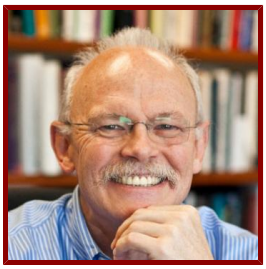
Stanford



Jay McClelland

Lucie Stern Professor in the Social Sciences, Professor of Psychology and, by courtesy, of Linguistics and of Computer Science

CONTACT INFORMATION

- **Alternate Contact**

  Reneé Rittler - Administrative Services Manager

  Email rittler@stanford.edu

  Tel 6507237431

Bio

ACADEMIC APPOINTMENTS

- Professor, Psychology
- Professor (By courtesy), Linguistics
- Professor (By courtesy), Computer Science
- Member, Bio-X
- Faculty Affiliate, Institute for Human-Centered Artificial Intelligence (HAI)
- Member, Wu Tsai Human Performance Alliance
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Professor, Department of Psychology, (2006- present)
- Director, Center for Mind, Brain, Computation and Technology, (2006- present)

HONORS AND AWARDS

- Distinguished Scientific Contribution Award, American Psychological Association (1996)
- Member, National Academy of Sciences (2001-)

PROGRAM AFFILIATIONS

- Symbolic Systems Program

PROFESSIONAL EDUCATION

- Ph. D., University of Pennsylvania , Cognitive Psychology (1975)

LINKS

- Jay McClelland's Home Page: https://stanford.edu/~jlmcc/
- Center for Mind, Brain, Computation and Technology: https://neuroscience.stanford.edu/mbct/home

- PDP Lab: http://web.stanford.edu/group/pdplab/index.html

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

My research addresses topics in perception and decision making; learning and memory; language and reading; semantic cognition; and cognitive development. I view cognition as emerging from distributed processing activity of neural populations, with learning occurring through the adaptation of connections among neurons. A new focus of research in the laboratory is mathematical cognition and reasoning in humans and contemporary AI systems based on neural networks.

Please visit my web page for more information.

Teaching

COURSES

2026-27

- Foundations of Cognition: PSYCH 205 (Spr)

2025-26

- Neural Network Models of Cognition: PSYCH 209 (Win)

2024-25

- Foundations of Cognition: PSYCH 205 (Spr)

2023-24

- Neural Network Models of Cognition: PSYCH 209 (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Rinseo Park, Joshua Ryu

Doctoral Dissertation Advisor (AC)

Sabrina Jones

Master's Program Advisor

Amrita Malhotra, Nicolo di Borgoricco

Doctoral (Program)

Jerome Han, Violet Xiang

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Neurosciences (PhD Program)

Publications

PUBLICATIONS

- **Reflections on David E. Rumelhart and the Rumelhart Prize** *TOPICS IN COGNITIVE SCIENCE*
  McClelland, J. L.
  2025

- **Grounding mathematics in an integrated conceptual structure, part I: experimental evidence that grounded rules support transfer that formal rules do not.** *Frontiers in psychology*
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- **Language models, like humans, show content effects on reasoning tasks.** *PNAS nexus*
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- **Systematic Human Learning and Generalization From a Brief Tutorial With Explanatory Feedback.** *Open mind : discoveries in cognitive science*
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  2024; 8: 148-176

- **Causal interventions expose implicit situation models for commonsense language understanding**
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- **Capturing advanced human cognitive abilities with deep neural networks** *TRENDS IN COGNITIVE SCIENCES*
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- **A weighted constraint satisfaction approach to human goal-directed decision making** *PLOS COMPUTATIONAL BIOLOGY*
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- **Data Distributional Properties Drive Emergent In-Context Learning in Transformers**
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- **Placing language in an integrated understanding system: Next steps toward human-level performance in neural language models** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
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- **Do estimates of numerosity really adhere to Weber's law? A reexamination of two case studies** *PSYCHONOMIC BULLETIN & REVIEW*
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- **Integration of new information in memory: new insights from a complementary learning systems perspective.** *Philosophical transactions of the Royal Society of London. Series B, Biological sciences*
  McClelland, J. L., McNaughton, B. L., Lampinen, A. K.
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- **Intrusions into the shadow of attention: A new take on illusory conjunctions** *ATTENTION PERCEPTION & PSYCHOPHYSICS*
  Henderson, C. M., McClelland, J. L.
  2020; 82 (2): 564-584

- **Exemplar models are useful and deep neural networks overcome their limitations: A commentary on Ambridge (2020)** *FIRST LANGUAGE*
  McClelland, J. L.
  2020; 40 (5-6): 612-615

- **Numerosity discrimination in deep neural networks: Initial competence, developmental refinement and experience statistics** *DEVELOPMENTAL SCIENCE*
  Testolin, A., Zou, W. Y., McClelland, J. L.
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- **Quasi-compositional mapping from form to meaning: a neural network-based approach to capturing neural responses during human language comprehension** *PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES*

Rabovsky, M., McClelland, J. L.
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  Lampinen, A. K., McClelland, J. L.
  2020
- **Generative Continual Concept Learning**
  Rostami, M., Kolouri, S., McClelland, J., Pilly, P., Assoc Advancement Artificial Intelligence
  ASSOC ADVANCEMENT ARTIFICIAL INTELLIGENCE.2020: 5545-5552
- **Developing the knowledge of number digits in a child-like robot** *NATURE MACHINE INTELLIGENCE*
  Di Nuovo, A., McClelland, J. L.
  2019; 1 (12): 594-605
- **A mathematical theory of semantic development in deep neural networks.** *Proceedings of the National Academy of Sciences of the United States of America*
  Saxe, A. M., McClelland, J. L., Ganguli, S.
  2019
- **Value-based decision making: An interactive activation perspective.** *Psychological review*
  Suri, G. n., Gross, J. J., McClelland, J. L.
  2019
- **Modelling the N400 brain potential as change in a probabilistic representation of meaning** *NATURE HUMAN BEHAVIOUR*
  Rabovsky, M., Hansen, S. S., McClelland, J. L.
  2018; 2 (9): 693–705
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  Lampinen, A. K., McClelland, J. L.
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- **Concepts, Control, and Context: A Connectionist Account of Normal and Disordered Semantic Cognition** *PSYCHOLOGICAL REVIEW*
  Hoffman, P., McClelland, J. L., Ralph, M.
  2018; 125 (3): 293-328
- **Distinct Representations of Magnitude and Spatial Position within Parietal Cortex during Number-Space Mapping** *JOURNAL OF COGNITIVE NEUROSCIENCE*
  Kanayet, F. J., Mattarella-Micke, A., Kohler, P. J., Norcia, A. M., McCandliss, B. D., McClelland, J. L.
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- **Bayesian statistics to test Bayes optimality.** *The Behavioral and brain sciences*
  Turner, B. M., McClelland, J. L., Busemeyer, J.
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  Turner, B. M., Gao, J., Koenig, S., Palfy, D., L McClelland, J.
  2017
- **Building on prior knowledge without building it in** *BEHAVIORAL AND BRAIN SCIENCES*
  Hansen, S. S., Lampinen, A. K., Suri, G., McClelland, J. L.
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- **What Learning Systems do Intelligent Agents Need? Complementary Learning Systems Theory Updated** *TRENDS IN COGNITIVE SCIENCES*
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- **Locating Object Knowledge in the Brain: Comment on Bowers's (2009) Attempt to Revive the Grandmother Cell Hypothesis** *PSYCHOLOGICAL REVIEW*
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  McClelland, J. L.
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- **The Place of Modeling in Cognitive Science** *TOPICS IN COGNITIVE SCIENCE*
  McClelland, J. L.
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