Daniel Bennett

Curriculum Vitae

Princeton Neuroscience Institute, Princeton University, USA
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Research interests

I study mood, learning, and decision making. I use computational methods (e.g., reinforcement learning models of behaviour, multivariate pattern analysis of neural data) to understand how these phenomena interact. I am particularly interested in investigating the ways that interactions between mood, learning, and decision making might go awry in psychiatric conditions like major depression and bipolar disorder.

Employment

Postdoctoral Research Fellow **2019-present**

Princeton Neuroscience Institute, Princeton University &
Department of Psychiatry, Monash University

Postdoctoral Research Associate **2017-2018**

Princeton Neuroscience Institute, Princeton University
Advisor: Yael Niv

Education

Doctor of Philosophy (PhD) in Psychology **2013-2017**

The University of Melbourne
Thesis: Belief updating and information seeking in decision making under uncertainty
Supervisors: Stefan Bode, Carsten Murawski, Rob Hester

Bachelor of Science (Honours) in Psychology **2011**

The University of Melbourne
Thesis: Visual object detection in schizophrenia
Supervisors: Olivia Carter, Suresh Sundram

Bachelor of Science and Bachelor of Arts **2007-2010**

The University of Western Australia

Publications

Preprints and under review

1. **Bennett, D.**, Davidson, G., & Niv, Y. (under review). A model of mood as integrated advantage. Preprint hosted at *PsyArXiv*: https://psyarxiv.com/dzsme/
2. Smillie, L. D., **Bennett, D.**, Tan, N. P., Sutcliffe, K., Fayn, K., Bode, S., & Wacker, J. (under review). Does openness/intellect predict sensitivity to the reward value of information?. Manuscript submitted for review.
3. Zorowitz, S., **Bennett, D.**, & Niv, Y. (under review). A recurring reproduction error in the administration of the Generalized Anxiety Disorder Scale. Manuscript submitted for review.

Book chapters

4. **Bennett, D.**, & Niv, Y. (2020). Opening Burton's clock: Psychiatric insights from computational cognitive models. Chapter in *The Cognitive Neurosciences, 6th edition* (M. Gazzaniga, ed.).

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Peer-reviewed journal publications

5. **Bennett, D.**, Sutcliffe, K., Tan, N. P., Smillie, L. D., & Bode, S. (in press). Anxious and obsessive-compulsive traits are independently associated with valuation of non-instrumental information. Manuscript accepted at *Journal of Experimental Psychology: General*. doi: 10.1101/768168.

6. **Bennett, D.**, Silverstein, S., & Niv, Y. (2019). The two cultures of computational psychiatry. *JAMA Psychiatry, 76*(6), 563-564.

7. **Bennett, D.***, Sasmita, K.*, Maloney, R. T., Murawski, C., & Bode, S. (2019). Monetary feedback modulates performance and electrophysiological indices of belief updating in reward learning. *Psychophysiology, 56*(10), e13431.
*These authors contributed equally

8. Bode, S., Feuerriegel, D., **Bennett, D**., & Alday, P. M. (2019). The Decision Decoding ToolBOX (DDTBOX): A multivariate pattern analysis toolbox for event-related potentials. *Neuroinformatics, 17*(1), 27-42.

9. Sewell, D., Warren, H. A., Rosenblatt, D., **Bennett, D.**, Lyons, M., & Bode, S. (2018). Feedback discounting in probabilistic categorization: converging evidence from EEG and cognitive modelling. *Computational Brain and Behavior, 1*(2), 165-183.

10. Bode, S., **Bennett, D.**, Sewell, D, K., Paton, B., Egan, G. F., Smith, P. L., & Murawski, C. (2018). Dissociating neural variability related to stimulus quality and response times in perceptual decision-making. *Neuropsychologia, 111*, 190-200.

11. Brydevall, M.*, **Bennett, D.***, Murawski, C., & Bode, S. (2018). The neural encoding of information prediction errors during non-instrumental information seeking. *Scientific Reports, 8*, 6134.
*These authors contributed equally

12. **Bennett, D.**, Yücel, M., & Murawski, C. (2018). Errors of statistical inference in the Information Sampling Task. *Biological Psychiatry, 83*(12), e61-e62.

13. **Bennett, D.**, Oldham, S., Dawson, A., Parkes, L., Murawski, C., & Yücel, M. (2017). Systematic overestimation of reflection impulsivity in the Information Sampling Task. *Biological Psychiatry, 82*(4), e29-e30.

14. Carter, O., **Bennett, D.**, Nash, T., Arnold, S., Brown, L., Cai, R.Y., Allan, Z., Dluzniak, A., McAnally, K., Burr, D., & Sundram, S. (2017). Sensory integration deficits support a dimensional view of psychosis and are not limited to schizophrenia. *Translational Psychiatry, 7*, e1118.

15. **Bennett, D.**, Bode, S., Brydevall, M., Warren, H., & Murawski, C. (2016). Intrinsic valuation of information in decision making under uncertainty. *PLoS Computational Biology, 12*(7), e1005020.

16. **Bennett, D.**, Dluzniak, A., Cropper, S., Partos, T., Sundram, S., & Carter, O. (2016). Selective impairment of global motion integration, but not global form integration, in schizophrenia and bipolar affective disorder. *Schizophrenia Research: Cognition, 3*, 11-14.

17. **Bennett, D.** (2015). The neural mechanisms of Bayesian belief updating. *The Journal of Neuroscience, 35*(50), 16300-16302.

18. **Bennett, D.**, Murawski, C., & Bode, S. (2015). Single-trial event-related potential correlates of belief updating. *eNeuro, 2*(5), 1-14.

19. Bode, S., **Bennett, D.**, Stahl, J., & Murawski, C. (2014). Distributed patterns of event-related potentials predict subsequent ratings of abstract stimulus attributes. *PLoS One, 9*(10), e109070.

Extended abstracts in peer-reviewed conference proceedings

20. **Bennett, D**., Davidson, G., & Niv, Y. (2019). Momentum and mood in policy-gradient reinforcement learning. *The 4th Multidisciplinary Conference on Reinforcement Learning and Decision Making.*

21. **Bennett, D**., Feuerriegel, D., Alday, P. M., & Bode, S. (2017). The Decision Decoding ToolBOX (DDTBOX): A multivariate pattern analysis toolbox for event-related potentials. *Conference on Cognitive Computational Neuroscience 2017.*

Funding and awards

Travel Fellowship Award (USD $2,000) **2020**
Society of Biological Psychiatry

Graduate Fellowship (USD $40,000) **2019**
American-Australian Association

CJ Martin Early Career Fellowship (AUD $417,192) **2019-2022**
National Health and Medical Research Council
Project title: Towards a neurocomputational model of mood instability in psychiatric illness.

Career Development Award (AUD $1,500) **2016**
School of Psychological Sciences, The University of Melbourne

Postgraduate student presentation award **2015**
School of Psychological Sciences, The University of Melbourne

Melbourne Abroad Travelling Scholarship (AUD $1,500) **2014**
The University of Melbourne

Australian Postgraduate Award (AUD $92,008) **2013-2016**
Postgraduate research scholarship, Australian Federal Department of Education

Dwight Prize for Honours in Psychology **2011**
For coursework in Psychology at The University of Melbourne

Dean's Honours List in Science **2011**
For coursework in the Bachelor of Science at The University of Melbourne

Convocation, The UWA Graduates Association Prize **2008**
Award for undergraduate coursework

Commonwealth Accommodation Scholarship **2007-2010**
Undergraduate scholarship, Australian Federal Department of Education

Presentations

Invited presentations and symposia

1. "Modelling mood and mood disorders with reinforcement learning." Invited Monash Health Professorial Lecture, November 2020.
2. "A trandsiagnostic association between mood pathology and mood-learning interaction." Talk within the *Computational Psychiatry* symposium at the Biological Psychiatry Australian Conference 2020.
3. "Modelling mood and mood disorders with reinforcement learning." Invited presentation at the Institute for Pure and Applied Mathematics, UCLA, February 2020.
4. "Individual differences in attention allocation during value construction." Invited presentation at the Parallel Distributed Processing meeting, Princeton University, February 2019 (with Angela Radulescu).
5. "Reinforcement learning and computational psychiatry." Invited tutorial at the Kavli Summer Institute in Cognitive Neuroscience, Lake Tahoe, July 2018.
6. "Assessing mood's effect on attention via compound generalisation." Invited presentation at the Chesapeake Area Memory and Learning meeting, July 2018.
7. "Affect in reinforcement learning." Invited presentation at the Parallel Distributed Processing meeting, Princeton University, April 2018.
8. "Assessing mood's effects on attention via compound generalisation." Invited presentation at the Center for Computational Cognitive Neuropsychiatry, Rutgers University, May 2018 (with Angela Radulescu).
9. "A computational process model of affect dynamics." Invited presentation at the Neuroscience and Social Decision Making seminar series, Princeton University, December 2017.
10. "Testing a neurocomputational model of mood instability." Invited presentation at the Center for Computational Cognitive Neuropsychiatry, Rutgers University, October 2017.
11. "Information seeking in decision making under uncertainty." Invited presentation at the Affective Brain meeting, University College London, December 2016.
12. "Belief updating and information seeking in decision making under uncertainty." Invited presentation at the University of California (San Diego), November 2016.
13. "Belief updating and information seeking in decision making under uncertainty." Invited presentation at Harvard University, October 2016.
14. "Belief updating and information seeking in decision making under uncertainty." Invited presentation at the Parallel Distributed Processing meeting, Princeton Neuroscience Institute, October 2016.
15. "Impaired reversal learning in psychosis." Invited presentation at the Princeton Neuroscience Institute, October 2016.

Conference presentations

16. "A trandsiagnostic association between extreme mood and mood-learning interaction." Webinar talk for the *Australasian Society for Bipolar and Depressive Disorders* (Oral presentation).
17. **Bennett, D**., Davidson, G., & Niv, Y. (2019). Momentum and mood in policy-gradient reinforcement learning. *Reinforcement Learning and Decision Making: Montreal, Canada.* (Poster presentation)
18. **Bennett, D.**, Radulescu, A., Zorowitz, S., & Niv, Y. (2019). Measuring attention to value in decision making. *Society for Affective Science: Boston, USA*. (Poster presentation)

19. **Bennett, D.**, & Niv, Y. (2018). A computational process model of affect dynamics. *Society for Affective Science: Los Angeles, USA*. (Poster presentation)
20. **Bennett, D.**, Lee, C., & Niv, Y. (2018). Mood-congruency in the relationship between affect and stimulus valuation. *Society for Affective Science: Los Angeles, USA*. (Poster presentation)
21. **Bennett, D.**, Brydevall, M., Murawski, C., & Bode, S. (2016). The feedback-related negativity encodes an information prediction error in decisions to seek information. *Society for Neuroscience: San Diego, USA*. (Poster presentation)
22. **Bennett, D.**, Sasmita, K., Murawski, C., & Bode, S. (2016). Bayes if it pays: Switches between Bayesian and heuristic learning strategies are encoded in the event-related potential. *Australasian Experimental Psychology Conference: Melbourne, Australia.* (Oral presentation)
23. **Bennett, D.**, Brydevall, M., Murawski, C. & Bode, S. (2016). The feedback-related negativity reflects an intrinsic preference for information in decision making under uncertainty. *Australasian Cognitive Neuroscience Society Conference: Auckland, New Zealand.* (Poster presentation)
24. **Bennett, D.**, Bode, S., Warren, H., & Murawski, C. (2015). Computational modelling of information seeking under uncertainty. *Australian Mathematical Psychology Conference: Newcastle, Australia.* (Oral presentation)
25. **Bennett, D.**, Murawski, C., & Bode, S. (2014) Bayesian modeling of belief updating in reinforcement learning. *Australian Mathematical Psychology Conference: Canberra, Australia.* (Oral presentation)
26. **Bennett, D.**, Murawski, C., & Bode, S. (2014). Belief updating is indexed by single-trial P3 amplitude: a neurocognitive modelling approach to EEG. *International Conference on Cognitive Neuroscience: Brisbane, Australia.* (Poster presentation)
27. **Bennett, D.**, Murawski, C., & Bode, S. (2013). Single-trial P3 amplitude indexes feedback information in reinforcement learning. *Australasian Cognitive Neuroscience Conference: Melbourne, Australia.* (Poster presentation)
28. **Bennett, D.**, Carter, O., Cropper, S., & Sundram, S. (2012). The problem of integrating sensory information in schizophrenia. *Melbourne Health Research Week: Melbourne, Australia.* (Poster presentation)

Professional service

Supervision

- 2019-present: Senior thesis co-supervisor for Claire Lee (Princeton University)
- 2019-present: Junior project co-supervisor for Isla Weber (Princeton Neuroscience)
- 2017-2020: PhD co-supervisor for Ariel Goh (Monash University)
- 2014-2017: Assistant supervision for 4 Honours students at The University of Melbourne (primary supervision by Olivia Carter or Stefan Bode)

Ad-hoc peer reviewer (journal articles)

Behavioural Processes; Biological Psychiatry; Cerebral Cortex; Cognition & Emotion; Cognitive, Affective, and Behavioral Neuroscience; Computational Brain & Behavior; Computational Psychiatry; Current Opinion in Behavioral Sciences; eLife; Frontiers in Human Neuroscience; Journal of Affective Disorders; Journal of Cognitive Neuroscience; Journal of Experimental Psychology: General; Journal of Individual Differences; Journal of Neuroscience; NeuroImage; PLoS Computational Biology; PLoS One; Psychiatry & Clinical Neurosciences; Psychonomic Bulletin & Review; Psychological Medicine; Schizophrenia Research; Translational Psychiatry.

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Ad-hoc peer reviewer (funding schemes)

German Research Foundation; Swiss National Science Foundation.

Other service

- 2018-2019: Member of seminar series organising committee, Princeton Neuroscience Institute.
- 2016: Graduate student representative for external relations committe, Melbourne School of Psychological Sciences
- 2016: Workshop co-organiser, "Multivariate Analysis of Event-Related Potentials", University of South Australia, Adelaide

Teaching

Postdoctoral Tutorial Leader **Fall Semester, 2018**

Junior Neuroscience Tutorial, Princeton University
Responsibilities: design, deliver, and assess an intensive undergraduate tutorial series on a topic of my choice.

Ad-hoc lecturer **Semester 2, 2016**

PSYC40004: Current Topics in Cognitive Neuroscience, The University of Melbourne
Responsibilities: design and deliver a one-off lecture.

Tutor **Semester 1, 2015**

PSYC30018: Neuroscience and the Mind, The University of Melbourne
Responsibilites: delivery of tutorial material and assignment marking

Non-residential Tutor **2011-2012**

Responsibilities: design and deliver first-year psychology coursework tutorials at several residential colleges at The University of Melbourne (Janet Clarke Hall, Newman College, St. Mary's College, University College).