2021**

University of North Carolina at Charlotte · Charlotte, North Carolina

- Founded the Co-Creativity Lab to design, develop, and evaluate co-creative artificial intelligence systems.

- Taught Human-Centered Design and Computational Creativity, spanning user research, prototyping, evaluation, co-creativity, and autonomous creative systems.
- Developed QuantCollab, a drawing platform for quantifying human collaboration, and investigated cognitive, collaborative, and interaction dynamics across human–human and human–AI co-creation.

Graduate Research Assistant
2012–2017

Expressive Machinery Lab, Georgia Tech · Atlanta, Georgia

- Co-designed, implemented, and evaluated the Drawing Apprentice, an influential co-creative drawing system.
- Developed cognitive models of creativity and co-creation, including Creative Sense-Making as a method for quantifying interaction dynamics.
- Designed mixed-method user studies and mentored 12 undergraduate and 10 graduate students.

User Experience Research Intern
2014

YouTube · San Bruno, California

- Led early-stage product visioning with strategists, designers, and product stakeholders.
- Interviewed expert users, generated 20 design concepts and mocks, conducted follow-up studies, and synthesized design principles and a long-term product vision.

User Experience Research Intern
2013

Google · California

- Conducted iterative usability research on Google Chromecast and Google Now TV Cards to improve onboarding, define information needs, and model user behavior.
- Presented research findings, facilitated product discussions, and translated insights into prioritized design recommendations.

Research Intern
2012

Adobe Creative Technologies Lab · Washington

- Studied creative-technology user experience through interviews, surveys, and usability research.
- Designed and built a web application for teaching art skills and supporting creative expression.

Graduate Research Assistant
2011–2012

ACME Lab, Georgia Tech · Atlanta, Georgia

- Built perceptive sketching and creativity-support tools and developed cognitive theories of creativity support.
- Contributed to multimodal design-support evaluation, dementia-screening research, and National Science Foundation proposals.

Graduate Research Assistant
2010–2011

Entertainment Intelligence Lab, Georgia Tech · Atlanta, Georgia

- Designed and conducted studies of AI-supported creativity for novice digital filmmakers.
- Conducted ethnographic fieldwork with expert filmmakers and modeled the distributed cognitive organization of digital filmmaking.

Research Assistant
2009–2010

Center for Cognition and Culture · Cleveland, Ohio

- Contributed interface design and human–robot interaction research for a robotic wheelchair controlled through natural-language commands.

Undergraduate Research Assistant
2006–2009

Case Western Reserve University · Cleveland, Ohio

- Conducted research in natural-language processing, cognitive robotics, creative cognition, and cognitive semiotics.

Selected Research Contributions and Systems

Interaction-Centered Intelligence	A theoretical framework that treats interaction trajectories, coordination, participation, and regulation as primary units for analyzing intelligence.
Cognitive Trajectory Modeling	A theory and analytical framework for transforming temporal traces into cognitively grounded trajectories, properties, events, and attractor dynamics.
Creative Sense-Making	A cognitive framework and quantitative method for modeling how collaborative creativity reorganizes, stabilizes, and develops through time.
Enactive Model of Creativity	A foundational account of how computational systems can participate as artistic colleagues through situated, embodied, and adaptive interaction.
Cognitive Trajectory Laboratory	An instrumented drawing environment for process measurement, replay, trajectory analysis, event detection, chapter segmentation, and AI-assisted reporting.
Aether and AI Drawing Partner	Co-creative drawing systems that operationalize enactive participation and quantify human–AI interaction dynamics in real time.

Research Methods and Technical Expertise

RESEARCH METHODS Mixed-method user studies, cognitive modeling, quantitative and qualitative analysis, ethnography, usability testing, concept testing, task analysis, heuristic evaluation

PROTOTYPING AND DESIGN Rapid prototyping, interaction design, user journeys, personas, wireframes, high-fidelity prototypes, research-platform development

PROGRAMMING JavaScript, HTML5, CSS, Python, Java, Processing, Jython, C#

FRAMEWORKS AND APIS Node.js, Socket.IO, TensorFlow.js, OpenAI/ChatGPT API, Stable Diffusion API

DESIGN TOOLS Figma, Adobe Photoshop, Adobe Illustrator

Teaching Experience

Assistant Professor
2017–2021

University of North Carolina at Charlotte

- ITIS 6400: Human-Centered Design
- ITIS 8010: Special Topics in Computational Creativity

Lecturer and Graduate Teaching Assistant
2012–2017

Georgia Institute of Technology

- CS 4001: Computing & Society (Lecturer, 2013 and 2016)
- CS 4699/8903: Tech Arts Practicum (Co-instructor, 2016–2017)
- CS 8803: Computational Creativity (Graduate TA, 2014)
- CS 8803: Design Games (Graduate TA, 2012)

Undergraduate Teaching Assistant
2008–2009

Case Western Reserve University

- COGS 202: Cultural Perspectives on Cognition
- COGS 301: Special Topics in Cognitive Robotics

Publications

42 scholarly articles and chapters • 1,100+ citations (citation total presented as an approximate, time-sensitive public metric)

RECENT PREPRINTS AND CURRENT RESEARCH PROGRAM

Davis, N. (2026). Cognitive Trajectory Modeling: Quantifying Human–AI Co-Creation through Cognitively Grounded Interaction Trajectories. arXiv:2606.15358.

Davis, N. (2026). Interaction-Centered Intelligence: Toward an Interaction-Based Theory of Human–AI Co-Creation. arXiv:2606.00807.

Davis, N. (2025). AI Drawing Partner: Co-Creative Drawing Agent and Research Platform to Model Co-Creation. arXiv:2501.06607.

REFEREED CONFERENCE PAPERS AND PROCEEDINGS

Davis, N., Deshpande, M., Rezwana, J., & Magerko, B. (2024). The Five Pillars of Enaction as a Theoretical Framework for Co-Creative Artificial Intelligence. Proceedings of the 15th International Conference on Computational Creativity, 136–145. Best Paper Award.

Davis, N., Clemens, M., Rafner, J., Rezwana, J., & Sherson, J. (2024). Co-Creation as an Interaction Paradigm for Generative AI to Achieve Hybrid Intelligence. Manuscript submitted to the ACM CHI Conference on Human Factors in Computing Systems.

Davis, N., Siddiqui, S., Karimi, P., Maher, M. L., & Grace, K. (2019). Creative Sketching Partner: A Co-Creative Sketching Tool to Inspire Design Creativity. Proceedings of ICCC, 358–359.

Karimi, P., Maher, M. L., **Davis, N.**, & Grace, K. (2019). Deep Learning in a Computational Model for Conceptual Shifts in a Co-Creative Design System. arXiv:1906.10188.

Karimi, P., Grace, K., **Davis, N.**, & Maher, M. L. (2019). Creative Sketching Apprentice: Supporting Conceptual Shifts in Sketch Ideation. Design Computing and Cognition '18, 721–738. Springer.

Karimi, P., **Davis, N.**, Maher, M. L., Grace, K., & Lee, L. (2019). Relating Cognitive Models of Design Creativity to the Similarity of Sketches Generated by an AI Partner. Proceedings of Creativity and Cognition, 259–270.

Davis, N., Hsiao, C.-P., Singh, K. Y., Lin, B., & Magerko, B. (2017). Creative Sense-Making: Quantifying Interaction Dynamics in Co-Creation. Proceedings of Creativity and Cognition, 356–366. Best Student Paper Award.

Long, D., Jacob, M., **Davis, N.**, & Magerko, B. (2017). Designing for Socially Interactive Systems. Proceedings of Creativity and Cognition, 39–50.

Davis, N., Hsiao, C.-P., Singh, K. Y., & Magerko, B. (2016). Co-Creative Drawing Agent with Object Recognition. Proceedings of AIIDE, 12(1), 9–15.

Singh, K. Y., **Davis, N.**, Hsiao, C.-P., Jacob, M., Patel, K., & Magerko, B. (2016). Recognizing Actions in Motion Trajectories Using Deep Neural Networks. Proceedings of the 12th AIIDE Conference.

Li, R., Wang, Y., Hsiao, C.-P., **Davis, N.**, Hallam, J., & Do, E. Y.-L. (2016). Tactile Teacher: Enhancing Traditional Piano Lessons with Tactile Instructions. Proceedings of CSCW Companion, 329–332.

Davis, N., Hsiao, C.-P., Singh, K. Y., Li, L., & Magerko, B. (2015). Empirically Studying Participatory Sense-Making in Abstract Drawing with a Co-Creative Agent. Proceedings of Intelligent User Interfaces.

Davis, N., Comerford, M., Jacob, M., Hsiao, C.-P., & Magerko, B. (2015). An Enactive Characterization of Pretend Play. Proceedings of Creativity and Cognition, 275–284.

Davis, N., Hsiao, C.-P., Singh, K. Y., Li, L., Moningi, S., & Magerko, B. (2015). Drawing Apprentice: An Enactive Co-Creative Agent for Artistic Collaboration. Proceedings of Creativity and Cognition, 185–186.

Swarts, M., **Davis, N.**, Hsiao, C.-P., & Hallam, J. (2015). Sharing the Lights: Exploration on Teaching Electronics for Sensory Augmentation Development. Proceedings of Augmented Human, 203–204.

Davis, N. M., Popova, Y., Sysoev, I., Hsiao, C.-P., Zhang, D., & Magerko, B. (2014). Building Artistic Computer Colleagues with an Enactive Model of Creativity. Proceedings of ICCC, 38–45.

Davis, N. (2013). Human–Computer Creativity: Blending Human and Computational Creativity. Proceedings of AIIDE.

Davis, N., Zook, A., Kirschner, F., Nitsche, M., & Riedl, M. (2013). Techniques for Evaluating Novice-Oriented Creativity Support Tools. ACM SIGCHI Workshop on Evaluation Methods for Creativity Support.

Davis, N., Zook, A., O'Neill, B., Grosz, A., Headrick, B., Nitsche, M., & Riedl, M. O. (2013). Creativity Support for Novice Digital Filmmaking. Proceedings of the ACM CHI Conference.

Davis, N., Winnemoeller, H., Dontcheva, M., & Do, E. Y.-L. (2013). A Cognitive Theory of Creativity Support. Proceedings of Creativity and Cognition.

Hsiao, C.-P., **Davis, N.**, & Do, E. Y.-L. (2013). Sketch Master: A Sketch Game for Collecting Exploratory Data. Proceedings of Creativity and Cognition.

Li, B., Zook, A., **Davis, N. M.**, & Riedl, M. O. (2012). Goal-Driven Conceptual Blending: A Computational Approach for Creativity. Proceedings of ICCC, 9–16.

Davis, N., Li, B., O'Neill, B., Riedl, M. O., & Nitsche, M. (2011). Distributed Creative Cognition in Digital Filmmaking. Proceedings of Creativity and Cognition. Best Student Paper Award.

BOOK CHAPTERS

Davis, N., Clemens, M., Browne, E., & Rezwana, J. (2024). Unlocking the Black Box of Artificial Media with Quantified and Explainable Co-Creative AI. In N. Zagalo (Ed.), Artificial Media. Springer. Submitted manuscript.

Davis, N. (2024). Creative Sense-Making: A Cognitive Framework for Modeling Interaction Dynamics in Co-Creative AI. In F. Tigre-Moura (Ed.), AI, Co-Creativity, and Creativity. Routledge.

Davis, N., Hsiao, C.-P., Popova, Y., & Magerko, B. (2015). An Enactive Model of Creativity for Computational Collaboration and Co-Creation. In Creativity in the Digital Age, 109–133.

JOURNAL ARTICLES

Davis, N., Hsiao, C.-P., Singh, K. Y., Lin, B., & Magerko, B. (2017). Quantifying Collaboration with a Co-Creative Drawing Agent. ACM Transactions on Interactive Intelligent Systems, 7(4), 1–25.

Nitsche, M., Riedl, M. O., & **Davis, N.** Creativity, Cognition, and Machinima. Animation Journal, 27, 50–66.

Davis, N., & Do, E. Y.-L. (2012). Quantifying the Artistic Experience with Perceptive Sketching Tools: Cognitive Technologies to Support Creativity Researchers. Comunicação e Sociedade, 22, 76–95.

Invited Presentations, Exhibitions, and Guest Lectures

Davis, N. (2024). AI Drawing Partner: Co-Creative Drawing Agent and Research Platform to Model Co-Creation. Center for Hybrid Intelligence, Aarhus University, Denmark.

Davis, N. (2024). Co-Creative Art Making with the AI Drawing Partner: A Quantified Approach to Model Co-Creation. Human Interactivity and Language Lab, University of Warsaw, Poland.

Davis, N. (2015). Using Feedback and Interactive Machine Learning to Train Co-Creative Agents. Computational Creativity Lab, Goldsmiths, University of London.

Davis, N. (2015). Drawing Apprentice: A Co-Creative Drawing Agent for Real-Time Collaboration. Interactive art exhibition, Eyedrum Art & Music Gallery, Atlanta.

Davis, N. (2015). Collaborating with Creative Agents. STEAM3: The Future of Education Conference, Georgia State University.

Davis, N. (2015). Where Art and Technology Meet. C4Atlanta TechSmarts Lecture Series, Atlanta.

Davis, N. (2014). Toward Human–Computer Co-Creativity. Guest lecture, Georgia Tech.

Davis, N. (2014). Creative Cognition and Sense-Making. Guest lecture, Georgia Tech.

Davis, N., & Do, E. Y.-L. (2011). Teaching Patients to Regulate Stress with Biofeedback Art Therapy. Public Health Informatics Conference, Atlanta.

Elliott, M., & **Davis, N.** (2008). Cognitively Based Parsing and Extraction of Potential Knowledge from Sentence Structures. TABU Dag Linguistics Conference, Groningen, Netherlands.

Davis, N. (2009). The Theoretical Architecture for a Cognitive Robot. Cognitive Science Student Conference, Cleveland.

Davis, N. (2009). Perceptual Symbols Meshing: Examining the Relationship Between Intention and Perception. Conceptual Structure, Discourse, and Language Conference, Cleveland.

Honors and Awards

Best Paper Award · International Conference on Computational Creativity **2024**

Best Student Paper Award · ACM Creativity and Cognition **2017**

Digital Art Competition Winner · Georgia Tech - Drawing Apprentice **2014**

Best Student Paper Award · ACM Creativity and Cognition **2011**

Presidential Fellowship · Georgia Institute of Technology **2010–2017**

NSF Graduate Research Fellowship Program · Honorable Mention **2010**

Cognitive Science Student of the Year · Case Western Reserve University **2009**

Phi Beta Kappa and Summa Cum Laude · Case Western Reserve University **2009**

Provost Merit Scholarship · Case Western Reserve University **2005–2009**

Dean's High Honors · Case Western Reserve University **Seven semesters**