

# Leyla Isik

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## Academic Appointments

**Johns Hopkins University**, Clare Boothe Luce Assistant Professor 2019-present

Department of Cognitive Science

Secondary appointment: Biomedical Engineering

Kavli Neuroscience Discovery Institute

**Center for Brains, Minds, and Machines**, Postdoctoral Associate 2015-2019

**Massachusetts Institute of Technology**, McGovern Institute for Brain Research

Advisor: Nancy Kanwisher

**Boston Children's Hospital, Harvard Medical School**

Advisor: Gabriel Kreiman

## Education

**Massachusetts Institute of Technology**, Ph.D. Computational Biology 2015

Advisor: Tomaso Poggio

Thesis title: The dynamics of invariant object and action recognition in the human visual system.

**Johns Hopkins University**, B.S. Biomedical Engineering 2010

## Publications

(mentees underlined)

*Submitted*

Im, E.\*, Shirahatti, A.\*, and **Isik, L.** The neural development of naturalistic social scene perception in young children.

Preprint: PsyArXiv, doi: [10.31234/osf.io/aqryd](https://doi.org/10.31234/osf.io/aqryd)

Lee Masson, H., Chang, L., and Isik, L. Multidimensional neural representations of social features during movie viewing.

Preprint: bioarxiv, doi: 10.1101/2023.11.22.568258

Soulos, P. and Isik, L. Disentangled deep generative models reveal coding principles of the human face processing network.

Preprint: biorxiv, doi: 10.1101/2023.02.15.528489

Lee Masson, H., Chen, J., and Isik, L. A shared neural code for social interaction encoding and memory in the human superior temporal sulcus.

Preprint: bioarxiv, doi: 10.1101/2022.10.03.510639

Vogelstein, J., Verstynen, T., Kording, K., Isik, L., et al. Prospective Learning: Back to the Future.

Preprint: arXiv, doi: 10.48550/arXiv.2201.07372

#### *Peer-reviewed articles*

Malik, M. and Isik, L. (2023) Relational visual representations underlie human social interaction recognition. *Nature Communications*.

Preprint: psyarxiv, doi: 10.31234/osf.io/5cuyr

McMahon, E., Bonner, M., and Isik, L. (2023) Hierarchical organization of social action features along the lateral visual pathway. *Current Biology*.

McMahon, E. and Isik, L. (2023) Seeing Social Interactions. *Trends in Cognitive Sciences*.

Lee Masson, H. and Isik, L. (2023) Rapid processing of observed touch via a social perceptual pathway: an EEG-fMRI fusion study. *Journal of Neuroscience*.

Dima, D., Hebart, M., and Isik, L. (2023) A data-driven investigation of human action representations. *Scientific Reports*.

Dima, D., Tomita, T., Honey, C., and Isik, L. (2022) Social-affective features drive human representations of observed actions. *eLife*.

Ivanova, A., Schrimpf, M., Anzellotti S., Zaslavsky N., Fedorenko E., and Isik, L. (2022) Beyond linear regression: mapping models in cognitive neuroscience should align with research goals. *Neurons, Behavior, Data, and Theory*.

Lee Masson, H. and Isik, L. (2021) Functional selectivity for social interaction perception in the human superior temporal sulcus during natural viewing. *Neuroimage*.

Soulos, P. and **Isik, L.** (2020) Disentangled face representations in deep generative models and the human brain. *NeurIPS workshop on Shared Visual Representations in Humans and Machines (SVRHM)*.

**Isik, L.**, Mynick, A., Pantazis D., and Kanwisher N. (2020) The speed of human social interaction perception. *Neuroimage*.

Dobs, K., **Isik, L.**, Pantazis D., and Kanwisher, N. (2019) How face perception unfolds over time. *Nature Communications*.

**Isik, L.\***, Tacchetti, A.\*, and Poggio, T. (2018) Fast, invariant representations for human action in the visual system. *The Journal of Neurophysiology*.

**Isik, L.**, Singer, J., Madsen, J.R., Kanwisher, N., and Kreiman G. (2018) What is changing when: Decoding visual information in movies from human intracranial recordings. *Neuroimage*.

Ward, E., **Isik, L.**, and Chun, M. (2018) General transformations of object representations in human visual cortex. *The Journal of Neuroscience*.

Tacchetti, A., **Isik, L.**, and Poggio, T. (2018) Invariant recognition dictates neural representations of visual input. *Annual Reviews of Vision Science*.

Tacchetti, A.\*, **Isik, L.\***, and Poggio, T. (2017) Invariant recognition drives neural representations of action sequences. *PLoS Computational Biology*.

**Isik, L.**, Koldewyn, K., Beeler, D., and Kanwisher N. (2017) Perceiving social interactions in the posterior superior temporal sulcus. *Proceedings of the National Academy of Sciences*.

Chen, F., Roig, G., **Isik, L.**, Boix, X., and Poggio T. (2017) Eccentricity-dependent deep neural networks: Modeling invariance in human vision. *AAAI Spring Symposium Series*.

**Isik, L.**, Meyers, E.M., Leibo, J.Z., and Poggio, T. (2014) The dynamics of invariant object recognition in the human visual system. *The Journal of Neurophysiology*.

**Isik, L.**, Han, Y., and Poggio, T. (2013) Decoding invariant visual information with MEG sensor and source data. *NeurIPS workshop on Machine Learning and Interpretation in Neuroimaging*.

**Isik, L.**, Leibo, J.Z., and Poggio, T. (2012) Learning and disrupting invariance in visual recognition with a temporal association rule. *Frontiers in Computational Neuroscience*.

Carter, H., Chen, S., **Isik, L.**, Tyekucheva, S., Velculescu, V.E., Kinzler, K.W., Vogelstein, B., and Karchin, R., (2009) Cancer-specific high-throughput annotation of somatic mutations: computational prediction of driver missense mutations. *Cancer Research* .

## Research Funding

NIH R01MH132826 (2023-2028). PI	\$3,115,834
<i>The neural computations underlying human social interaction recognition.</i>	
NIH R21MH129899 (2022-2024). PI	\$464,876
<i>The neural basis of social interaction perception and its disruption in autism.</i>	
NSF AI Institute Planning Grant (2020-2022). Co-I (PI: Konrad Kording).	\$76,629
<i>Understanding Biological Intelligence for Active Lifelong Learning.</i>	
Google Faculty Research Award (2019). PI	\$85,240
<i>Deep learning models of human social interaction perception.</i>	
NSF STC award (2019-2021). Co-I (PI: Tomaso Poggio).	\$168,250
<i>A Center for Brains, Minds, and Machines: The Science and the Technology of Intelligence.</i>	

## Honors and Awards

Faculty Research Award, Google AI, 2019.

American Physiological Society APS*select* award for the article "A fast, invariant representation for human action in the visual system", 2018.

Mark Gorenberg Graduate Student Fellowship, McGovern Institute for Brain Research MIT, 2013-2014.

National Science Foundation Graduate Research Fellowship, 2010-2013.

MIT Graduate Women of Excellence Award, 2013.

Teresa Keng Graduate Teaching Prize, MIT Biology Dept., 2012.

Women in Machine Learning NeurIPS Student Travel Grant, 2012.

## Selected Invited Talks

University of Coimbra Seeing and Acting Workshop 2023.

Dartmouth Innovators in Cognitive Neuroscience Speaker Series 2023.

MIT Center for Brains, Minds, and Machines Colloquium 2023.

University of Waterloo Centre for Theoretical Neuroscience 2022.

CVPR NeuroVision Workshop 2022.  
UC Santa Barbara Mellichamp Mind-Machine Summit 2022.  
University of Michigan Cognitive Area Talk 2022.  
American University Cognition and Cognitive Neuroscience Seminar Series 2021.  
John Hopkins University Mind/Brain Institute Bodian Seminar Series 2021.  
Cognitive Computational Neuroscience (CCN) Workshop 2021.  
University of Regensburg Cognitive Neuroscience Seminar 2021.  
Social and Affective Neurosciences (SANS) Symposium 2021.  
Dartmouth Center for Cognitive Neuroscience Talk Series 2021.  
UC Merced Mind, Technology, & Society Talk Series 2021.  
University of Alabama Birmingham, BrainCore Seminar 2021.  
NeurIPS workshop on Shared Visual Representations in Humans and Machines 2020.  
Cognitive Computational Neuroscience (CCN) Workshop 2020.  
Capital Area Cognition, Attention, and Perception Conference 2020.  
Morgan State ASCEND Scholars Seminar 2019.  
Rutgers University Women in Neuroscience Seminar 2018.  
Bernstein Computational Neuroscience Workshops 2018.  
International Biomagnetism Conference 2018.  
Cognitive Neuroscience Society 2018.  
Johns Hopkins University Biomedical Engineering Special Seminar 2018.  
UC Santa Barbara Psychological and Brain Science Seminar 2018.  
Northwestern University Psychology Colloquium 2018.  
Boston University Biomedical Engineering Seminar Series 2018.  
Johns Hopkins University Cognitive Science Seminar 2017.  
UC Irvine Cognitive Science Seminar 2017.  
Affective Brain Lab, University College London/MIT, 2015.  
Cognitive Neuropsychology Lab, Harvard University, 2015.  
Brain Image Analysis Research Group, Carnegie Mellon University, 2014.

## Selected Conference Presentations

Im, E., Shirahatti, A., and Isik, L. Investigating the neural development of social scene perception in young children using naturalistic stimuli. Talk: Seeing and Acting Workshop 2023.

ANT Neuro Travel Award Winner.

Malik, M. and Isik, L. Human Social Interaction Judgements are Uniquely Explained by both Bottom-up Graph Neural Networks and Generative Inverse Planning Models. Poster: Cognitive Computational Neuroscience 2023.

Lee Masson, H. and Isik, L. Rapid processing of observed social touch through a social perceptual pathway: an EEG-fMRI fusion study. Poster: Cognitive Computational Neuroscience 2023.

McMahon, E., Abel, T., Gonzalez-Martinez, J., Bonner, M., Ghuman, A., and Isik, L. The spatiotemporal dynamics of social scene perception in the human brain. Talk: Vision Sciences Society 2023.

National Eye Institute Travel Award Winner.

Lee Masson, H. and Isik, L. Observed social touch is processed in a rapid, feedforward manner: an EEG-fMRI fusion study. Talk: Vision Sciences Society 2023.

Malik, M. and Isik, L. Both Purely Visual and Simulation-based Models Uniquely Explain Human Social Interaction Judgements. Poster: Vision Sciences Society 2023.

Small, H. and Isik, L. Lateralization of dynamic social interaction perception. Poster: Vision Sciences Society 2023.

Shirahatti, A. and Isik, L. Developmental differences in social brain responses during movie viewing. Poster: Cognitive Computational Neuroscience 2022.

Malik, M. and Isik, L. Social Inference from Relational Visual Information: An Investigation with Graph Neural Network Models. Poster: Cognitive Computational Neuroscience 2022.

McMahon, E., Bonner, M., and Isik, L. Hierarchical representations of naturalistic social interactions in the lateral visual pathway. Poster: Cognitive Computational Neuroscience 2022.

Soulos, P. and Isik, L. Disentangled face representations in deep generative models and the human brain. Poster: Cognitive Computational Neuroscience 2022.

Malik, M. and Isik, L. Social inference from relational visual information. Talk: Vision Science Society (VSS) 2022.

McMahon, E., Bonner M., and **Isik L.** Naturalistic two-person social perception in the brain. Poster: Vision Science Society (VSS) 2022.

Lee Masson, H., Chang, L., Chen, J. and **Isik L.** Neural basis of remembering details of a social versus non-social scene shown in a natural movie. Poster: Vision Science Society (VSS) 2022.

Dima, D., Tomita, T., Honey C., Hebart M., and **Isik, L.** A data-driven investigation of human action representations. Poster: Vision Sciences Society (VSS) 2021.

Lee Masson, H., and **Isik, L.** Selective processing of social interactions during natural movie viewing. Poster: Vision Sciences Society (VSS) 2021.

McMahon, E., Bonner, M., and **Isik, L.** A large-scale naturalistic dataset of two-person social actions. Poster: Vision Sciences Society (VSS) 2021.

Chang, L., Lee Masson, H., and **Isik, L.** A multi-regression model of social perception during natural movie viewing. Poster: Vision Sciences Society (VSS) 2021.

Soulos, P. and **Isik, L.** Disentangled face representations in deep generative models and the human brain. Poster: NeurIPS workshop on Shared Visual Representations in Humans and Machines (SVRHM) 2020.

Dima, D., Tomita, T., Honey, C., and **Isik, L.** The representational space of action perception. Poster: Vision Sciences Society (VSS) 2020.

Dima, D., Tomita, T., Honey, C., and **Isik, L.** Disentangling the features of human action perception. Talk: Capital Area Cognition, Attention, and Perception Conference 2020.

**Isik, L.**, Mynick, A., Pantazis, D., and Kanwisher, N. The speed of social interaction perception in the human brain. Poster: Cognitive Computational Neuroscience (CCN) 2018.

The neural dynamics of social perception. **Isik L**, Mynick A, Koldewyn K, and Kanwisher N. Poster: Vision Sciences Society (VSS) 2018.

**Isik, L.**, Tacchetti A., and Poggio T. Invariant recognition drives neural representations of actions. Poster: Cognitive Computational Neuroscience (CCN) 2017.

**Isik, L.**, Tacchetti, A., and Poggio T. Fast, invariant representations for action in the human visual system. Talk: The International Conference on Biomagnetism (Biomag) 2016.

**Isik, L.**, Singer, J., Madsen, J.R., Kanwisher, N., and Kreiman, G. Probing human intracranial visual responses with commercial movies. Poster: Vision Sciences Society (VSS) 2016.

**Isik, L., Tacchetti, A., and Poggio, T.** Invariant representations for action in the human visual system. Poster: Computational and Systems Neuroscience (COSYNE) 2015.

**Isik, L., Tacchetti, A., and Poggio, T.** Invariant representations for action in the human visual system. Poster: Society for Neuroscience 2014.

**Isik, L., Han, Y., and Poggio, T.** Decoding invariant visual information with MEG sensor and source data. Poster: NeurIPS Workshop on Machine Learning and Interpretation in Neuroimaging 2013.

**Isik, L., Meyers, E.M., Leibo, J.Z., and Poggio, T.** A spatiotemporal profile of invariant object recognition in the human visual system. Talk: Society for Neuroscience 2013.

**Isik, L., Meyers, E.M., Leibo, J.Z., and Poggio, T.** The dynamics of invariant object recognition. Poster: Computational and Systems Neuroscience (COSYNE) 2013.

**Isik, L., Meyers, E.M., Leibo, J.Z., and Poggio, T.** Decoding visual stimuli with magnetoencephalography. Poster: Women in Machine Learning Workshop 2012.

**Isik, L., Meyers, E.M., Leibo, J.Z., and Poggio, T.** Detecting invariant visual signals with MEG decoding. Poster: Society for Neuroscience 2012.

## Teaching

JHU Cognitive Science Department, Computational Social Cognition. Fall 2021-2023.

JHU Cognitive Science Department, Visual Cognition. Spring 2020-2022.

MIT Biology Department, 7.QBWx Quantitative Biology Workshop. Instructor for section on "Introduction to Machine Learning and Biology". January 2014, January 2016. Available on EdX.

Brains, Minds, and Machines, Summer Course, Marine Biological Laboratory. Teaching Assistant (Profs. Tomaso Poggio, Gabriel Kreiman, Nancy Kanwisher, Josh Tenenbaum, and Boris Katz). Summers 2014, 2015.

## Advising

*JHU (current)*

Colin Conwell (Postdoc) 2023-present.

Yuan-fang Zhao (Postdoc) 2023-present.



Emalie McMahon (PhD) 2019-present.

NSF GRFP recipient 2019

Paul Soulos (MA, PhD) 2019-present.

Manasi Malik (PhD) 2021-present.

Hannah Small (PhD) 2021-present.

NSF GRFP recipient 2023

Kathy Garcia (PhD) 2022-present.

Elizabeth Im (Research Assistant/Lab manager) 2022-present.

Veric Tan (undergraduate) 2023-present.

Adina Mosa (undergraduate) 2023-present.

*JHU (former)*

Haemy Lee Masson (Postdoc) 2020-2022.

Current position: Assistant Professor of Psychology, Durham University

Diana Dima (Postdoc) 2019-2021.

Current position: Postdoctoral fellow, Western University

Angira Shirahatti (MA) 2021-2022.

Gemma Nicholson (MA) 2019-2020.

Jiewan Hong (undergraduate) 2023.

Seojin Lee (undergraduate) 2022-2023.

Raven Foster (undergraduate) 2022.

Lucy Chang (undergraduate) 2020-2022.

Victoria Liu (undergraduate) 2021-2022.

Josh Kim (undergraduate) 2021-2022.

Jihoon Kim (undergraduate) 2021-2022.

Cora Mentor Roy (undergraduate) 2020-2021.

Emmanuel Ochieng (undergraduate) 2020-2022.

Susan Liu (undergraduate) 2020-2021.

Melody Lee (undergraduate) 2020-2021.

Bethany Kemp (undergraduate) 2020-2021.

*MIT/Harvard*

Elizabeth Eastman (undergraduate, MIT, 2018; Master of Engineering, MIT, 2019) 2018-2019.

Felix Sosa (undergraduate, University of Central Florida, MIT) 2018.

Yue Zhang (undergraduate, Tsinghua University) Summer 2017.

Aditya Karhade (medical student, Harvard Medical School, 2019) 2016-2017.

Francis Chen (Master of Engineering, MIT 2017) 2016-2017.

Manon Remy (undergraduate Polytech Nice Sophia, 2017) Summer 2016.

Kaley Jenney (undergraduate Emmanuel College 2017) 2015-2016.

Yena Han (undergraduate, MIT, 2014; Master of Engineering, MIT, 2015) 2012-2015.

Caroline Mak (undergraduate, MIT, 2018) 2014-2015.

Heejung Kim (undergraduate, MIT, 2013) 2012-2013.

Toby Clark (undergraduate, Duke, 2013) Summer 2013.

**Service**

Cognitive Computational Neuroscience (CCN) Conference Program Committee. 2020-present. Co-Chair 2022-2023.

JHU Cognitive Science Department Diversity and Representation Committee. 2020-present.

JHU Cognitive Science Department Brown Bag Talk Coordinator. 2020-present.

Associate Editor PLoS Computational Biology. 2019-2022.

Neuromatch Academy research team mentor. 2020.

Ad-hoc reviewer: Nature, Nature Neuroscience, Nature Communications, PNAS, Neuron, Journal of Neuroscience, Neuroimage, Cerebral Cortex, PLoS Computational Biology, eLife, IEEE Transactions, Scientific Reports, PLoS ONE.

Graduate Women at MIT, Executive co-chair. 2013-2015.