

# Sean Dae Houlihan

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## APPOINTMENTS

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Postdoc.	Dartmouth College	2022–
	Fellow — Neukom Institute for Computational Science	2023–
	Lecturer — Program in Cognitive Science	2023–

## EDUCATION

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Ph.D.	Massachusetts Institute of Technology Department of Brain and Cognitive Sciences Dissertation: <i>A computational framework for emotion understanding</i> Advisors: Rebecca Saxe, Josh Tenenbaum, John Gabrieli	2015–2022
B.A.	University of Colorado, Boulder Molecular, Cellular, and Developmental Biology (Major) Biochemistry (Major)	2004–2008

## AWARDS, HONORS, FELLOWSHIPS

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2023–	Neukom Institute for Computational Science Postdoctoral Fellowship
2017–	Fellow at The Dalai Lama Center for Ethics and Transformative Values
2019–2020	Friends of the McGovern Institute Fellowship
2018	Austen Riggs Scholar in Computational Psychiatry
2018	Cognitive Computational Neuroscience (CCN) Travel Award
2017	Angus MacDonald Award for Excellence in Undergraduate Teaching
2014	Mind and Life, Summer Research Institute Fellowship
2013	California Institute of Regenerative Medicine (CIRM), Bridges Award
2004–2008	University of Colorado Boulder, Honors Program
2004	M.R. Hellie Memorial Scholarship

## PUBLICATIONS

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**Houlihan, S. D.**, Ong, D., Cusimano, M., & Saxe, R. Causal inference over an intuitive theory of emotion. (*in prep.*).

**Houlihan, S. D.**, Kleiman-Weiner, M., Hewitt, L. B., Tenenbaum, J. B., & Saxe, R. (*in press*). Emotion prediction as computation over a generative theory of mind. *Philosophical Transactions of the Royal Society A*. <https://doi.org/10.1098/rsta.2022.0047>

**Houlihan, S. D.**, Ong, D., Cusimano, M., & Saxe, R. (2022). Reasoning about the antecedents of emotions: Bayesian causal inference over an intuitive theory of mind. *Proceedings of the 44th Annual Conference of the Cognitive Science Society*, 854-861. <https://escholarship.org/uc/item/7sn3w3n2>

- Anzellotti, S., **Houlihan, S. D.**, Liburd Jr., S., & Saxe, R. (2021). Leveraging facial expressions and contextual information to investigate opaque representations of emotions. *Emotion*, 21(1), 96-107. <https://doi.org/10.1037/emo0000685>
- Houlihan, S. D.**, Tenenbaum, J. B., & Saxe, R. (2021). Linking models of Theory of Mind and measures of human brain activity. In M. Gilead & K. N. Ochsner (Eds.), *The Neural Basis of Mentalizing* (pp. 209-235). Springer International Publishing. [https://doi.org/10.1007/978-3-030-51890-5\\_11](https://doi.org/10.1007/978-3-030-51890-5_11)
- Saxe, R., & **Houlihan, S. D.** (2017). Formalizing emotion concepts within a Bayesian model of theory of mind. *Current Opinion in Psychology*, 17, 15-21. <https://doi.org/10.1016/j.copsy.2017.04.019>
- van Lutterveld, R., **Houlihan, S. D.**, Pal, P., Sacchet, M. D., McFarlane-Blake, C., Patel, P. R., Sullivan, J. S., Ossadtchi, A., Druker, S., Bauer, C., & Brewer, J. A. (2017). Source-space EEG neurofeedback links subjective experience with brain activity during effortless awareness meditation. *NeuroImage*, 151, 117-127. <https://doi.org/10.1016/j.neuroimage.2016.02.047>
- Houlihan, S. D.**, & Brewer, J. A. (2016). The emerging science of mindfulness as a treatment for addiction. In E. Shonin, W. V. Gordon, & M. D. Griffiths (Eds.), *Mindfulness and Buddhist-Derived Approaches in Mental Health and Addiction* (pp. 191-210). Springer International Publishing. [https://doi.org/10.1007/978-3-319-22255-4\\_9](https://doi.org/10.1007/978-3-319-22255-4_9)

#### INVITED PRESENTATIONS (SELECTED)

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2022	Consortium for Interacting Minds, Dartmouth College
2022	Machine Common Sense Working Group, IBM-Harvard-MIT
2021	Center for Brain Minds and Machines Annual Retreat, MIT
2018	Morality Lab (Prof. Liane Young), Boston College
2017	Cognitive Lunch, MIT
2016	Biology Department, Berkeley City College
2016	Consciousness Hacking SF
2016	Peabody Essex Museum
2016	SinhaLab (Prof. Pawan Sinha), MIT

#### CONFERENCE PRESENTATIONS (SELECTED TALKS)

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- Houlihan, S. D.**, Ong, D. C., & Saxe R. (July 2022). Reasoning about the antecedents of emotions: Bayesian causal inference over an intuitive theory of mind. Talk given at the 44th Annual Conference of the Cognitive Science Society (CogSci). Toronto, Canada.
- Houlihan, S. D.**, Ong, D. C., & Saxe R. (April 2022). Reasoning about emotions, expressions, and events: Bayesian causal inference over an intuitive theory. Talk given at the Society for Affective Science (SAS) Conference. Remote. **Top Ranked Abstract.**
- Houlihan, S. D.**, Kleiman-Weiner M., Tenenbaum J. B., & Saxe R. (October 2019). A generative model of context-based emotion reasoning. Talk given at the

Interdisciplinary Advances in the Development of Emotion Understanding Pre-conference, at the Biennial Meeting of the Cognitive Development Society (CDS). Louisville, KY.

**Houlihan, S. D.**, Kleiman-Weiner M., Tenenbaum J. B., & Saxe R. (September 2018). Modeling emotion attribution as inverse inference in an intuitive theory of mind. Talk given at the Conference on Cognitive Computational Neuroscience (CCN). Philadelphia, PA. **CCN Student Travel Award**.

**Houlihan, S. D.**, Kleiman-Weiner M., Tenenbaum J. B., & Saxe R. (May 2018). Emotion attribution as Bayesian inference in an intuitive theory of mind. Talk in symposium, "Predictive Social Cognition: Neural and Computational Approaches to Understanding How Perceivers Glimpse the Social Future," at the 30th Association for Psychological Science (APS) Annual Convention. San Francisco, CA.

#### CONFERENCE PRESENTATIONS (SELECTED POSTERS)

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**Houlihan S. D.**, Kleiman-Weiner M., Tenenbaum J. B., & Saxe R. (July 2019). Emotion attributions echo the structure of people's intuitive theory of psychology. Poster presented at the 41st Annual Conference of the Cognitive Science Society (CogSci). Montreal, CA.

**Houlihan S. D.**, Kleiman-Weiner M., Tenenbaum J. B., & Saxe R. (October 2018). Formalizing people's intuitive theory of emotions as a probabilistic program. Poster presented at the International Conference on Probabilistic Programming (PROBPROG). Boston, MA.

**Houlihan S. D.**, Kleiman-Weiner M., Tenenbaum J. B., & Saxe R. (September 2018). Poster presented at Duality's End: Computational Psychiatry and the Cognitive Science of Representation. Stockbridge, MA. **Erikson Institute Travel Award**.

**Houlihan S. D.**, Kleiman-Weiner M., Tenenbaum J. B., & Saxe R. (July 2018). A generative model of people's intuitive theory of emotions: inverse planning in rich social games. Poster presented at the 40th Annual Conference of the Cognitive Science Society (CogSci). Madison, WI.

**Houlihan S. D.**, Kleiman-Weiner M., Tenenbaum J. B., & Saxe R. (March 2018). Reverse-engineering emotional intelligence: generative models of an intuitive theory of emotions. Poster presented at MIT Intelligence Quest (MITIQ). Cambridge, MA.

Anzellotti S., **Houlihan S. D.**, & Saxe R. (September 2017). Nonlinear statistical dependence outperforms linear dependence in Bayesian inferences about the neural networks underlying simulated fMRI data. Poster presented at the Conference on Cognitive Computational Neuroscience (CCN). New York City, NY.

**Houlihan S. D.**, & Saxe R. (April 2017). Modeling emotion attributions as inference in an intuitive theory of mind. Poster presented at the Wisconsin Symposium on Emotion. Madison, MI.

**Houlihan S. D.**, van Lutterveld R., Pal P., Sacchet M. D., McFarlane-Blake C., Patel P. R., Bauer C., & Brewer J. A. (February 2015). Source-estimated EEG neurofeedback for effortless awareness meditation. Poster presented at the Real-time Functional Imaging and Neurofeedback Conference. Gainesville, FL.

Amin N., **Houlihan S. D.**, & Kaufer D. (November 2014). The role of stress hormones in prosociality in rats. Poster presented at the Science of Compassion Conference. San Francisco, CA.

**Houlihan S. D.**, van Lutterveld R., Pal P., McFarlane-Blake C., Patel P., Garrison K. A., Whitfield-Gabrieli S., & Brewer J.A. (November 2014). Multimodal real time neurofeedback to dissect default network function related to meditation, addiction and stress. Poster presented at the Basic Research/Graduate School of Biomedical Sciences Retreat, University of Massachusetts Medical School. Amherst, MA.

**Houlihan S. D.**, Taravosh-Lahn K., Hamilton J., Francis D., & Kaufer D. (July 2014). Hippocampal white-matter remodeling due to early life environment. Poster presented at the CIRM Bridges Trainee Conference, California Institute of Regenerative Medicine. Burlingame, CA.

## TEACHING EXPERIENCE

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### Harvard

HST583: Functional Magnetic Resonance Imaging, Data Acquisition and Analysis.  
2017 Fall (TA for Profs. Jon Polimeni & Susan Whitfield-Gabrieli).

### MIT

Brains, Minds, and Machines.

2017 Summer (TA for Profs. Gabriel Kreiman and Tomaso Poggio on 1-month intensive).

9.46: Neuroscience of Morality.

2016 Fall (TA for Prof. Rebecca Saxe). **Award for excellence in undergraduate teaching.**

### MIT Educational Studies Program

S10607: The neuroscience of meditation.

2016 (Instructor, 1-day course during Independent Activities Period).

S9746: The neuroscience of meditation.

2015 (Instructor, 1-day course during Independent Activities Period).

### Berkeley City College

Bio 230A: Scientific Instrumentation I.

2012 Spring (Co-instructor with Dr. Scott Blicht).

2012 Fall (TA for Dr. Barbara Des Rochers).

Bio 230B: Scientific Instrumentation II.

2012 Spring (TA for Dr. Brandon Celaya).

Bio 33: Applied Immunology.

2012 Spring (TA for Dr. Barbara Des Rochers).

Bio 34: Genetics.

2012 Fall (TA for Dr. Ann Marie Faust).

Bio 10: Introduction to Biology.

2012 Spring (TA for Dr. Linda McPherson).

2008 Fall (TA for Dr. Pieter de Haan).

Bio 1A: General Biology.  
2009 Spring (TA for Javier Silva).  
2009 Fall (TA for Javier Silva).  
2009 Summer (TA for Javier Silva).  
2008 Fall (TA for Javier Silva).

National Outdoor Leadership School

Rocky Mountain Lightweight Backpacking Seminar.  
2011 Summer (Instructor, 1-week wilderness skills course).

**PROFESSIONAL SERVICE**

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Professional Societies and Conferences

International Conference on Machine Learning (ICML)  
2023 Program Committee Member, Workshop on Theory of Mind

**POSITIONS HELD**

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2014–2015	Research Assistant – UMass Medical School (PI: Judson Brewer)
2013	CIRM Scholar – University of California, Berkeley (PI: Daniela Kaufer)

**EMPLOYMENT**

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2012.01–2013.01	Berkeley City College – Co-Instructor, Curriculum Developer
2011.05–2011.12	National Outdoor Leadership School (NOLS) – Field Instructor
2011.04–2011.04	The Pianist Lost Production – Helicopter Camera Operator
2011.02–2011.05	ChromaDex – Analytical Chemistry Technician
2011.01–2011.05	Longmont Tutoring Club – Math and Science Tutor
2010.01–2010.12	Math and Biology Tutor
2008.09–2010.01	Berkeley City College – Instructional Assistant