

# KEVIN ELLIS

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## ACADEMIC AND SCIENTIFIC TIMELINE

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### Cornell University

Assistant Professor in Computer Science  
Ithaca Campus

*summer 2021 – present*

### Common Sense Machines

Research Scientist

*summer 2020 – summer 2021*

### Massachusetts Institute of Technology

PhD in Cognitive Science

*2014 – 2020*

Thesis: [Algorithms for Learning to Induce Programs](#)

Advisors: Joshua B. Tenenbaum and Armando Solar-Lezama

### Massachusetts Institute of Technology

B.S. in Physics

*2010 – 2014*

Concentration in Linguistics

## PRESS

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[Is Geometry a Language That Only Humans Know?](#) Cover of New York Times Science Section.  
covers work with Mathias Sablé-Meyer, Joshua Tenenbaum, Stanislas Dehaene

[AI that can learn the patterns of human language.](#) MIT News.

Covers work with Adam Albright, Armando Solar-Lezama, Joshua B. Tenenbaum, Timothy J. O'Donnell

[Beyond deep learning.](#) PNAS Front Matter.

Covers neurosymbolic systems, including DreamCoder

## HONORS

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[Nature Communications Editors Highlights](#) (2022). Showcases recent best papers in an area

Google Research Scholar Award (2022)

Nominee from MIT for ACM Distinguished Dissertation Award (2020, one of two MIT nominees)

Angus McDonald Award for Excellence in Undergraduate Teaching (2017)

National Science Foundation Graduate Research Fellowship awardee (2015)

MIT Presidential Graduate Fellowship (2014)

Sigma Pi Sigma Physics Honor Society inductee (2014)

## SELECTED TALKS

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Toward Trustworthy Neural Program Synthesis

© ETH Workshop on Dependable and Secure Software Systems. October 2022. [Video](#)

Unsupervised Program Synthesis: Hierarchy and Perception

© PLDI Symposium on Machine Programming. June 2022, Invited Keynote. [Video](#)

The Role of Higher-level Knowledge in Discovery Problems: Programs and Hierarchical Bayes

@ Max Planck Institute: Workshop on Artificial Scientific Discovery. June 2021. [Video](#)

Programming Languages for Design and Fabrication Applications

@ Computational Fabrication Seminar Series. w/ Karl Willis. March 2021. [Video](#)

Growing domain-specific languages alongside neural program synthesizers via wake-sleep program learning

@ Neuro-symbolic Webinar Series. September 2020. [Video](#)

Learning Languages for Visual Programs

@ CVPR Tutorial: Neuro-Symbolic Visual Reasoning and Program Synthesis. June 2020. [Video](#)

Building Machines that Discover Generalizable, Interpretable Knowledge. [Video](#)

@ MIT Brain and Cognitive Sciences, Princeton, Harvard, Cornell, UCSD, University Washington (2020)

DreamCoder: Growing Libraries of Concepts with Wake-Sleep Program Induction. [Video](#)

@ Dagstuhl Seminar on Approaches and Applications of Inductive Programming (May 2019)

@ International Conference on Probabilistic Programming (October 2018)

@ Cognitive Science workshop on Learning as Program Induction; w/ Mathias Sablé-Meyer (July 2018)

Inducing phonological rules: Perspectives from Bayesian program learning. [Video](#)

@ MIT Workshop on Simplicity in Grammar Learning (September 2017)

Learning to Learn Programs from Examples: Going Beyond Program Structure.

@ Microsoft Research Redmond (August 2017)

@ IJCAI (August 2018)

Bayesian program learning: Prospects for building more human-like AI systems. [Video](#)

@ NeurIPS Neural Abstract Machines and Program Induction; w/ Josh Tenenbaum. December 2016

## SERVICE

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Workshop Co-Organizing

@ Conceptual Abstraction and Analogy in Natural and Artificial Intelligence (AAAI 2021)

@ Neurosymbolic Generative Models (ICLR 2023)

Area Chair

@ ICLR (2023)

@ ICML (2023)

@ NeurIPS (2022)

Program Committee Member

@ PLDI (2023)

@ ICLR Workshops: Deep Learning for Code (2022), Bridging AI and Cognitive Science (2020)

NSF Panel Member (2022)

## PUBLICATIONS

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- NeurIPS 2023  
*Oral* Kevin Ellis  
[Human-like Few-Shot Learning via Bayesian Reasoning over Natural Language](#)
- NeurIPS 2023 Kensen Shi, Hanjun Dai, Wen-Ding Li, [Kevin Ellis](#), Charles Sutton  
[LambdaBeam: Neural Program Search with Higher-Order Functions and Lambdas](#)
- ICML 2023 Hao Tang, [Kevin Ellis](#)  
[From Perception to Programs: Regularize, Overparameterize, and Amortize](#)
- POPL 2023 Matthew Bowers, Theo X. Olausson, Catherine Wong, Gabriel Grand, Joshua B. Tenenbaum, [Kevin Ellis](#), and Armando Solar-Lezama  
[Top-Down Synthesis For Library Learning](#)
- Cognitive Psychology  
2023 Mathias Sabl-Meyer, [Kevin Ellis](#), Josh Tenenbaum, Stanislas Dehaene.  
[A language of thought for the mental representation of geometric shapes](#)
- Nature Communications  
2022 [Kevin Ellis](#), Adam Albright, Armando Solar-Lezama, Joshua B. Tenenbaum, Timothy J. O'Donnell  
[Synthesizing theories of human language with Bayesian program induction](#)
- ICLR 2022 Kensen Shi\*, Hanjun Dai\*, [Kevin Ellis](#),<sup>+</sup> Charles Sutton<sup>+</sup>. (*\*equal contribution, +equal advising*)  
[CrossBeam: Learning to Search in Bottom-Up Program Synthesis](#)
- ICLR 2022 Tuan Anh Le, Katherine M. Collins, Luke Hewitt, Kevin Ellis, Siddharth N, Samuel J. Gershman, Joshua B. Tenenbaum  
[Hybrid Memoised Wake-Sleep: Approximate Inference at the Discrete-Continuous Interface](#)
- AAAI 2022 Nathanaël Fijalkow, Guillaume Lagarde, Théo Matricon, [Kevin Ellis](#), Pierre Ohlmann, Akarsh Potta  
[Scaling Neural Program Synthesis with Distribution-based Search](#)
- PLDI 2021 [Kevin Ellis](#), Catherine Wong, Maxwell Nye, Mathias Sabl-Meyer, Lucas Morales, Luke Hewitt, Luc Cary, Armando Solar-Lezama, Joshua B. Tenenbaum.  
[DreamCoder: Bootstrapping Inductive Program Synthesis with Wake-Sleep Library Learning](#)
- FnT in  
Programming  
Languages  
2021 Swarat Chaudhuri, [Kevin Ellis](#), Oleksandr Polozov, Rishabh Singh, Armando Solar-Lezama, Yisong Yue  
[Neurosymbolic Programming](#)
- CogSci 2021 Christopher Yang, [Kevin Ellis](#).  
[Phonological Interactions, Process Types, and Minimum Description Length Principles](#)
- Artificial Intelligence  
2021 Richard Evans, Matko Bošnjak, Lars Buesing, [Kevin Ellis](#), David Pfau, Pushmeet Kohli, Marek Sergot.  
[Making sense of raw input](#)

ICML 2021 Catherine Wong, [Kevin Ellis](#), Josh Tenenbaum, Jacob Andreas.  
[Leveraging natural language for program search and abstraction learning](#)

NeurIPS 2020 *Oral* Lucas Y. Tian, [Kevin Ellis](#), Marta Kryven, Joshua B. Tenenbaum.  
[Learning abstract structure for drawing by efficient motor program induction](#)

NeurIPS 2020 Yewen Pu, [Kevin Ellis](#), Marta Kryven, Joshua B. Tenenbaum, Armando Solar-Lezama.  
[Program Synthesis with Pragmatic Communication](#)

NeurIPS 2019 [Kevin Ellis](#)\*, Maxwell Nye\*, Yewen Pu\*, Felix Sosa\*, Joshua B. Tenenbaum, and Armando Solar-Lezama. (*\*equal contribution*)  
[Write, Execute, Assess: Program Synthesis with a REPL](#)

ICLR 2019 Yonglong Tian, Andrew Luo, Xingyuan Sun, [Kevin Ellis](#), William T. Freeman, Joshua B. Tenenbaum, and Jiajun Wu  
[Learning to Infer and Execute 3D Shape Programs](#)

Topics in Cognitive Science 2019 Willem Zuidema, Robert M. French, Raquel G. Alhama, [Kevin Ellis](#), Tim O'Donnell, Tim Sainburgh, Tim Gentner.  
[Five ways in which computational modeling can help advance cognitive science: lessons from Artificial Grammar Learning](#)

CogSci 2019 Catherine Wong, [Kevin Ellis](#), Mathias Sablé-Meyer, Joshua B. Tenenbaum  
[Modeling Expertise with Neurally-Guided Bayesian Program Induction](#)  
(Full paper published as abstract)

NeurIPS 2018 *Spotlight* [Kevin Ellis](#), Lucas Morales, Mathias Sablé-Meyer, Armando Solar-Lezama, Joshua B. Tenenbaum  
[Learning Libraries of Subroutines for Neurally-Guided Bayesian Program Induction](#)

NeurIPS 2018 *Spotlight* [Kevin Ellis](#), Daniel Ritchie, Armando Solar-Lezama, Joshua B. Tenenbaum  
[Learning to Infer Graphics Programs from Hand-Drawn Images](#)

IJCAI 2017 [Kevin Ellis](#), Sumit Gulwani  
[Learning to Learn Programs from Examples: Going Beyond Program Structure](#)

NeurIPS 2016 [Kevin Ellis](#), Armando Solar-Lezama, Joshua B. Tenenbaum  
[Sampling for Bayesian Program Learning](#)

NeurIPS 2015 [Kevin Ellis](#), Armando Solar-Lezama, Joshua B. Tenenbaum  
[Unsupervised Learning by Program Synthesis](#)

AAAI Symposium 2015 [Kevin Ellis](#), Eyal Dechter, Joshua B. Tenenbaum. At the AAAI Symposium on Knowledge Representation and Reasoning: Integrating Symbolic and Neural Approaches  
[Dimensionality Reduction via Program Induction](#)

ECAI 2014 Dianhuan Lin, Eyal Dechter, [Kevin Ellis](#), Joshua B. Tenenbaum, Stephen Muggleton. At European Conference on Artificial Intelligence.  
[Bias reformulation for one-shot function induction](#)

