# Ryan E. Harvey, PhD

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## Education

**University of New Mexico** *Albuquerque, NM*

Ph.D., Psychology *2016 - 2021*

- Dissertation title: Hippocampal activity following prenatal alcohol exposure
- Passed with distinction

**University of New Mexico** *Albuquerque, NM*

M.Sc., Psychology *2015 - 2016*

- Thesis title: Influence of anterior thalamic inactivation on the retrieval of spatial reference memory and working memory in the radial arm maze

**Purdue University** *Fort Wayne, IN*

B.A, Psychology *2010 - 2014*

- Thesis title: Previous training improves egocentric navigation performance in otoconia-deficient mice: evidence for performance improvements in microgravity

## Research positions

**Postdoctoral Associate**

Cornell University; Dr. Antonio Fernández-Ruiz & Dr. Azahara Oliva, Supervisor *2021 - present*

- Coordination of hippocampal cell ensembles

**Graduate Student**

University of New Mexico; Dr. Benjamin Clark, Supervisor *2015 - 2021*

- Contribution of the anterior thalamus to hippocampal dynamics and spatial memory
- The impact of prenatal alcohol exposure on spatial processing

**Research Technician**

Purdue University; Dr. Ryan Yoder, Supervisor *2014 - 2015*

- Hippocampal representations of otoconia-deficient mice

**Research Assistant**

Purdue University; Dr. Punya Nachappa, Supervisor *2014 - 2015*

- The effect of microgravity on soybean growth

**Research Assistant**

Purdue University; Dr. Carol Lawton, Supervisor *2013 - 2015*

- Human spatial navigation and memory in virtual environments
- Motion sickness in response to visual optic flow

**Research Assistant**

Purdue University; Dr. Ryan Yoder, Supervisor *2012 - 2015*

- Spatial navigation and memory in otoconia-deficient mice

## Awards & Fellowships

2022 **Fellowship**, Mong Senior Cornell Neurotech Fellow

2017-2020 **Fellowship**, National Institute on Alcohol Abuse and Alcoholism T32 Predoctoral Fellowship

2017 **Presentation Award**, Psychology research day, University of New Mexico

2017 **Travel award**, Student conference award program travel award, University of New Mexico

2016 **Travel award**, Student conference award program travel award, University of New Mexico

2016 **Poster Award**, Psychology research day, University of New Mexico

2015 **Poster award**, student research & creative endeavor symposium, Purdue University

2014 **Research grant**, Research, engagement, & sponsored program research scholarship, Purdue University

## Publications

- Tang, W., Mei, X., **Harvey, R.E.**, Carbajal-Leon, E., Netzer, T., Chang, H., Fernandez-Ruiz, A. (2025). Goal-directed hippocampal theta sweeps during memory-guided navigation. bioRxiv.
- Karaba, L.A., Robinson, H.L., **Harvey, R.E.** Chen, W., Fernandez-Ruiz, A., Oliva, O. (2024). A hippocampal circuit mechanism to balance memory reactivation during sleep. Science.
- **Harvey, R.E.** Robinson, H.L., Liu, C., Oliva, O., Fernandez-Ruiz, A. (2023). Hippocampo-cortical circuits for selective memory encoding, routing, and replay. Neuron.
- Soula, M., Maslarova, A., **Harvey, R.E.**, Valero, M., Brandner, S., Hamer, H., Fernandez-Ruiz, A, Buzsaki, G. (2023). Intricate epileptiform discharges affect memory in an Alzheimer's Disease mouse model. PNAS.
- **Harvey, R.E.** Berkowitz, L.E., Savage, D.D., Clark, B.J. (2021). Prenatal alcohol exposure disrupts hippocampal sharp-wave ripple-associated spike dynamics. bioRxiv.
- **Harvey, R.E.**, Berkowitz, L.E., Savage, D.D., Hamilton, D.A., Clark, B.J. (2020). Altered hippocampal place cell representation and theta rhythmicity following moderate prenatal alcohol exposure. Current Biology. (Commentary: Wirt, R.A., McNeela, A.M., & Hyman, J.M. (2020). Current Biology)
- **Harvey, R.E.**, Berkowitz, L. E., Hamilton, D. A., & Clark, B. J. (2019). The Effects of Developmental Alcohol Exposure on the Neurobiology of Spatial Processing. Neuroscience & Biobehavioral Reviews.
- Xu, Z., Wu, W., Winter, S. S., Mehlman, M. L., Butler, W. N., Simmons, C. M., **Harvey, R.E.**, Berkowitz, L.E., Chen, Y., Taube, J.S., Wilber, A. A., & Clark, B.J. (2019). A Comparison of Neural Decoding Methods and Population Coding Across Thalamo-Cortical Head Direction Cells. Frontiers in Neural Circuits.
- Berkowitz, L. E., **Harvey, R.E.**, Drake, E., Thompson, S. M., & Clark, B. J. (2018). Progressive impairment of directional and spatially precise trajectories by TgF344-Alzheimer's disease rats in the Morris Water Task. Scientific reports.
- **Harvey, R.E.**, Rutan, S. A., Willey, G. R., Siegel, J. J., Clark, B. J., & Yoder, R. M. (2018). Linear self-motion cues support the spatial distribution and stability of hippocampal place cells. Current Biology.
- **Harvey, R.E.**, Thompson, S. M., Sanchez, L. M., Yoder, R. M., & Clark, B. J. (2017). Post-training inactivation of the anterior thalamic nuclei impairs spatial performance on the radial arm maze. Frontiers in neuroscience.
- Clark, B. J., & **Harvey, R.E.** (2016). Do the anterior and lateral thalamic nuclei make distinct contributions to spatial representation and memory? Neurobiology of learning and memory.

### Book Chapters

- Berkowitz, L.E., **Harvey, R.E.**, Clark B.J. (2020). Spatial Navigation and Alzheimer's disease. In: C. Martin& V.R. Preedy (Eds.), The Neuroscience of Dementia: Genetics, Neurology, Behavior, and Diet in Dementia (1st ed., Vol. 2, pp. 677-692). Academic Press.

## Presentation

### Poster Presentations & Talks

*2024*

- **Harvey, R.E.**, Liu, C., Zhao, Z., Carbajal-Leon, E., Oliva, A., Fernandez-Ruiz, A. (2024, October). Hippocampal-cortical memory consolidation occurs at learning timescales. Chicago, IL.
- Karaba, L., Robinson, H.L., **Harvey, R.E.**, Fernandez-Ruiz, A., Oliva, A. (2024, October). A hippocampal circuit mechanism to balance memory reactivation during consolidation. Chicago, IL.
- Paudel, P., Vogt, C., Liu, C., Zhao, Z., **Harvey, R.E.**, Niraula, R., Sheehan, M., Fernandez-Ruiz, A., Oliva, A. (2024, October). Social experiences in rewilded mice living in outdoor enclosures reactivate during sleep. Chicago, IL.
- Berkowitz, L., Rodorova, R., **Harvey, R.E.**, Cabus, D., Letendre, J., Shimizu, J., Dong, X., Tehrani, N., Jia, J., Roth, S., Fernandez-Ruiz, A., Nishimura, N., Schaffer, C. (2024, October). Mechanisms of context encoding in APP/PS1 mice are rescued by increasing cerebral blood flow by eliminating capillary stalls. Chicago, IL.

*2022*

- **Harvey, R.E.**, Robinson, H.L., Liu, C., Oliva, A., Fernandez-Ruiz, A. (2022, November). Hippocampo-cortical circuits for selective memory encoding, routing, and replay. Poster presented at the Society for Neuroscience Conference. San Diego, CA.

*2020*

- **Harvey, R.E.**, Berkowitz, L.E., Clark, B.J. (2020,October). Hippocampal replay alterations following moderate prenatal alcohol. Traditional talk at Neuromatch Conference 3.0. Talk Link
- Berkowitz, L.E., **Harvey, R.E.**, Gabaldon-Parish, M., Roy, V.J., Clark, B.J. (2020,October). Investigation of postsubicular head direction cells in the TgF344-AD rat model of Alzheimer's disease. Traditional talk at Neuromatch Conference 3.0.
- James, K.E., Berkowitz, L.E., **Harvey, R.E.**, Thompson, S.M., Olguin, C.R., Drake, E.N., Pentkowski, N.S., Clark, B.J. (2020,October). The contribution of anxiety to spatial memory deficits in the TgF344-AD rat model of Alzheimer's disease. Neuromatch Conference 3.0.
- Berkowitz, L.E., **Harvey, R.E.**, Clark, B.J. (2020, July). Head direction cells in the TgF344-AD rat model of Alzheimer's disease. Alzheimer's Association International Conference.

*2019*

- **Harvey, R.E.**, Berkowitz, L.E., Savage, D.D., Hamilton, D.A., Clark, B.J. (2019, October). Hippocampal CA1, CA3, and dentate gyrus place cell firing characteristics in a rat model of moderate prenatal alcohol exposure. Poster presented at the Society for Neuroscience Conference. Chicago, IL.
- Gonçalves-Garcia, M., Berkowitz, L.E., Donaldson, T., **Harvey, R.E.**, Wagner, J., Davies, S., Savage, D.D., Clark, B.J. (2019, October). The effects of moderate prenatal alcohol exposure on the organization of exploratory behavior by adult rats. Poster presented at the Society for Neuroscience Conference. Chicago, IL.
- **Harvey, R.E.**, Berkowitz, L.E., Clark, B.J. (2019, October). Disruption of the anterior thalamic head direction cell network impairs the hippocampal place signal. Poster presented at the Society for Neuroscience Conference. Chicago, IL.
- Berkowitz, L.E., **Harvey, R.E.**, Gabaldon-Parish, M., Roy, V. (2019, October). Characterization of cortical and thalamic head direction cells in the TgF344-AD rat model of Alzheimer's disease. Poster presented at the Society for Neuroscience Conference. Chicago, IL.
- Berkowitz, L.E., Gabaldon-Parish, M., **Harvey, R.E.**, Sneddon, E., Clark, B.J. (2019, October). Distributive home base behavior in the TgF344-AD rat model of Alzheimer's disease. Poster presented at the Society for Neuroscience Conference. Chicago, IL.
- Gabaldon-Parish, M., Berkowitz, L.E., **Harvey, R.E.**, Sneddon, E., Clark, B.J. (2019, March). Distributed home base behavior in TgF344-AD rat model of Alzheimer's disease. Poster presented at UNM Neuroscience day, Albuquerque, NM.
- Gonçalves-Garcia, M., Donaldson, T., Berkowitz, L.E., **Harvey, R.E.**, Gabaldon-Parish, M., Sanchez, L., Goss, J.K., Wagner, J., Davies, S., Tofighi, D., Savage, D.D., Clark, B.J. (2019, March). The effects of moderate prenatal alcohol exposure on the organization of exploratory behavior by adult female rats. Poster presented at UNM Neuroscience day, Albuquerque, NM.

*2018*

- Sanchez, L.M., **Harvey, R.E.**, Benthem, D., Goss, J., Johnson, S.A., Turner, S.M., Savage. D.D., Burke, S.N., & Clark, B.J., (2018, November). The effect of moderate prenatal alcohol exposure on object discrimination by adult rats. Poster presented at the Society for Neuroscience Conference. San Diego, CA.
- Yoder, R.M., **Harvey, R.E.**, Rutan, S.A., Carstensen, L.C., Willey, G.R., Terry, C.A., Siegel, J.J., & Clark, B.J., (2018, November). Linear self-motion cues contribute to hippocampal place cells: Functional implications. Current Biology, 28(11), 1803-1810. Poster presented at the Society for Neuroscience Conference. San Diego, CA.
- **Harvey, R.E.**, Berkowitz, L. E., Savage, D. D., Hamilton, D. A., & Clark, B. J. (2018, November). Spatial and temporal stability in CA1 hippocampal place cells following moderate prenatal alcohol exposure. Poster presented at the Society for Neuroscience Conference. San Diego, CA.
- **Harvey, R.E.**, Berkowitz, L. E., Savage, D. D., Hamilton, D. A., & Clark, B. J. (2018, September). Spatial and temporal deficits in hippocampal place cells following moderate prenatal alcohol exposure. Poster presented at FASD Awareness Day. Albuquerque, NM.
- **Harvey, R.E.**, Berkowitz, L. E., Savage, D. D., Hamilton, D. A., & Clark, B. J. (2018, October). Altered spatial coding of hippocampal place cells following moderate prenatal alcohol exposure. Poster presented at the New Mexico EEG and Behavior conference. Albuquerque, NM
- **Harvey, R.E.**, Berkowitz, L. E., Savage, D. D., Hamilton, D. A., & Clark, B. J. (2018, April). Altered spatial coding of hippocampal place cells following moderate prenatal alcohol exposure. Poster presented at the International Conference on Learning and Memory. Huntington Beach, CA.
- Berkowitz, L. E., **Harvey, R.E.**, & Clark, B. J. (2018, April). Characterization of Head Direction Cells in the TgF344-AD Rat Model of Alzheimer's Disease. Poster presented at the International Conference on Learning and Memory. Huntington Beach, CA.
- **Harvey, R.E.**, Berkowitz, L. E., Savage, D. D., Hamilton, D. A., & Clark, B. J. (2018, March). Reduced Spatial Coding of Hippocampal Place Cells Following Moderate Prenatal Alcohol Exposure. Poster presented at the Gordon Research Conference. Galveston, TX

*2017*

- Berkowitz, L. E. Thompson, S. M., Drake, E. N., Madden, J. T., Sneddon, E. A., **Harvey, R.E.**, Clark B. J. (2017, November). Sex specific spatial navigation and spatial memory impairment in the TgF344-ad rat model of Alzheimer's disease. Poster presented at the Society for Neuroscience Conference. Washington DC.
- **Harvey, R.E.**, Goss, J., Rigg, T., Berkowitz, L. E., Wagner, J. L., Savage, D. D., Hamilton, D. A., & Clark, B.J. (2017, November). Reduced spatial coding of hippocampal place cells following moderate prenatal alcohol exposure. Poster presented at the Society for Neuroscience Conference. Washington DC.
- **Harvey, R.E.**, Rigg, T., Goss, J., Wagner, J.L., Savage, D.D., Hamilton, D.A., Clark, B.J. (2017). Reduced spatial and directional coding by hippocampal place cells following moderate prenatal alcohol exposure in the rat. Poster presented at the 40th Annual Research Society on Alcoholism Meeting, Denver, CO.
- **Harvey, R.E.** (2017). First Characterization of Hippocampal Place Cell firing in a Moderate Prenatal Alcohol Rat Model. Talk delivered at UNM Psychology Research Day, Data Blitz. Albuquerque, NM.
- **Harvey, R.E.**, Rigg, T., Goss, J., Rysanek, J.S., Wagner, J.L., Savage, D.D., Hamilton, D.A., Clark, B.J., (2017). Reduced directional coding and phase locking by hippocampal place cells following moderate prenatal alcohol exposure in the rat. Poster presented at UNM Neuroscience day, Albuquerque, NM.
- **Harvey, R.E.**, Rigg, T., Goss, J., Rysanek, J.S., Wagner, J.L., Savage, D.D., Hamilton, D.A., Clark, B.J., (2017). Reduced directional coding and phase locking by hippocampal place cells following moderate prenatal alcohol exposure in the rat. Poster presented at UNM Alcohol Research Poster Session, Albuquerque, NM.

*2016*

- Thompson, S.M., **Harvey, R.E.**, Sanchez, L.M., Winter, S.S., Clark, B.J. (2016). Directional Discrimination in an Object-Place Paired Associate Memory is Impaired after Muscimol Inactivation of the Anterior Thalamus. Poster presented at The Annual Society for Neuroscience conference. San Diego, CA.
- **Harvey, R.E.**, Thompson, S., Sanchez, L.M., Sneddon, E.A., Yoder, R.M., Clark, B. (2016). Influence of Anterior Thalamic Inactivation on the Retrieval of Spatial Inactivation of the Anterodorsal Thalamic Nuclei Leads to Reference Memory and Working Memory in the Radial Arm Maze. Poster presented at The Annual Society for Neuroscience conference. San Diego, CA.
- **Harvey, R.E.**, Thompson, S., Sanchez, L.M., Yoder, R.M., Clark, B. (2016). Inactivation of the anterodorsal thalamus leads to navigational deficits in the radial arm maze. Poster presented at UNM psychology department's Psychology Research Day. Albuquerque, NM.
- **Harvey, R.E.**, Thompson, S., Sanchez, L.M., Yoder, R.M., Clark, B. (2016). Inactivation of the anterodorsal thalamic nuclei leads to navigational deficits in the radial arm maze. Poster presented at the Brain & Behavioral Health Institute's Neuroscience day. Albuquerque, NM.

*2015*

- Lawton C. A., **Harvey, R.E.**, Horton, A. H., Terry, C. A., Serna, C. E. (2015). Effects of video game experience on perceived self-motion in a stereoscopic display. Poster presented at the Association for Psychological Science. New York, NY.
- Lawton C. A., **Harvey, R.E.**, Horton, A. H., Terry, C. A., Serna, C. E. (2015). Sex Differences in Perceived Self-Movement in a Stereoscopic Head-Mounted Display. Poster presented at the Midwestern Psychological Association, Chicago, IL.
- **Harvey, R.E.**, Horton, A. H., Serna, C. E., Terry, C. A.(2015). Video game experience: Perception of self motion and motion sickness in the virtual world. 18th Annual Student Research And Creative Endeavor Symposium. Purdue University Fort Wayne, 2015.

*2014*

- **Harvey, R.E.** & Yoder, R. M. (2014). Previous training improves egocentric navigation performance in otoconia-deficient mice. Poster presented at the Midwestern Psychological Association, Chicago, IL.
- Lawton, C. A., Brockman, S. N., Goebel, E. A., Long, A. M., Phillips, E. L., **Harvey, R.E.**, Kirby, S. L., & Rosbrugh, H. H. (2014). Sex, handedness, and virtual navigation. Poster presented at the Midwestern Psychological Association, Chicago, IL.
- **Harvey, R.E.** (2014). Pretraining improves egocentric navigation performance in otoconia-deficient mice.17th Annual Student Research And Creative Endeavor Symposium. Purdue University Fort Wayne, 2014.

*2013*

- Kirby, S. L., **Harvey, R.E.**, Goebel, E. A., Köppen, J. R., Wallace, D. G., & Yoder, R. M. (2013) Head direction signal degradation impairs spatial learning. Poster presented at Society for Neuroscience, San Diego, CA.
- **Harvey, R.E.** & Yoder, R. M. (2013). Finding Their Way in Space: An Alternative Strategy Improves Navigation Performance in Otoconia-Deficient Mice. Poster presented at the 29th American Society for Gravitational and Space Research, Orlando, FL.
- Kirby, S. L., **Harvey, R.E.**, & Yoder, R. M. (2013). Head direction signal degradation contributes to navigation impairments. Poster presented at the Midwestern Psychological Association, Chicago, IL.
- **Harvey, R.E.** & Yoder, R. M. (2013). The head direction signal contributes to accurate navigation in darkness. Program No. 16. 16th Annual Student Research And Creative Endeavor Symposium. Purdue University Fort Wayne, 2013.

## Other education

### Kaggle Courses

*2021-22*

- Intro to Machine Learning
- pandas

### Neuromatch Academy

Interactive track *2020*

- Gained experience with traditional and emerging tools of computational neuroscience
- Group project title: Spatiotemporal distribution of motor processing in V1

## Editorial service

Co-reviewer

- 2022: Nature
- 2020: Wellcome Open Research
- 2019: Frontiers neural circuits
- 2017: Current biology
- 2017: Behavioral brain research

## Mentorship

2020-2021 **Katie James**, Undergraduate Research Assistant
2019 **Mônica Gonçalves-Garcia**, Undergraduate Research Assistant
2017-2019 **Jacob Ring**, Honors Student
2017 **Danielle Benthem**, Psych 499 Student
2016-2018 **Joshua Rysanek**, Undergraduate Research Assistant
2016-2019 **Jonathan Goss**, Psych 499 Student
2016-2017 **Tanner Rigg**, Work Study Student
2016 **Landri Medina**, Undergraduate Research Assistant
2015-2017 **Elizabeth Sneddon**, Psych 499 Student
2015-2017 **Shannon Thompson**, Post-bacc
2015-2017 **Lilliana Sanchez**, Post-bacc
2015 **Sierra Yazzie**, Undergraduate Research Assistant

## Academic service

2016-2019 **New Mexico Brain Bee**, organizing volunteer, speaker, and judge
2016 **Office for Diversity, Equity & Inclusion STEAM-H**, speaker
2016 **NeuroExpo ABQ at the New Mexico Museum of Natural History**, presenter

## Teaching Experience

2021 **Brain & Behavior**, Guest Lecture, University of New Mexico
2021 **Learning & memory**, Teaching Assistant, University of New Mexico
2021 **History of Psychology**, Teaching Assistant, University of New Mexico
2020 **Transcranial stimulation laboratory**, Teaching Assistant, University of New Mexico
2017 **Brain & Behavior**, Guest Lecture, University of New Mexico
2016 **Brain & Behavior**, Teaching Assistant, University of New Mexico
2015 **Aging & Dementia**, Guest Lecture, University of New Mexico
2015 **Introductory Psychology**, Teaching Assistant, University of New Mexico
2013 **Psychobiology**, Teaching Assistant, Purdue University
2012 **Introductory Psychology**, Teaching Assistant, Purdue University

## Skills

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| **Animal Behavior** | Rodent handling & training on spatial tasks, detailed behavioral scoring |
| **In-vivo Electrophysiology** | Micro-drive construction & implantation, single unit recordings in awake behaving rodents |
| **In-vivo drug infusion** | Construction and use of custom infusion device for drug delivery to multiple brain regions |
| **Programming** | Python, Matlab, R, LaTeX, Git, CI/CD |
| **Machine Learning** | Scikit-learn, Pytorch, Keras, TensorFlow, SciPy |
| **Python Packages** | NumPy, Pandas, Matplotlib, Seaborn, StatsModels |
| **Tissue preparation** | Sectioning & staining tissue |