

David Leo Barack, Ph.D.

Curriculum Vitae

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Research Associate
Department of Neuroscience
Visiting Scholar
Department of Philosophy
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Employment

- March 2021 – Visiting Scholar, Department of Philosophy, University of Pennsylvania
- Oct 2020 – Research Associate, Platt Lab, Department of Neuroscience, University of Pennsylvania
- July 2020 – Associate Research Scientist, Salzman Lab, Zuckerman
Sept 2020 Mind, Brain, and Behavior Institute, Department of Neuroscience, Columbia University
- May 2019 – Post-doctoral Research Scientist, Salzman Lab, Zuckerman
June 2020 Mind, Brain, and Behavior Institute, Department of Neuroscience, Columbia University
- July 2018 – Affiliate Scholar in Society and Neuroscience, Center for
Sept 2020 Science and Society, Columbia University
- July 2018 – Post-doctoral Fellow, Salzman Lab, Zuckerman Mind, Brain, and
April 2019 Behavior Institute, Departments of Neuroscience and Psychiatry, Columbia University
- July 2015 – Presidential Scholar in Society and Neuroscience, Center for Science
July 2018 and Society, Salzman Lab, Departments of Philosophy, Neuroscience, and Economics, Columbia University
- July 2014 – Post-doctoral Researcher, Gold Lab, Departments of Neuroscience and
June 2015 Philosophy, University of Pennsylvania

Education

- Sept 2008 – Duke University
June 2014
- June 2014 Ph.D. Philosophy; Dissertation: “Mindcraft: A Dynamical Systems Theory of Cognition”; Committee: Alex Rosenberg (Co-Chair), Walter Sinnott-Armstrong (Co-Chair), Felipe De Brigard, Karen Neander, Michael Platt
- June 2014 Cert. Cognitive Neuroscience
- Sept 2007 – Northwestern University

Aug 2008
 Unfinished Cert. Pre-Medical
 Sept 2005 – University of Wisconsin-Milwaukee
 May 2007
 May 2007 M.A. Philosophy; Thesis: “Systematicity and Mental Content”;
 Committee: Robert Schwartz (Chair), John Koethe, Steven Leeds
 Sept 2000 – Pitzer College
 May 2004
 May 2004 B.A. Consciousness Studies; Thesis: “Regaining Consciousness: An
 exploration of consciousness, the mind, processes and their scientific
 study”; Advisors: William Banks (Pomona College), Amy Kind
 (Claremont McKenna College), Brian Keeley (Pitzer College)

Areas of Specialization

Neuroscience
 Neural mechanisms of decision making and foraging behavior in nonhuman primates
 Philosophy
 Philosophy of science (philosophy of neuroscience; philosophy of cognitive science)
 and philosophy of mind

Areas of Competence

Neuroscience
 Behavioral decision-making and neural mechanisms of reward processing,
 computational modeling of behavior
 Philosophy
 Metaphysics

Grants

National Institutes of Health/NIDA – 1K99DA048748-01 – (05/2019 – 05/2023)
 K99/R00 Pathway to Independence BRAIN Initiative Diversity Award
 Role: Principal Investigator
 \$318,104 (K99 phase); \$750,000 (R00 phase)

National Institutes of Health – T32 Training Fellowship
 Administered by Columbia University
 Role: Post-doctoral Fellow
 \$52,000

Presidential Scholarship in Society and Neuroscience
 Columbia University
 Role: Presidential Scholar
 \$325,000

Summer research stipend
 Duke University
 Role: Graduate student
 \$2000

Publications

Journal Articles

Reviewed:

1. Barack DL, Miller EK, Moore CI, Packer AM, Pessoa L, Ross LN, and Rust NC. “A call for more clarity around causality in neuroscience”. 2022. *Trends in Neurosciences*. [https://www.cell.com/trends/neurosciences/fulltext/S0166-2236\(22\)00121-7](https://www.cell.com/trends/neurosciences/fulltext/S0166-2236(22)00121-7)
2. Barack DL and Krakauer J. “Two Views on the Cognitive Brain”. 2021. *Nature Reviews Neuroscience*. <https://www.nature.com/articles/s41583-021-00448-6>
3. Barack DL and Platt ML. “Neuronal activity in the posterior cingulate cortex signals environmental information and predicts behavioral variability during routine foraging”. 2021. *Journal of Neuroscience*, 41(12):2703–2712. <https://www.jneurosci.org/content/41/12/2703.abstract>
4. Barack DL. “Mental Kinematics”. 2020. *Synthese*. <https://link.springer.com/article/10.1007/s11229-020-02766-1>
5. Barack DL and Jaegle A. “Codes, Functions, and Causes”. 2019. *Behavioral and Brain Sciences*. <https://www.cambridge.org/core/journals/behavioral-and-brain-sciences/article/abs/codes-functions-and-causes-a-critique-of-brettes-conceptual-analysis-of-coding/917AFE6FA4850F278AE8D93E28B6BB92>
6. Barack DL. “Mental Machines”. 2019. *Biology and Philosophy*, v34(63). <https://link.springer.com/article/10.1007/s10539-019-9719-6>
7. Barack DL. “Cognitive Recycling”. 2019. *British Journal for the Philosophy of Science*, v70(1), p. 239–268. <https://www.journals.uchicago.edu/doi/10.1093/bjps/axx024>
8. Barack DL, Chang SWC, and Platt ML. “Posterior cingulate neurons dynamically signal decisions to disengage during foraging”. 2017. *Neuron*, v96(2), p. 339-347. <https://www.sciencedirect.com/science/article/pii/S0896627317309170>
9. Addicott MA, Pearson JM, Sweitzer MM, Barack DL, and Platt ML. “A primer on foraging and the explore/exploit trade-off for psychiatry research”. 2017. *Neuropsychopharmacology*, v42, p. 1931-1939. <https://www.nature.com/articles/npp2017108>
10. Barack DL and Platt ML. “Neurocomputational Nosology: Malfunctions of Models and Mechanisms”. 2016. *Frontiers in Psychology*, v7(602), p. 1–9. <https://www.frontiersin.org/articles/10.3389/fpsyg.2016.00602/full>
11. Barack DL and Gold JI. “Temporal Trade-offs in Psychophysics”. 2016. *Current Opinion in Neurobiology*, v37, p.121–125. <https://www.sciencedirect.com/science/article/pii/S0959438816300010>
12. Chang SWC, Barack DL, and Platt ML. “Mechanistic Classification of Neural Circuit Dysfunctions: Insights from Neuroeconomics Research in Animals”. 2012. *Biological Psychiatry*, v72, p. 101-106. <https://www.sciencedirect.com/science/article/pii/S0006322312001448>
13. Pearson JM, Heilbronner SR, Barack DL, Hayden BY, and Platt ML. “Posterior Cingulate Cortex: Adapting Behavior to a Changing World”. 2011. *Trends in Cognitive Sciences*, v15(4), p. 143–151. <https://www.sciencedirect.com/science/article/pii/S1364661311000180>

Invited:

1. Wise TB, Barack DL, and Templer VL. “Geometrical representation of serial order in working memory”. 2022. *Learning and Behavior*.
<https://doi.org/10.3758/s13420-022-00541-5>
2. Flanagan OJ and Barack DL. “Neuroexistentialism”. 2010. *EurAmerica*, v40(3), p. 1–18.

Under Review:

1. Barack DL. “Information Harvesting”. *Ergo*.
2. Barack DL. “Inferential Agency”. *Synthese*.
3. Barack DL. “What is Foraging?” *Biology and Philosophy*.
4. Barack DL, Bakkour A, Shohamy D, and Salzman CD. “Signatures of visuospatial information foraging during learning of complex environments”. *Current Biology*. bioRxiv:
<https://www.biorxiv.org/content/10.1101/2021.09.22.461356v1>.
5. Barack DL and Jaegle A. “Extended Intelligence”. *Journal of Philosophy*. arXiv: <https://arxiv.org/abs/2209.07449>.
6. Barack DL, Ludwig VU, Parodi F, Ahmed N, Brannon EM, Ramakrishnan A, and Platt ML. “Attention Deficits Linked with Proclivity to Explore while Foraging”. *Biological Psychiatry*. psyRxiv: <https://psyarxiv.com/nyvjq>.

Revise and Resubmit:

1. Walker EY, Pohl S, Denison RN, Barack DL, Lee J, Block N, Ma WJ, and Meyniel F. “Studying the Neural Representations of Uncertainty”. *Nature Neuroscience*. Resubmitted.

In Preparation:

1. Barack DL and Gerraty RT. “Represent Represent”.
2. Barack DL. “A Formal Model of Reasoning as Foraging”.
3. Barack DL. “The Epistemic Problem of Implementation”.
4. Barack DL. “Dynamical Regularities as the Laws of Thought”.
5. Barack DL. “Layers, not Levels, in the Brain”.
6. Barack DL. “Representation, Computation, and Dynamics”.
7. Barack DL. “Vehicles, Symbols, and Beliefs”.
8. Barack DL. “Inference and the Roles of Reasons”.
9. Barack DL. “Walls, Brains, and Programs”.

Manuscripts:

1. Barack DL. “Implementation and Counterfactual Constraints”.

Chapters

1. Barack DL and Platt ML. “Engaging and Exploring: Cortical Circuits for Adaptive Foraging Decisions”. 2017. In J.R. Stevens (ed.), *Impulsivity*, p. 163-199. https://link.springer.com/chapter/10.1007/978-3-319-51721-6_6
2. Harris JA, Barack DL, McMahon AR, Mitroff SR, & Woldorff MG. “Object-Category Processing, Perceptual Awareness, and the Role of Attention during Motion-Induced Blindness”. 2014. In G. R. Mangun (ed.), *Cognitive Electrophysiology of Attention: Signals of the Mind*, p. 97–106.

Talks

Neuroscience

- “Primate Orbitofrontal Cortex Neurons Reflect Learning of States of Complex Environments”. Icahn School of Medicine at Mount Sinai MSN seminar, January 2023.
- “Assessing Preferences for Different Foods in Nonhuman Primates during Unconstrained Behavior”. Society for Neuroscience 52, November 2022.
- “What Is Foraging?” Future of Foraging Seminar Series, May 2022, <https://www.youtube.com/watch?v=vYQs1EgWYv0>.
- “Signatures of information foraging during learning of complex environments”. Innovators in Cognitive Neuroscience, October 2021, <https://www.youtube.com/watch?v=LejOgvLQbCU>.
- “Two Views on the Cognitive Brain”. Ruhr University Bochum, September 2021.
- “Two Views on the Cognitive Brain”. Duke University, July 2021.
- “Two Views on the Cognitive Brain”. Brown University, July 2021.
- “Information Seeking and Learning in Complex Environments”. Princeton University, September 2020.
- “From Ecology to Neurobiology and Back: Foraging in Both the External and Internal Worlds”. COSYNE 2020. Accepted, not delivered.
- “Information Seeking and Learning in Complex Environments”. Claremont Colleges, February 2020.
- “Primates seek information to learn states of complex environments”. Society for Neuroscience 49, October 2019.
- “Posterior Cingulate Cortex and Adaptive Foraging”. Society for Neuroscience 46, November 2016.
- “From Bits to Policies: The Posterior Cingulate Encodes Environmental Information”. Max Planck Institute for Intelligent Systems, July 2015.
- “Adaptive Action and the Posterior Cingulate”. Princeton University, December 2014.
- “Exploiting the Posterior Cingulate”. Princeton University, July 2014.
- “Strategic Decision Making and the Cingulate Cortex”. University of Pennsylvania, December 2012.

Philosophy

- “Content Preservation and Streams of Thought”. American Philosophical Association, Eastern Division, January 2023.
- “The New Central Executive”. Neurocognitive Foundations of Mind, November 2022.
- “The New Central Executive”. Philosophy of Neuroscience in the Gulf V, September 2022.
- “The New Central Executive”. University of Colorado – Boulder, September 2022.
- “Computation with Neural Manifolds”. British Society for the Philosophy of Science, July 2021.
- “Extended Intelligence”. Kinds of Minds 2020 (postponed), June 2021.
- “Computation with Neural Manifolds”. Neural Mechanisms Online, January 2021.
- “Represent Represent”. Philosophy of Neuroscience in the Gulf III, October 2020.
- “On the Purported Impenetrability of Perception by Cognition”. Inter-American Congress of Philosophy, October 2019. Accepted, not delivered.
- “Stream of Thought”. American Philosophical Association, Central Division, February 2019.
- “Streams of Thought: Search, Selection, and Content Preservation in Reasoning”. Duke University, May 2018.

- “The Explanatory Impotence of Deep Neural Networks”. Southern Society for Philosophy and Psychology, March 2018.
- “From Moth to Machine”. American Philosophical Association, Central Division, February 2018.
- “Mental Machines”. American Philosophical Association, Eastern Division, January 2018.
- “Levels and Layers”. European Philosophy of Science Association, September 2017.
- “Information Harvesting: Reasoning as Foraging in the Space of Inferences”. American Philosophical Association, Eastern Division, January 2017.
- “Dynamical Mechanisms and Models in Cognitive Neuroscience”. Models and Simulations VI, University of Notre Dame, May 2014.

Posters

- Barack DL and Salzman CD. 2022. Cognitive Computational Neuroscience (CCN) 6.
- Barack DL and Jaegle A. 2022. Society for Philosophy and Psychology / European Society for Philosophy and Psychology Joint Meeting.
- Barack DL and Salzman CD. 2018. Cognitive Computational Neuroscience (CCN) 2.
- Barack DL and Salzman CD. 2017. Society for Neuroscience 47.
- Bromberg-Martin EM, Platt ML, and Barack DL. 2016. COSYNE 13.
- Barack DL, Li Y, Nassar MR, and Gold JI. 2015. Society for Neuroscience 45.
- Barack DL. 2015. Society for Philosophy and Psychology.
- Barack DL, Gariépy JF, and Platt ML. 2014. Society for Neuroscience 44.
- Barack DL, Gariépy JF, and Platt ML. 2014. COSYNE 11.
- Barack DL, Gariépy JF, and Platt ML. 2013. Society for Neuroscience 43.
- Barack DL and Platt ML. 2013. COSYNE 10.
- Barack DL, Hayden BY, and Platt ML. 2012. Society for Neuroscience 42.
- Barack DL, Hayden BY, Pearson JM, and Platt ML. 2012. Computational and Systems Neuroscience (COSYNE) 9.
- Barack DL, Hayden BY, Pearson JM, and Platt ML. 2011. Society for Neuroscience 41.
- Harris J, Barack DL, and Woldorff MW. 2010. Society for Neuroscience 40.
- Barack DL and Woldorff MW. 2009. Society for Neuroscience 39.

Teaching

- | | |
|--|------------------------------|
| Duke University, Durham, NC | January 2013-May 2014 |
| Teaching Assistant, “Neuroethics”, Philosophy Department | |
| Lecturer, “Introduction to Philosophy” and “Seminar in Theories of Cognition”, Philosophy Department | |
| University of Wisconsin-Milwaukee, Milwaukee, WI | August 2005-May 2007 |
| Teaching Assistant and Lecturer, “Introduction to Philosophy”, Philosophy Department | |
| Pomona College, Claremont, CA | September 2003-December 2003 |
| Research and Teaching Assistant, “Consciousness and Cognition”, Psychology Department | |

References

Dr. Christopher A B Peacocke

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Columbia University
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Dr. John Morrison
Associate Professor of Philosophy
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Dr. Michael L Platt
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Professor of Neuroscience, Professor of Psychology, and Professor of Marketing
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