

Proceedings for the 42nd Annual
Meeting of the
Cognitive Science Society

29 July – 1 August 2020

*Developing a Mind: Learning in
Humans, Animals, and Machines*

Program Chairs: Stephanie Denison, Michael Mack, Yang Xu,
Blair C. Armstrong

<http://www.cognitivesciencesociety.org/cogsci-2020>

Introduction

Welcome to the 42nd Annual Conference of the Cognitive Science Society and our first ever virtual meeting! This year's conference brings together the latest research across all of Cognitive Science and also highlights the theme *Developing a mind: Learning in humans, animals, and machines*. In addition to the Rumelhart Prize keynote presentation by Stanislas Dehaene (Collège de France), the program features three plenary speakers: Janet Werker (University of British Columbia), Geoffrey Hinton (Google Research & Vector Institute), and Cecilia Heyes (University of Oxford), as well as three invited symposia. Further, the program includes a symposium to celebrate the inaugural winner of the Elman Prize: Jenny Saffran, and a symposium for the Robert J. Glushko Dissertation Awards. The keynotes and invited symposia showcase the broad spectrum of ideas that encompass the conference theme of *development*.

The program committee for CogSci 2020 received 1,174 submissions, including 841 full papers, 302 member abstracts, 12 publication-based talks, as well as 9 proposals for symposia, and 9 for workshops and tutorials. After a rigorous review process, the committee selected 176 papers for oral presentation and inclusion in the conference proceedings (20.9%), 325 papers for poster presentation and inclusion in the proceedings (38.6%), and 130 papers for poster presentation with inclusion of abstracts in the proceedings (15.5%). We also selected 237 submitted member abstracts. In addition, we accepted 4 publication-based talks, 9 symposia, and 9 workshops and tutorials to make for an exciting and inclusive program.

We hope that you enjoy the program this year!

Your Program Co-Chairs,

Stephanie Denison (University of Waterloo, Canada)

Michael Mack (University of Toronto, Canada)

Yang Xu (University of Toronto, Canada)

Blair C. Armstrong (University of Toronto, Canada)

Acknowledgements

We are extremely grateful to everyone who contributed to the planning and organization of this year's Cognitive Science virtual meeting, to all authors who submitted their contributions, and to all reviewers who generously donated their expertise and time to evaluate the submissions. We offer our special thanks to those reviewers who have completed additional reviews during the pandemic. We thank the members of the Program Committee who coordinated the reviews and made important recommendations about the submissions, and the members of the conference organizing subcommittees who showed high efficiency in completing their demanding tasks. We list the Organizing and Program Committee members in the following pages.

We are very grateful for the assistance of a number of individuals and groups critical to handling the many organizational aspects of the virtual meeting. We thank Asifa Majid, the Chair of the Cognitive Science Society, Anna Drummey, the Executive Officer of the Society and the entire Governing Board of the Society, for their advice and support throughout the process. We also thank the Virtual Conference Committee for taking on the major logistical tasks associated with moving the conference online. Lauren Moline and Jude Ross at Podium Conferences, and James Stewart at Precision Conference Solutions have been helpful, effective, and constant partners during the process. Additional help included key contributions from Desmond Ong for speedy communication, Timothy Rogers for the awards organization, and Yevdokiya Yermolayeva for creating the conference poster.

Finally, we are grateful to the Cognitive Science Society and to the sponsors of this conference, including the The Robert J. Glushko and Pamela Samuelson Foundation, Duolingo and MIT-IBM Watson AI Lab, as well as the Exhibitors, for their support.

Enjoy the virtual conference!

Stephanie Denison, Michael Mack, Yang Xu, and Blair C. Armstrong
Co-Chairs, CogSci2020

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How to Cite Your Paper

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APA formatted citation for a published abstract:

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APA formatted citation for a talk/poster presentation:

Author, A. & Author, B. (2020, July). This is the title of the talk or poster. Paper (or Poster) presented at the 42nd Annual Conference of the Cognitive Science Society (p. NUMBER).

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Conference Awards

Marr Prize

The Marr Prize, named in honor of the late David Marr, is awarded to the best student paper at the conference. All student first authors were eligible for the Marr Prize for the best student paper. The Marr Prize includes an honorarium of \$1000 and is sponsored by The Cognitive Science Society. The winner of the 2020 Marr Prize for the Best Student Paper is:

Anjali Sifar, Indian Institute of Technology

Limits on predictability of risky choice behavior

Summary: “We empirically establish lower bounds on prediction error that realistic models of risky choice can expect to achieve.”

Computational Modeling Prizes

Four prizes worth \$1000 each are awarded for the best full paper submissions to CogSci 2020 that involve computational cognitive modeling. The four prizes represent the best modeling work in the areas of perception/action, language, higher-level cognition, and applied cognition. These prizes are sponsored by The Cognitive Science Society. The winners of the 2020 Computational Modeling Prizes are:

Perception and Action:

Ruomeng Zhu, The University of Edinburgh

Synchrony and asynchrony of the two eyes in binocular fixations in the reading of English and Chinese: The implications for ocular prevalence

Summary: “A study of fine-grain motor coordination of the eyes in reading in English and Chinese and its relation to perception.”

Language:

Robert Hawkins, Princeton University

Generalizing meanings from partners to populations: Hierarchical inference supports convention formation on networks

Summary: “We test a model of how linguistic meaning is generalized from partner-specific common ground to community-wide conventions.”

Higher Cognition:

Sarah A. Wu and Rose E. Wang, Massachusetts Institute of Technology

Too many cooks: Coordinating multi-agent collaboration through inverse planning

Summary: “A Bayesian approach to learning group goals is a model of human intention attribution and enables agents to cooperate.”

Applied Cognition:

Lauren A. Oey and Isabella Destefano, University of California, San Diego

Formalizing Interdisciplinary Collaboration in the CogSci Community

Summary: “We introduce bottom-up network and topic space measures to an ongoing debate: is CogSci more inter- or multi-disciplinary?”

Sayan Gul Award

Sayan Gul was an undergraduate at UC Berkeley studying cognitive science and computer science, and had great potential as a cognitive scientist. This award is intended to support similarly outstanding undergraduates conducting research in cognitive science. In memory of Sayan Gul, the award supports undergraduate students with travel related costs who are presenting authors at the conference. The Sayan Gul Award includes a cash award of \$500. This year’s recipient of the Sayan Gul award is:

Chelsea Campbell, Indiana University

How much to copy from others? The role of partial copying in social learning

Summary: “Our research has found that groups solving complex problems perform best when they copy only part of their peers’ solutions.”

Cognitive Science Society Prizes

Robert J. Glushko Dissertation Prizes

The Cognitive Science Society and the Robert J. Glushko and Pamela Samuelson Foundation award up to five outstanding dissertation prizes in cognitive science each year. The goals of these prizes are to increase the prominence of cognitive science and encourage students to engage in interdisciplinary efforts to understand minds and intelligent systems. The hope is that the prizes will recognize and honor young researchers conducting ground-breaking research in cognitive science. The eventual goal is to aid in efforts to bridge between the areas of cognitive science and create theories of general interest to the multiple fields concerned with scientifically understanding the nature of minds and intelligent systems. Promoting a unified cognitive science is consistent with the belief that understanding how minds work will require the synthesis of many different empirical methods, formal tools, and analytic theories. 2011 was the inaugural year of this prize, and a new competition is held annually. The 2020 recipients are:

Damián Blasi – Max Planck Institute for Mathematics in the Sciences, 2018

Linguistic Diversity Through Data

Stephen Ferrigno – University of Rochester, 2018

The Evolutionary and Developmental Origins of Human Thought

Shipra Kanjlia – Johns Hopkins University, 2018

Preservation and Plasticity in the Neural Basis of Numerical Thinking in Blindness

Falk Lieder – University of California, Berkeley, 2018

Beyond Bounded Rationality: Reverse-Engineering and Enhancing Human Intelligence

Sebastian Michelmann – University of Birmingham, 2018

Temporal Dynamics and Mechanisms of Oscillatory Pattern Reinstatement in Human Episodic Memory

Laurel Perkins – University of Maryland, 2019

How Grammars Grow: Argument Structure and the Acquisition of Non-basic Syntax

Leor Zmigrod – University of Cambridge, 2019

The Cognitive Underpinnings of Ideological Thinking

The Jeffrey L. Elman Prize for Scientific Achievement and Community Building

In recognition of Jeffrey L. Elman's many contributions to the field of cognitive science, the Cognitive Science Society in partnership with the University of California, San Diego awards a prize at the Cognitive Science Society annual meeting to mid-career cognitive scientists (individuals or teams) whose careers exemplify the twin strands of scientific excellence and commitment to community-building and service that were so evident in his career.

Jeffrey Elman made several major contributions to the theoretical foundations of human cognition, most notably in the areas of language and development. His work had, and continues to have, an immense impact across fields as diverse as cognitive science, psycholinguistics, developmental psychology, evolutionary theory, computer science and linguistics. In addition to the many important intellectual contributions Jeffrey Elman made to Cognitive Science, he also was an inspiring scientific citizen who is remembered for his generosity and mentorship.

The inaugural Elman Prize has been awarded to **Jenny Saffran**, the Vilas Distinguished Achievement Professor at the University of Wisconsin-Madison.

Elman Symposium

This symposium will honor Dr. Saffran's contributions to the scientific community. Dr. Saffran's interests concern a seminal question in cognitive science: How do children acquire language? Acquiring language depends on a combination of innate structure and learning from experience. Saffran and her colleagues developed laboratory methods to study the experiential input to infant language learning to test specific theories about how learning unfolds. Her experimental research demonstrates, quite remarkably, that humans, including infants, acquire language by tracking statistical information available in the environment. The Elman prize, and the symposium, also reflect the many contributions Dr. Saffran has made to nurturing a community of scientists, a goal reflected in her work as an undergraduate teacher, a graduate mentor, and a collaborator.

David E. Rumelhart Prize

The David E. Rumelhart Prize is awarded annually to an individual or collaborative team making a significant contemporary contribution to the theoretical foundations of human cognition. Contributions may be formal in nature: mathematical modeling of human cognitive processes, formal analysis of language and other products of human cognitive activity, and computational analyses of human cognition using symbolic or non-symbolic frameworks all fall within the scope of the award. The David E. Rumelhart Prize is funded by the Robert J. Glushko and Pamela Samuelson Foundation. The prize consists of a hand-crafted, custom bronze medal, a certificate, a citation of the awardee's contribution, and a monetary award of \$100,000.

The recipient of the 2020 Prize is **Sanislas Dehaene**, from the Collège de France.

Invited Presentations

Keynote Talks

Janet Werker, University of British Columbia

Perceptual Beginnings to Language Acquisition: Critical Periods and Multi-Sensory Influences

Geoffrey Hinton, Google Research & Vector Institute

Unsupervised Learning

Cecilia Heyes, University of Oxford

Cognitive Gadgets - New Thinking from Old Parts

Invited Symposia

Statistical Learning and Development

Inbal Arnon & Ori Lavi-Rotbain (The Hebrew University of Jerusalem)

Laura Batterink (Western University)

Naomi Feldman (University of Maryland)

Rebecca Gomez (University of Arizona)

Fostering Deep Integration Between Development and Different Domains of Cognitive Science

Chris Eliasmith (University of Waterloo)

Celeste Kidd (University of California, Berkeley)

Tetsuro Matsuzawa (Kyoto University)

Joelle Proust (Ecole Normale Supérieure)

The Impact of Social, Cultural and Linguistic Constraints on Development

Kristin Andrews (York University)

Roger Levy (MIT)

Amanda Seed (University of St Andrews)

Kenny Smith (University of Edinburgh)