

Desmond C. Ong

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Research Interests

I am a cognitive scientist interested in affective and social cognition: how humans reason about the emotional and mental states of others. At a basic level, I distill insights from affective science and cognitive psychology into formal and precise models of reasoning about emotions, intentions, and other mental states. At an applied level, I study how we can build computational and AI models that can perform such affective and social reasoning (for affective computing and social robotics).

In my research, I take an interdisciplinary approach, theoretically grounded in cognitive science and affective science, and augmented with tools from computer science (probabilistic modelling and probabilistic programming; machine learning; natural language processing). With my collaborators, I also study affective and social cognition through developmental, neuroscientific, clinical, social psychological and interventional lenses.

Education

- 2017 Ph.D., Psychology (Cognitive Psychology and Affective Science), Stanford University
- 2017 M.S., Computer Science (Specialization in Artificial Intelligence), Stanford University
- 2014 M.A., Psychology, Stanford University
- 2011 B.A., Economics (*summa cum laude*; top in class),
and Physics (*magna cum laude*; top three in class),
with minors in Cognitive Studies; and in Information Science,
Cornell University

Professional Appointments

- 2019 - present Assistant Professor (Tenure-Track)
Department of Information Systems and Analytics
School of Computing, National University of Singapore
- 2017 - present Research Scientist
A*STAR Artificial Intelligence Initiative (A*AI),
Institute for High Performance Computing (IHPC),
Agency for Science, Technology and Research (A*STAR), Singapore
(* Since 2019, I hold a minority-time appointment at A*STAR)
- Concurrent affiliations
- 2019 - present Member, NUS AI Lab, National University of Singapore
- 2020 - present Core Faculty, Institute for Applied Learning Sciences and Educational Technology
(ALSET), National University of Singapore

Past Appointments

- 2011 - 2012 Research Engineer
Data Storage Institute (DSI),
Agency for Science, Technology and Research (A*STAR), Singapore

Awards, Honors, Fellowships

- 2015 Computational Social Science Fellowship, Institute for Research in the Social Sciences, Stanford
- 2014 Society for Personality and Social Psychology Graduate Student Travel Award
- 2012 National Science Scholarship: PhD (NSS-PhD)
Agency for Science, Technology and Research (A*STAR), Singapore
Funding period: 2012 – 2017
Full tuition and stipend support for graduate studies.
- 2011 Paul Hartman Prize in Applied Physics, Cornell
Awarded for outstanding work in experimental physics by an undergraduate in Physics or Applied Physics.
- 2011 Omicron Delta Epsilon
International Honor Society in Economics
- 2011 Phi Beta Kappa
Honor Society in the Arts and Sciences
- 2011 A*STAR Chairman's Honours List
For outstanding academic performance
- 2009 Hunter R. Rawlings III Cornell Presidential Research Scholarship
Funding period: 2009 – 2011
Undergraduate research scholarship with a research grant of \$5,000.
- 2006 National Science Scholarship: B.S. (NSS-BS)
Agency for Science, Technology and Research (A*STAR), Singapore
Funding period: 2008 – 2011
Full tuition and stipend support for undergraduate studies.

Research Grants

13. "K-EMERGE: Knowledge Extraction, Modelling, and Explainable Reasoning for General Expertise"
Singapore Research Innovation and Enterprise 2020 (RIE2020)
Advanced Manufacturing and Engineering Programmatic Grant
2020 – 2023. Role: Co-Principal Investigator
12. "Developing Capabilities in AI Modelling of Social and Affective Behaviour"
Ministry of Education Academic Research Fund Tier 1 (NUS Startup Grant)
2019 – 2022. Role: Principal Investigator
11. "Assistive AI with Artificial Theories of Mind and Body"
AI Singapore Grant Call (to PI: H. Soh)
2019 – 2022. Role: Collaborator
10. "Semantic and Map-lite Indoor Visual Navigation"
National Robotics Programme (to PI: K.W. Wan)
2019 – 2021. Role: Co-Investigator
9. "Scalable Mindset Interventions to Nurture Strategic, Self-Regulated Learners"
Singapore Millennium Foundation Grant (to PI: P. Chen)
2018 – 2021. Role: Interdisciplinary Collaborator
8. "Human-Centric AI (CHEEM) Research Project"
A*STAR Science and Engineering Research Council
(to Programme Managers K. Kwok, C. Tan)
2017 – 2020. Role: Work Package Lead

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7. "Computational and brain predictors of emotion cue integration"
National Institutes of Health 1R01MH112560-01 (to PI: J. Zaki)
2017 - 2022. Role: Other Significant Contributor (key personnel)
- Pre-doctoral grants**
6. "Annotating a corpus of emotional narratives"
Dissertation Research Funds, Department of Psychology, Stanford,
2015 - 2016. Role: PI
5. "Continuous Multimodal Emotion Inference"
Computational Social Science Fellowship Grant,
Institute for Research in the Social Sciences, Stanford
2015 - 2016. Role: PI
4. "Studying the determinants of paying it forward"
Norman H. Anderson Research Grant, Department of Psychology, Stanford,
2012 - 2013. Role: PI
3. "Serial Reciprocity: What makes us want to 'pass it on'?"
Einhorn Discovery Grant, College of Arts and Sciences, Cornell,
2010 - 2011. Role: PI
2. "Serial Reciprocity: What makes us want to 'pass it on'?"
College of Arts and Sciences Undergraduate Research Grant, Cornell,
2010 - 2011. Role: PI
1. "Studying packing in asymmetric dimer particles"
Hunter R. Rawlings III Cornell Presidential Research Scholarship, Cornell,
2009 - 2011. Role: PI

Publications

Links to sortable lists of publications (by discipline/topic), and associated code and data, can be found on my website.

† indicates primary trainee.

30. Weisz, E., **Ong, D. C.**, Carlson, R. W., & Zaki, J. (in press). Building Empathy: A Brief Intervention to Promote Social Connection. *Emotion*.
29. **Ong, D. C.**, Wu, Z. †, Zhi-Xuan, T. †, Reddan, M., Kahhale, I., Mattek, A., & Zaki, J. (in press). Modeling emotion in complex stories: the Stanford Emotional Narratives Dataset. *IEEE Transactions on Affective Computing*.
28. **Ong, D. C.**, Soh, H., Zaki, J., & Goodman, N. D. (in press). Applying Probabilistic Programming to Affective Computing. *IEEE Transactions on Affective Computing*.

Material from this paper was presented as a Tutorial at *Affective Computing and Intelligent Interaction*, in Cambridge, UK, September 2019,
and at a Tutorial at A*STAR, Singapore, June 2018.
27. Lai, Y., Kankanhalli, A., & **Ong, D. C.** (2021). Human-AI Collaboration in Healthcare: A Review and Research Agenda. In *Proceedings of the Hawaii International Conference on System Sciences 2021*.
26. Zhi-Xuan, T. †, Soh, H., & **Ong, D. C.** (2020). Factorized Inference in Deep Markov Models for Incomplete Multimodal Time Series. In *Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI 2020)*. [Oral Presentation]
25. Wu, Z. †, Nguyen, T.-S., & **Ong, D. C.** (2020). Structured Self-Attention Weights Encodes Semantics in Sentiment Analysis. In *Proceedings of the 2020 EMNLP Workshop on BlackboxNLP: Analyzing and Interpreting Neural Networks for NLP*.

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24. Jospe, K., Genzer, S., Klein-Selle, N., **Ong, D. C.**, Zaki, J. & Perry, A. (2020). The contribution of linguistic and visual cues to physiological synchrony and empathic accuracy. *Cortex*, 132, 296-308.
23. **Ong, D. C.**, Zaki, J., & Goodman, N. D. (2019). Computational models of emotion inference in Theory of Mind: A review and roadmap. *Topics in Cognitive Science*, 11(2), 338-357.
22. Asaba, M.*, **Ong, D. C.***, & Gweon, H. (2019). Integrating expectations and outcomes: Preschoolers' developing ability to reason about others' emotions. *Developmental Psychology*, 55(8), 1680-1693.
* equal contribution
21. Wu, Z.[†], Zhang, X., Zhi-Xuan, T.[†], Zaki, J. & **Ong, D. C.** (2019). Attending to Emotional Narratives. In *Proceedings of the 8th International Conference on Affective Computing and Intelligent Interaction (ACII 2019)*. [Oral Presentation]
20. Tan, Z.-X.[†] & **Ong, D. C.** (2019). Bayesian Inference of Social Norms as Shared Constraints on Behavior. In *Proceedings of the 41st Annual Meeting of the Cognitive Science Society*, 2919-2925.
19. Tan, Z.-X.^{*†}, Goel, A.*, Nguyen, T.-S.*, & **Ong, D. C.** (2019). A Multimodal LSTM for Predicting Listener Empathic Responses over time. Presented at the *OMG-Empathy Challenge workshop at the 14th IEEE International Conference on Automatic Face and Gesture Recognition (FG) 2019*.
* equal contribution
18. Xie, Y., Bodala, I. P., **Ong, D. C.**, Hsu, D., & Soh, H. (2019). Robot Capability and Intention in Trust-based Decisions across Tasks. In *Proceedings of the 14th ACM/IEEE Conference on Human-Robot Interaction (HRI)*, 39-47.
17. **Ong, D. C.**, Goodman, N. D., & Zaki, J. (2018). Happier than thou? A self-enhancement bias in emotion attribution. *Emotion*, 18(1), 116-126.
16. Williams, W. C., Morelli, S. A., **Ong, D. C.**, & Zaki, J. (2018). Interpersonal emotion regulation: Implications for affiliation, perceived support, relationships, and well-being. *Journal of Personality and Social Psychology*, 115(2), 224-254.
15. **Ong, D. C.**, Zaki, J., & Gruber, J. (2017). Increased cooperative behavior across remitted bipolar I disorder and major depression: Insights utilizing a behavioral economic trust game. *Journal of Abnormal Psychology*, 126(1), 1-7.
14. Morelli, S. A., **Ong, D. C.**, Makati, R., Jackson, M. O., & Zaki, J. (2017). Empathy and well-being correlate with centrality in different social networks. *Proceedings of the National Academy of Sciences*, 114(37), 9843-9847.
13. Chen, P., Chavez, O., **Ong, D. C.**, & Gunderson, B. (2017). Strategic Resource Use for Learning: A Self-administered Intervention that Guides Effective Resource Use Enhances Academic Performance. *Psychological Science*, 28(6), 774-785.
12. **Ong, D. C.***, Asaba, M.*, & Gweon, H. (2016). Young children and adults integrate past expectations and current outcomes to reason about others' emotions. In *Proceedings of the 38th Annual Meeting of the Cognitive Science Society*, 135-140.
* equal contribution
11. **Ong, D. C.**, Zaki, J., & Goodman, N. D. (2016). Emotions in lay explanations of behavior. In *Proceedings of the 38th Annual Meeting of the Cognitive Science Society*, 360-365.
10. Devlin, H. C., Zaki, J., **Ong, D. C.**, & Gruber, J. (2016). Tracking the emotional highs, but missing the lows: Hypomania Risk is associated with positively biased empathic accuracy inference. *Cognitive Therapy and Research*, 40(1), 72-79.
9. Nook, E., **Ong, D. C.**, Morelli, S. A., Mitchell, J. P., & Zaki, J. (2016). Prosocial Conformity: Social norms motivate broad generosity and empathy. *Personality and Social Psychology Bulletin*, 42(8),

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1045-1062.

8. **Ong, D. C.**, Zaki, J., & Goodman, N. D. (2015) Affective Cognition: Modeling reasoning about emotion. *Cognition*, 143, 141-162.
7. **Ong, D. C.**, Goodman, N. D., & Zaki, J. (2015). Near-misses sting even when they are uncontrollable. In *Proceedings of the 37th Annual Meeting of the Cognitive Science Society*, 1775-1780.
6. Phillips, J.*, **Ong, D. C.***, Surtees, A. D. R., Xin, Y., Williams, S., Saxe, R., & Frank, M. C. (2015). A second look at automatic false belief representation: reconsidering Kovács, Téglás, and Endress (2010). *Psychological Science*, 26(9), 1353-1367.
* equal contribution
5. Devlin, H. C., Zaki, J., **Ong, D. C.**, & Gruber, J. (2014). Not as Good as You Think? Trait Positive Emotion is Associated with Increased Self-Reported Empathy but Decreased Empathic Performance. *PLOS ONE*, 9 (10), e110470

Previous work in physics and optics

4. Leahy, B. D., Cheng, X., **Ong, D. C.**, Liddell-Watson, C., & Cohen, I. (2013) Enhancing rotational diffusion using oscillatory shear. *Physical Review Letters*, **110**, 228301.
3. **Ong, D. C.**, Solanki, S., Liang, X., & Xu, X. W. (2012). Analysis of laser speckle severity, granularity, and anisotropy using the power spectral density in polar-coordinate representation. *Optical Engineering*, **51**, 054301.
2. Gerbode, S. J., **Ong, D. C.**, Liddell, C. M., & Cohen, I. (2010). Dislocations and vacancies in two-dimensional mixed crystals of spheres and dimers. *Physical Review E*, **82**, 041404.
1. Gerbode, S. J., Agarwal, U., **Ong, D. C.**, Liddell, C. M., Escobedo, F., & Cohen, I. (2010). Glassy dislocation dynamics in 2-D colloidal dimer crystals. *Physical Review Letters*, **105**, 078301.

Conference Symposia and Talks

Invited Conference Talks

1. *Emotion Preconference at the Society for Personality and Social Psychology (SPSP) 2021. Virtual, Feb 2021.*

Chaired Conference Symposia

7. Symposium: Emotion and Social Perception in Naturalistic Contexts: Perspectives from Affective Computing and Affective Neuroscience.

Chair: **Ong, D. C.** Co-chair: Reddan, M.

Contributed symposium at the 2020 Society for Affective Science (SAS) Annual Conference, San Francisco, CA, April 2020. [*Conference cancelled due to Covid-19*]

Speakers: **Desmond Ong**, Marianne Reddan, Eshin Jolly, Sidney D'Mello

Ong, D. C., Wu, Z., Reddan, M., & Zaki, J. (April 2020). Using deep and probabilistic modelling to study emotional cue integration in naturalistic emotional narratives.

6. Symposium: How people think they're better than others and why it matters: consequences for social relationships, emotions, the courtroom, and online romance.

Chairs: **Ong, D. C.**, & Hughes, B. L.

Contributed symposium at the Seventeenth Annual Meeting of the Society for Personality and Social Psychology, San Diego, CA, January 2016.

Speakers: Clayton Critcher, **Desmond Ong**, Mark Alicke, Emily Yeh

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Ong, D. C., Goodman, N. D., & Zaki, J. (January 2016). Happier than thou: an egocentric positivity bias in emotion attribution. Talk given at the Seventeenth Annual Meeting of the Society for Personality and Social Psychology, San Diego, CA.

5. Symposium: Understanding Affective Cognition: Frontiers in modeling reasoning about others' emotions.
Chairs: **Ong, D. C.,** Zaki, J., & Goodman, N. D.
Contributed symposium at the 36th Annual Meeting of the Cognitive Science Society, Quebec City, QC, Canada, July 2014.
Speakers: Amy Skerry, **Desmond Ong,** Yang Wu, Andrew Meltzoff

Ong, D. C., Zaki, J., & Goodman, N. D. (July 2014). Modeling lay theories of emotion attribution. Talk given at the 36th Annual Meeting of the Cognitive Science Society, Quebec City, QC, Canada.

Contributed Conference Talks

6. Weisz, E., **Ong, D. C.,** Chen, P., & Zaki, J. (Feb 2020). A Brief Intervention to Build Empathy in Middle School. Talk given by E. Weisz at the Society for Personality and Social Psychology Annual Convention 2020, New Orleans, LA.
5. Chen, P. C., Chavez, O., **Ong, D. C.,** & Gunderson, B. (May 2018). Strategically-Directed Effort: Self-Reflective Resource Use Promotes Better Academic Outcomes. Talk given by D. C. Ong at the 11th Meeting of the Society for the Science of Motivation, San Francisco, CA.
4. **Ong, D. C.,** Zaki, J., & Goodman, N. D. (April 2017). Towards studying affective cognition in naturalistic contexts. Talk given at the Affective Computing Pre-Conference, at the Society for Affective Science Annual Conference, Boston, MA.
3. **Ong, D. C.,** Goodman, N. D., & Zaki, J. (July 2015). Near-misses sting even when they are uncontrollable. Talk given at the 37th Annual Meeting of the Cognitive Science Society, Pasadena, CA.
2. **Ong, D. C.,** Zaki, J., & Goodman, N. D. (February 2015). Modeling lay theories of emotion attribution. Talk in symposium ("Beliefs About Emotion: Outcomes at the Individual, Interpersonal, and Cultural Levels") at the Sixteenth Annual Meeting of the Society for Personality and Social Psychology, Long Beach, CA.
1. **Ong, D. C.,** Goodman, N. D., & Zaki, J. (February 2014). Differences in intuitive theories of emotion along psychological distance. Talk given at the Emotion Preconference of the Fifteenth Annual Meeting of the Society for Personality and Social Psychology, Austin, TX.

Invited Talks

4. February 2020. Social Cognitive Neuroscience Lab Meeting, Department of Brain and Cognitive Sciences, MIT.
3. June 2019. Probabilistic Machine Learning Seminar, Uber AI Labs, San Francisco, USA.
2. April 2017. Computational Cognitive Neuroscience/Moral Psychology Research Lab Meeting, Department of Psychology, Harvard University
1. August 2013. Positive Emotion and Psychopathology Lab Meeting, Department of Psychology, Yale University

At own institution

7. May 2020. Institute for Applied Learning Sciences and Educational Technology, National University of Singapore.
6. April 2016. Affective Area Seminar, Department of Psychology, Stanford University

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5. March 2016. Cognition and Neuroscience Area Seminar, Department of Psychology, Stanford University
4. February 2015. Affective Area Seminar, Department of Psychology, Stanford University
3. January 2015. Affective Area Seminar, Department of Psychology, Stanford University
2. October 2013. Affective Area Seminar, Department of Psychology, Stanford University
1. April 2013. Cognition and Neuroscience Area Seminar, Department of Psychology, Stanford University

Teaching Experience

2. Instructor, IS4152: Affective Computing (Final-year elective). National University of Singapore. Semester 1, AY 2020/2021. [<https://is4152.github.io/>]
1. Co-Instructor, BT1101: Introduction to Business Analytics (Undergraduate first-year statistics, Enrolment of 280). National University of Singapore, Semester 1, AY 2019/2020.

Pre-tenure-track TA experience

6. Teaching Assistant, Psych 204: Computation and Cognition: The Probabilistic Approach (Graduate) Stanford University, Spring, 2015. Instructor: Noah D. Goodman
5. Teaching Assistant, Psych 254: Lab in Experimental Methods (Graduate) Stanford University, Winter, 2015. Instructor: Michael C. Frank
4. Teaching Assistant, Psych 90: Intro to Clinical Psychology (Undergraduate) Stanford University, Fall 2014. Instructor: Ian Gotlib
3. Teaching Assistant, Psych 80: Intro to Personality and Affective Science (Undergraduate) Stanford University, Spring 2014. Instructor: Jeanne Tsai
2. Teaching Fellow, Psych 1: Intro to Psychology (Undergraduate) Stanford University, Winter 2014. Instructors: Jamil Zaki, Bridgette Hard
1. Teaching Fellow, Psych 1: Intro to Psychology (Undergraduate) Stanford University, Fall 2013. Instructors: James Gross, Bridgette Hard

Guest Lectures (in CS and in Psychology):

"An Introduction to (Deep) Probabilistic Programming" (Apr 2019), in CS 5340: Uncertainty Modelling in AI, National University of Singapore

"Computational Cognitive Modeling" (Feb 2018), in CS 6281: Human-Centered AI, National University of Singapore

"Emotions in the workplace" (Feb 2018, Sep 2018, Aug 2019), in PL 3239: Industrial/Organizational Psychology, National University of Singapore

Tutorials

Ong, D. C., Tan, Z.-X., Soh, H., Zaki, J., & Goodman, N. D. (2019). "Integrating Theory-Driven and Data-Driven Approaches to Affective Computing via Deep Probabilistic Programming". Tutorial taught at *Affective Computing and Intelligent Interaction*, Cambridge, UK, September 2019.

Ong, D. C., & Goodman, N. D. (2018). "Applying Probabilistic Programming to building Human-Centric AI Technologies". Tutorial co-taught with Noah Goodman, at A*STAR, June 2018

Advising

Tan Zhi-Xuan (A*STAR post-baccalaureate Research Engineer), Jun 2018 - Aug 2019.
Currently: Ph.D. Student at MIT EECS & Brain and Cognitive Sciences

Wu Zhengxuan (Stanford Masters Student in Symbolic Systems), Mar 2018 - present

Honors Theses / Final Year Projects (FYP)

Terence Lim (NUS Business Analytics undergraduate, FYP, Aug 2019 - May 2020)
Won the NUS Outstanding Undergraduate Researcher Prize AY2019/2020

Short-term Interns

Joseph Kwon (Yale undergraduate, Jun 2020 - Aug 2020)

Lu Hui (Columbia undergraduate, Jun 2019 - Aug 2019)

Rucha Kelkar (MIT undergraduate, Jun 2019 - Aug 2019)

Pu Ruohan (Cambridge undergraduate, Jul 2019 - Aug 2019)

Ng Hui Xin (Vassar graduate, Jan 2019 - Aug 2019; now Ph.D. Student at UC San Diego)

Ph.D. Committee

Luo Kai (NUS Information Systems, 2020)

Professional Services

Professional Societies and Conferences

Conference Organizing Committee, IEEE Affective Computing and Intelligent Interaction 2021

Conference Communications Chair & Program Committee Member, Cognitive Science Society 2020

Academic Service (National University of Singapore)

School Ethics Review Committee, School of Computing, 2019-present

Graduate Admissions, Department of Information Systems and Analytics, 2019-present

Academic Service (Stanford University, Department of Psychology)

Faculty Search Committee, Cognitive Area, 2014-2015

Graduate Admissions Committee, Affective Science Area, 2013-2014

Area Seminar Committee, Cognitive Area, 2014-2015 & Affective Science Area, 2013-2014

Ad-hoc reviewer

Journals: *Psychological Science*; *Psychological Review*;

Cognition; *Cognitive Science*; *Emotion*;

Perspectives on Psychological Science; *Developmental Psychology*;

IEEE Transactions on Affective Computing; *Computer Speech and Language*;

Journal of Neuroscience, Psychology, and Economics; *Optical Engineering*

Cognitive Science Conferences: *Cognitive Science Society (CogSci 2015-2020)*, *Society for Philosophy and Psychology (SPP 2016)*

Computer Science Conferences: *Human-Robot Interaction (HRI 2019-2020)*,

Association for the Advancement of Artificial Intelligence (AAAI 2019),

Empirical Methods in Natural Language Processing (EMNLP 2015, 2020)

Information Systems Conferences: *International Conference on Information Systems (ICIS 2020)*

Professional Memberships

2014 - Cognitive Science Society

2013 - Society for Personality and Social Psychology (SPSP)

2014 - Society for Affective Science (SAS)

2018 - IEEE and IEEE Computer Society

References

Noah D. Goodman
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