

# Mark K. Ho

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## Employment

**Princeton University** - Princeton, NJ 2018 - Current  
**University of California Berkeley** - Berkeley, CA  
*Postdoctoral Research Associate*  
Advisor: Prof. Thomas Griffiths

## Education

**Brown University** - Providence, RI 2018  
Ph.D., Cognitive Science  
Dissertation Committee: Joseph L. Austerweil, Ph.D. (Chair), Michael Frank, Ph.D.,  
Fiery Cushman Ph.D., Michael L. Littman, Ph.D.

Sc.M., Computer Science 2015  
Specialization: Machine Learning and Artificial Intelligence

Sc.M., Cognitive Science 2014

**Princeton University** - Princeton, NJ 2011  
A.B. *Magna Cum Laude*, Philosophy  
Minors: Computer Science; Values and Public Life

**Bronx High School of Science** - Bronx, NY 2007

## Awards and Fellowships

**National Science Foundation Graduate Research Fellowship** 2014-2019

**Brown University Open Graduate Education Fellowship** 2014-2015

**Professor Lorrin A. Riggs Graduate Student Dissertation Fellowship** 2017

**NIPS Conference Student Travel Award** Fall 2016

**Indiana U. and NSF Young Scientist Travel Award** Summer 2016

**Peter D. Eimas Graduate Research Award** 2016-2017

**Brown University Conference Travel Award** Summer 2015

**Betty R.H. and James M. Pickett Fellowship** 2012-2013

## Journal Papers

**Ho, M. K.**, Cushman, F., Littman, M. L., & Austerweil, J. L. (2019). People teach with rewards and punishments as communication, not reinforcements. *Journal of Experimental Psychology: General*, 148(3), 520-549. <https://doi.org/10.1037/xge0000569>

**Ho, M. K.**, Abel, D., Griffiths, T. L., & Littman, M. L. (2019). The value of abstraction. *Current Opinion in Behavioral Sciences*. Elsevier Ltd. <https://doi.org/10.1016/j.cobeha.2019.05.001>

**Ho, M. K.**, MacGlashan, J., Littman, M. L., & Cushman, F. (2017). Social is special: A normative framework for teaching with and learning from evaluative feedback. *Cognition*. <https://doi.org/10.1016/j.cognition.2017.03.006>

## Pre-prints

**Ho, M. K.**, Cushman, F. A., Littman, M. L., & Austerweil, J. L. (under review) Communication in action: Planning and interpreting communicative demonstrations. <https://psyarxiv.com/a8sxxk/>

Sarin, A., **Ho, M. K.**, Martin, J., & Cushman, F. A. (under review) Punishment is organized around principles of communicative inference. <https://psyarxiv.com/2cyf7/>

## Book Chapters

Cushman, F.A., Sarin, A. & **Ho, M. K.**(in press). Punishment as communication. In *Oxford Handbook of Moral Psychology*. Eds. Doris, J. & Vargas, M. Oxford University Press.

## Conference Proceedings

Correa, C. G.\*, **Ho, M. K.\***, Callaway, F., & Griffiths, T. L. (2020). Resource-rational task decomposition to minimize planning costs. Proceedings of the 42nd Annual Conference of the Cognitive Science Society. \**Equal contribution*.

Sumers, T. R., **Ho, M. K.**, & Griffiths, T. L. (2020). Show or tell? Demonstration is more robust to changes in shared perception than explanation. Proceedings of the 42nd Annual Conference of the Cognitive Science Society.

**Ho, M. K.**, Abel, D., Cohen, J. D., Littman, M. L., & Griffiths, T. L. (2020) The Efficiency of Human Cognition Reflects Planned Information Processing. In Proceedings of the 34th AAAI Conference on Artificial Intelligence. AAAI Press.

Wang, G., Trimbach, C., Lee, J. K., **Ho, M. K.**, & Littman, M. L. (2020). Teaching a Robot Tasks of Arbitrary Complexity via Human Feedback. In Proceedings of the 2020 ACM/IEEE International Conference on Human-Robot Interaction (pp. 649-657).

Carroll, M., Shah, R., **Ho, M. K.**, Griffiths, T. L., Seshia, S. A., Abbeel, P. & Dragan, A. (2019) On the Utility of Learning about Humans for Human-AI Coordination. In Advances in Neural Information Processing Systems 32. Curran Associates, Inc.

**Ho, M. K.**, Korman, J., & Griffiths, T. L. (2019). The computational structure of unintentional meaning. Proceedings of the 41st Annual Conference of the Cognitive Science Society. In A.K. Goel, C.M. Seifert, & C. Freksa (Eds.) Proceedings of the 41st Annual Conference of the Cognitive Science Society (p. 1915-1921). Montreal, QB: Cognitive Science Society.

Vazquez-Chanlatte, M., Jha, S., Tiwari, A., **Ho, M. K.**, & Seshia, S. A. (2018). Learning Task Specifications from Demonstrations. In Advances in Neural Information Processing Systems 31. Curran Associates, Inc.

**Ho, M. K.**, Littman, M. L., Cushman, F., & Austerweil, J. L. (2018). Effectively learning from pedagogical demonstrations. In C. Kalish, M. Rau, T. Rogers, & J. Zhu (Eds.), Proceedings of the 40th Annual Conference of the Cognitive Science Society. Austin, TX: Cognitive Science Society.

**Ho, M. K.**, Littman, M. L. & Austerweil, J. L. (2017). Teaching by Intervention: Working Backwards, Undoing Mistakes, or Correcting Mistakes? In Proceedings of the 39th Annual Conference of the Cognitive Science Society. Austin, TX: Cognitive Science Society.

MacGlashan, J., **Ho, M. K.**, Loftin, R. T., Peng, B., Roberts, D. L., Taylor, M. E., & Littman, M. L. (2017). Interactive Learning from Policy-Dependent Human Feedback. Paper presented at the Proceedings of the 34th International Conference on Machine Learning (ICML).

**Ho, M. K.**, Littman, M., MacGlashan, J., Cushman, F., & Austerweil, J. L. (2016). Showing versus doing: Teaching by demonstration. In D. D. Lee, M. Sugiyama, U. V. Luxburg, I. Guyon, & R. Garnett (Eds.), Advances in Neural Information Processing Systems 29 (pp. 3027-3035).

**\*\*Selected for oral presentation\*\***

**Ho, M. K.**, MacGlashan, J., Greenwald, A., Littman, M. L., Hilliard, E. M., Trimbach, C., Brawner, S., Tenenbaum, J. B., Kleiman-Weiner, M., & Austerweil, J. L. (2016). Feature-based joint planning and norm learning in collaborative games. In Proceedings of the 38th Annual Meeting of the Cognitive Science Society. Austin, TX: Cognitive Science Society.

Kleiman-Weiner, M., **Ho, M. K.**, Austerweil, J. L., Littman, M. L., & Tenenbaum, J. B. (2016). Coordinate to cooperate or compete: Abstract goals and joint intentions in social interaction. In Proceedings of the 38th Annual Meeting of the Cognitive Science Society. Austin, TX: Cognitive Science Society.

**Ho, M. K.**, Littman, M. L., Cushman, F. & Austerweil, J. L. (2015). Teaching with rewards and punishments: Reinforcement or communication?. In D. C. Noelle and R. Dale and A. S. Warlaumont and J. Yoshimi and T. Matlock and C. D. Jennings and P. P. Maglio (Eds.), Proceedings of the 37th Annual Meeting of the Cognitive Science Society (p. 920-925). Austin, TX: Cognitive Science Society.

## Posters

**Ho, M. K.**, Abel, D., Cohen, J. D., Littman, M. L. & Griffiths, T. L. (2019, Sept.) Optimal planning to plan: People partially plan based on plan specificity. Extended Abstract presented at Cognitive Computational Neuroscience. Berlin, Germany.

Seshia, S, Griffiths, T., **Ho, M. K.** & Vazquez-Chanlatte, Marcell (Nov, 2019) Learning and Teaching Task Specifications from Demonstrations. Poster presented at NSF Cyber-Physical Systems PI Meeting. Washington, DC.

Vazquez-Chanlatte, M, **Ho, M. K.**, Griffiths, T., Seshia, S. (Dec, 2018) Communicating Compositional and Temporal Specifications by Demonstration. Poster presented at the 2nd IFAC Conference on Cyber-Physical and Human-Systems. Miami, Fl.

**Ho, M. K.**, Sanborn, S., Callaway, F., Bourgin, D., & Griffiths, T. (2018, Sept.). Human Priors in Hierarchical Program Induction. Extended Abstract presented at Cognitive Computational Neuroscience. Philadelphia, Pa.

**Ho, M. K.**, Littman, M., MacGlashan, J., Cushman, F., & Austerweil, J. L. (2017, Sept.) Showing versus Doing: Teaching by Demonstration. Poster presented at the Inaugural Conference on Cognitive Computational Neuroscience, New York City, New York.

Kleiman-Weiner, M., **Ho, M. K.**, Austerweil, J. L., Littman, M. L., & Tenenbaum, J. (2017, June). Learning to Cooperate and Compete. Poster presented at the Reinforcement Learning and Decision Making conference, Ann Arbor, Michigan, USA. **\*\*Best paper award\*\***

**Ho, M. K.**, Littman, M. L., MacGlashan J., Cushman F., & Austerweil J. L.. (2017, March). Human Teaching by Demonstration: Showing versus Doing Reinforcement Learning Tasks. Poster and talk presented at the 11th Annual Machine Learning Symposium of the New York Academy of Sciences, New York City, New York. **\*\*Top presentation award\*\***

**Ho, M. K.**, Littman, M.L., Cushman, F. & Austerweil, J. L. (2016, January). Generous Teachers: Evaluative Feedback as Communication. Poster presented at the Annual meeting of the Society for Personality and Social Psychology, San Diego, California.

**Ho, M. K.**, Littman, M. L., Cushman, F. & Austerweil, J. L. (2015, June). Evaluative Feedback: Reinforcement or Communication? Poster selected for a 2 minute spotlight data blitz and presented at the Reinforcement Learning and Decision Making conference, Edmonton, Alberta, Canada.

**Ho, M. K.** & Cushman, F. (2013, August). Modeling Social Learning and Working Memory Use. Poster presented at the 35th Annual Conference of the Cognitive Science Society. Berlin, Germany.

## Talks and Symposia

**Ho, M. K.**(2020, August). "Communicative Decision-Making and Interactive Teaching." Computational Cognitive Neuroscience Lab (PI: Anne Collins), University of California Berkeley. *Virtual talk*

**Ho, M. K.**(2020, May). "Communication, Planning, and Meta-Reasoning." Causality in Cognition Lab (PI: Tobias Gerstenberg), Stanford University. *Virtual talk*

**Ho, M. K.**(2020, March). "Meta-Reasoning about Partial Plans." Parallel Distributed Processing Seminar, Princeton University.

**Ho, M. K.**(2019, October). "Interactive Communication and Miscommunication in Humans." Center for Human-Compatible AI, University of California, Berkeley.

**Ho, M. K.**(2019, October). "Human-machine collaboration and information processing limitations" VeHiCal Project Annual Meeting, University of California, Berkeley.

**Ho, M. K.**(2019, September). "Communication, Coordination, and Computation in Human Interaction." Department of Cognitive Science Seminar Series, Central European University.

**Ho, M. K.**, Korman., J. & Griffiths T. L. (2019, July) "A computational account of unintentional speech acts." Annual Meeting of the Society for Philosophy and Psychology, San Diego, California.

**Ho, M. K.**(2019, June). "Communication in Interactive Settings." Department of Computer Science, University of North Carolina, Chapel Hill.

**Ho, M. K.**(2019, April). "Communicative Intentions in an Interactive World." Social-Ecological and Environmental Lab (PI: Alexandra Paxton), University of Connecticut.

**Ho, M. K.**(2019, April). "Communicative Intentions in an Interactive World." Yale Cognitive Development Laboratory (PI: Julian Jara-Ettinger).

**Ho, M. K.**(2019, April). "Communicative Intentions in Demonstrations and Rewards." Neuroscience of Social Decision-Making Seminar, Princeton University.

**Ho, M. K.**(2019, March). "Communicative and Pedagogical Intentions in an Interactive World." Concepts and Categories Seminar, New York University.

**Ho, M. K.**(2019, January). "Communicative Intent and Interactive Teaching." Project 6 Meeting (PI: Jonathan Cohen), Princeton University.

**Ho, M. K.**(2018, October). "Communicative Intent and Interactive Teaching." Cognition/Neuroscience Seminar Series, Stanford University.

**Ho, M. K.**(2017, May). "How People Intentionally Teach Agents in Interactive Settings." DREAM Seminar, University of California, Berkeley.

**Ho, M. K.**(2017, April). "Teaching with Communicative Intent in Interactive Settings." Computational Cognitive Science Group (PI: Josh Tenenbaum), MIT.

**Ho, M. K.**(2017, April). "Teaching by Demonstration: Showing vs. Doing." Brown Robotics Group Meeting, Brown University.

**Ho, M. K.**, Littman, M. L., Cushman, F., & Austerweil, J. L. (2016, August). "Not Quite Intuitive Behaviorists: Teachers use Rewards and Punishments Communicatively and not as Reinforcement." Abstract presented at the 49th Annual Meeting of the Society for Mathematical Psychology, New Brunswick, NJ.

**Ho, M. K.**(2016, July). "Teaching with Evaluative Feedback (and by Demonstration), Communicatively." Moral Psychology Research Lab, Harvard University.

**Ho, M. K.**(2016, May). "Teachers use rewards and punishments communicatively and not as reinforcement" presentation given to HAMLET (Human and Machine Learning: Experiments and Theory) seminar series at University of Wisconsin, Madison.

Austerweil, J. L., Brawner, S., Greenwald, A., Hilliard, E., **Ho, M. K.**, Littman, M. L., MacGlashan, J., & Trimbach, C. (2016, March). "The Impact of Outcome Preferences in a Collection of Non-Zero-Sum Grid Games." AAAI Spring Symposium 2016 on Challenges and Opportunities in Multiagent Learning for the Real World.

**Ho, M. K.**, Fernbach, P.M & Sloman, S. A. (2015, May). "Opening minds by exposing the illusion of explanatory depth." Talk given at the annual meeting of the Association for Psychological Science, New York, NY.

Ho, M. (2013, July). "Causal Self-Deception". 5-minute data blitz presentation given at the Moral Psychology Research Group annual meeting.

## Workshops

Wu, C. M., Vélez N., **Ho, M. K.** & Goldstone, R. L. (2020) Cognition, Collectives, and Human Culture. Workshop at the 42nd Annual Conference of the Cognitive Science Society. Organizing committee member and presenter. Workshop website: <https://cognitioncollectivesandculture.github.io/>

Hamrick, J, Nematzadeh, A, Burns, K, Dupoux, E, Gopnik, A, & Tenenbaum, J. (2020) Bridging AI And Cognitive Science (BAICS). Workshop at the International Conference on Learning Representations. Program committee member. Website: <https://baicsworkshop.github.io>

Brys, T., Harutyunyan A., Mannion, P & Subramanian, K. (2017) Adaptive Learning Agents. Workshop at the International Conference on Autonomous Agents and Multiagent Systems. Program committee member. Website: <http://ala2017.it.nuigalway.ie/>

Mathewson, K., Subramanian, K., **Ho, M. K.**, Loftin, R., Austerweil, J.L., Harutyunyan, A., Precup, D., El Asri, L., Gombolay, M., Zhu, X., Chernova, S., Isbell, C. L., Pilarski, P. M., Wong, W. K., Veloso, M., Shah, J.A., Taylor, M., Argall, B., & Littman, M. L. (2016) Future of Interactive Learning Machines. Workshop at the 30th Conference on Neural Information Processing Systems. Organizing Committee and Programming Committee member.

## Teaching Experience

**CLPS 0700** - Social Psychology, Brown University, Providence, RI Spring 2016  
*Teaching Assistant*

**Google igniteCS** - Nathan Bishop Middle School, Providence, RI 2014-2015  
*Teaching Assistant*

- Organized and taught basic coding and Computer Science classes at a local public middle school once a week.

**CLPS 1211** - Human and Machine Learning, Brown University, Providence, RI Fall 2015  
*Invited Guest Lecturer*

**CLPS 0900** - Quantitative Methods and Statistics, Brown University, Providence, RI Fall 2015

*Teaching Assistant*

**CLPS 0020** - Introduction to Cognitive Science, Brown University, Providence, RI      Fall 2013  
*Teaching Assistant*

**Princeton Student Volunteers Council - TEACH Program** - Trenton, NJ      Fall 2010 - Spring 2011  
*Volunteer Tutor*

- Tutored former prison inmates preparing for the GED (high school equivalency) exam.

## Service

**Brown Cognition Seminar Series**      Fall 2015 - Summer 2016  
 Weekly seminar series  
*Primary Organizer*

**Brown Graduate School Diversity and Inclusion Advisory Board**      2016 - 2018  
*Advisory Board Member*

**Brown Cognitive, Linguistic, and Psychological Sciences Dept.**      Spring 2016 - Fall 2017  
 Diversity Committee  
*Graduate Student Committee Member*

**ALANA (African American, Latino/a, Asian/Asian American, Native American)**      2014-2016  
 Mentorship Program at Brown University  
*Mentor*

## Ad hoc reviewer for

Cognitive Science  
 CogSci  
 Topics in Cognitive Science  
 Social Cognition  
 NeurIPS

## Software

Developer for MSDM (Models of Sequential Decision Making) Python library  
 Site: <https://github.com/markkho/msdm>

Contributor to BURLAP (Brown-UMBC Reinforcement Learning And Planning) Java library  
 Site: <https://github.com/jmacglashan/burlap>

## Skills

- General programming and machine learning in Python, Java, and C
- Web-based programming in HTML, CSS, and JavaScript (client- and server-side)
- Experimental design
- Data analysis in Python, R, MATLAB, and SPSS