

James A. Traer
Department of Psychological and Brain Sciences
Curriculum Vitae as of August 26, 2024
Report includes Dec 2019 to August 26, 2024
Contributions since Aug 2022 highlighted

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EDUCATION AND PROFESSIONAL HISTORY

Post Graduate Education

- 2013–2016 **Post-doctoral Fellow** Massachusetts Inst. of Technology (MIT), Dept. of Brain and Cognitive Sciences (Adviser: Josh H. McDermott)
- 2011–2013 **Post-doctoral Associate** UCSD, Scripps Inst. of Oceanography, Marine Physical Laboratory (Adviser: Peter Gerstoft)

Higher Education

- 2006–2011 **PhD** Physical Oceanography, Scripps Institute of Oceanography (Adviser: Peter Gerstoft)
- 2006 **MSc** Cambridge University (UK). Major (Minor): Experimental and Theoretical Physics (Physics of medical imaging)
- 2005 **BSc** Cambridge University (UK). Major: Experimental and Theoretical Physics

Professional and Academic Positions

- 2020–present **Assistant Professor** U. Iowa, Dept. of Psychological and Brain Sciences
- 2016–2020 **Research Scientist** MIT, Dept. of Brain and Cognitive Sciences

Honors and awards

- 2022 **Old Gold Summer Fellowship** U. Iowa
- 2016 **Spot award** Massachusetts Inst. of Technology
- 2011 **Best student paper** Acoustical Society of America (162nd meeting)
- 2010 **Best student paper** Acoustical Society of America (161st meeting)
- 2006 **Neville-Mott Award** Cavendish Laboratory, U. Cambridge (UK)

Memberships

- 2008–present Acoustical Society of America (ASA)
- 2014–present Association for Research in Otolaryngology

TEACHING

Teaching and advising overview at the University of Iowa

Semester /year	Advisees		Courses Taught		CLAS Core and Other Selected Scores					
	UG	Grad	Course Number and Title	Students Enrolled	Organization	Clarity	Learning Focused	Learning Materials	Assessment	Support
Spring 2024	1	2	PSY1001 Elementary Psychology	597	4.00	3.80	3.50	4.00	4.40	4.20
Fall 2023	1	2	PSY4090 Mental Models of a Physical World	12	6.00	6.00	6.00	6.00	6.00	6.00
Spring 2023	1	2	PSY3055: Science of Sound and Hearing	34	5.80	5.80	5.80	5.80	5.80	5.80
			PSY6070 (graduate): Theoretical Methods for the Brain Sciences	10	5.50	6.00	6.00	6.00	6.00	6.00
Fall 2022	1	2	PSY4090: Mental Models of a Physical World	11	6.00	6.00	5.80	5.80	5.80	5.80
Spring 2022	1	2	PSY3055: Science of Sound and Hearing	42	5.50	5.50	5.50	5.50	5.50	6.00
Fall 2021	0	2	PSY4090: Mental Models of a Physical World	14	5.60	5.60	5.80	5.80	5.80	5.90
Spring 2021	0	0								
Fall 2020	0	1	PSY4090: Mental Models of a Physical World	12	5.30	5.30	5.30	5.70	5.70	5.90

Summary of advisory roles at the University of Iowa

Year	Role	No. advisees (names)
2024	PhD research advisor	2 (K. Moore, J.J. Stolley)
	Post-doctoral research advisor	2 (J. Skye, E. Rooke)
	Post-baccalaureate research advisor	1 (N. Tansey)
	PhD Dissertation committee member (PBS)	2 (X. Chen, S. Chiu)
	Doctoral Comprehensive Exam Committee member (Mathematics)	1 (George F. Clare Kennedy)
2023	PhD research advisor	2 (K. Moore, J.J. Stolley)
	Post-doctoral research advisor	2 (J. Skye, E. Rooke)
	Post-baccalaureate research advisor	1 (N. Tansey)
	Undergraduate research advisor	1 (A. Davis)
	PhD Dissertation committee member (Neuroscience)	1 (J. Skye)
	PhD Dissertation committee member (Mathematics)	1 (E. Rooke)
	Research Advisory Committee (RAC) member	2 (Bettina Bustos, Zexuan Niu)
	Doctoral Prospectus Exam committee member (Neuroscience Graduate Program)	2 (K. Moore, J.J. Stolley)
Doctoral Comprehensive Exam committee member (Neuroscience Graduate Program)	1 (Avery L.Z. Van de Water)	
2022	PhD research advisor	2 (K. Moore, J.J. Stolley)
	Undergraduate research advisor	1 (A. Davis)
	Research Advisory Committee (RAC) member	1 (Samantha Chiu)
	Doctoral Prospectus Exam committee member (Neuroscience Graduate Program)	1 (J. Skye)
2021	PhD research advisor	2 (K. Moore, J.J. Stolley)
	Post-baccalaureate research advisor	1 (R. Gonzalez)
	PhD Dissertation committee member (Mathematics)	1 (Pake Melland)
	Research Advisory Committee (RAC) member	1 (John Zbaracki)
	Doctoral Comprehensive Exam committee member (Neuroscience Graduate Program)	1 (J. Skye)
2020	PhD rotation project advisor (Neuroscience Graduate Program)	1 (K. Moore)
	Post-baccalaureate research advisor	1 (R. Gonzalez)

Primary student advising

- Aug 2021–present **PhD student** Stolley, Jeff J.; Neuroscience Graduate Program
- May 2021–present **PhD student** Moore, Keland; Neuroscience Graduate Program
- Feb 2022–Dec 2023 **Undergraduate research assistant** Davis, Ariya; Discover, Engage, and Inquire (DEI) project

Primary professional advising

- Sep 2023–present **Post-doctoral researcher** Rooke, Ethan
- Jul 2023–present **Post-doctoral researcher** Skye, Jax (50% appointment; with 50% appointment in Dr. Kliemann’s lab)
- May 2023–present **Post-baccalaureate research assistant** Tansey, Nathan
- 2020–2022 **Post-baccalaureate research assistant** Gonzalez, Ray

SCHOLARSHIP

- * senior author, major contribution
- ** secondary contribution
- *** equal contribution
- **** minor contribution

Refereed Journal Publications

- 13) * J.H. McDermott, V. Agarwal, & J.A. Traer “Physics, Ecological Acoustics, and the Auditory System.”, *Current Biology*, (in press as of Aug 2024)
- 12) * J.A. Traer, S.V. Norman-Haignere, & J.H. McDermott, “Causal inference in environmental sound recognition”, *Cognition*, 214, 104627. (2021)
- 11) ** M.J. Bianco, P. Gerstoft, J.A. Traer, E. Ozanich, M.A. Roch, S. Gannot, & C.-A. Deledalle, “Machine learning in acoustics: theory and applications”, *J. Acous. Soc. Am.*, **146**(5), 3590-3628, (2019).
- 10) ** K.J.P. Woods, M.H. Siegel, J.A. Traer, & J.H. McDermott, “Headphone screening to facilitate web-based auditory experiments”, *Atten., Percep., Psych.*, (2017).
- 9) * J.A. Traer & J.H. McDermott, “Statistics of natural reverberation enable perceptual separation of sound and space”, *PNAS*, **113**(48), E7856–E7865, (2016).
- 8) ** J.Q. Taylor, P. Kovacic, J.A. Traer, P. Zakahi, C. Osowski, A.S. Widge, & C.A. Glorioso, “Avoiding a lost generation of scientists”, *eLife*, **5**, e17393, (2016).
- 7) * J.A. Traer & P. Gerstoft, “A unified theory of microseisms and hum”, *Journal of Geophysical Research: Solid Earth*, **119**(4), 3317–3339, (2014).
- 6) ** C. Yardim, P. Gerstoft, W.S. Hodgkiss, & J.A. Traer, “Compressive geoacoustic inversion using ambient noise”, *J. Acoust. Soc. Am.*, (2014).
- 5) * J.A. Traer, P. Gerstoft, P.D. Bromirski, & P.M. Shearer, “Microseisms and hum from ocean surface gravity waves”, *J. Geophys. Res.*, **117**, B11307, (2012).
- 4) * J.A. Traer & P. Gerstoft, “Coherent averaging of the passive fathometer response using short correlation time,” *J. Acoust. Soc. Am.*, **130**, 3633–3641, (2011).

- 3) * J.A. Traer, P. Gerstoft, & W.S. Hodgkiss, “Ocean bottom profiling with ambient noise: A model for the passive fathometer,” *J. Acoust. Soc. Am.* **129**, 1825–1836, (2011).
- 2) * J.A. Traer, P. Gerstoft, H.C. Song, & W.S. Hodgkiss, “On the sign of the adaptive passive fathometer impulse response,” *J. Acoust. Soc. Am.* **126**, 1657–1658, (2009).
- 1) * J.A. Traer, P. Gerstoft, P.D. Bromirski, W.S. Hodgkiss, & L.A. Brooks, “Shallow-water seismoacoustic noise generated by tropical storms Ernesto and Florence,” *J. Acoust. Soc. Am.* **124**, EL170–EL176, (2008).

Refereed Conference Proceedings

- ** V. Agarwal, J.A. Traer, & J.H. McDermott. (2023, September). “Sample-efficient learning of auditory object representations using differentiable impulse response synthesis.” In *ICML 2023 Workshop on Differentiable Almost Everything: Differentiable Relaxations, Algorithms, Operators, and Simulators*.
- ** C. Gan, Y. Gu, S. Zhou, J. Schwartz, S. Alter, J.A. Traer, ... & A. Torralba, “Finding Fallen Objects Via Asynchronous Audio-Visual Integration.”, In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition* (pp. 10523-10533). (2022)
- ** C. Gan, J. Schwartz, S. Alter, D. Mrowca, M. Schrimpf, J.A. Traer, ... & D. Yamins, “ThreeDWorld: A Platform for Interactive Multi-Modal Physical Simulation”, *Proceedings of the Neural Information Processing Systems Track on Datasets and Benchmarks* (2021).
- ** V. Agarwal, M. Cusimano, J.A. Traer, & J.H. McDermott, “Object-based synthesis of scraping and rolling sounds based on non-linear physical constraints”. In *The 24th International Conference on Digital Audio Effects (DAFx-21)*, (2021).
- * J.A. Traer, M. Cusimano, & J.H. McDermott, “A perceptually inspired generative model of rigid-body contact sounds”, *Digital Audio Effects (DAFx)*, (2019).
- * J.A. Traer, & J.H. McDermott, “Intuitive Physical Inference from Sound”, *Comp. Cog. Neuro.*, (2018).
- ** Z. Zhang, J. Wu, Q. Li, Z. Huang, J.A. Traer, J.H. McDermott, J.B. Tenenbaum, & W.T. Freeman, “Generative Modeling of Audible Shapes for Object Perception”, *ICCV*, (2017).

Conference Presentations

- “Perceptually inspired synthesis of rigid-body impact sounds,” 19th Digital Audio Effects conference (DAFx), Birmingham, UK, Sep 2020.
- “A library of real-world reverberation and a toolbox for its analysis and measurement,” Acoustical Society of America (ASA), Boston, MA, Jun 2017.
- “The Perception of Reverberation is Constrained by Environmental Statistics,” Acoustical Society of America (ASA), Salt Lake City, UT, May 2016.
- “Coherent averaging of the passive fathometer response using short correlation time,” 162nd meeting of the Acoustical Society of America (ASA), San Diego, CA, Nov 2011.
- “Estimation of geophysical parameters from ambient noise correlation,” (Awarded best student presentation) 161st meeting of the Acoustical Society of America (ASA), Seattle, WA, May 2011.
- “Ocean bottom profiling with ambient noise: a model for the passive fathometer,” *Invited paper* (Awarded best student presentation) 160th meeting of the Acoustical Society of America (ASA), Cancun, Mexico, Nov 2010.

- “Ocean bottom mapping with ambient noise: a model for the passive fathometer,” European Conference on Underwater Acoustics (ECUA), Istanbul, Turkey, Jul 2010.
- “Ocean Acoustic Measurement,” International Meeting of Students in Physical Oceanography (IMSPO), Ensenada, Mexico, September 2009.
- “Synthesis of adaptive processing of a passive fathometer,” 157th meeting of the Acoustical Society of America (ASA), Portland, OR, May 2009.

Conference Posters

- A.L. Van De Water, L. Byrge, D.P. Kennedy, R. Gonzalez, J.Y. Peters, D. Kliemann*, J.A. Traer*. (*co-senior authors). Brain responses to naturalistic videos predicted from audiovisual and semantic features. Jakobsen Research Showcase, Iowa City, IA. Mar, 2024
- A.L. Van de Water, L. Byrge, D.P., Kennedy, R. Gonzalez, J.Y. Peters, D. Kliemann, & J.A. Traer (Kliemann and Traer contributed equally). Poster presented by A.L. Van de Water. “Brain responses to naturalistic videos predicted from audiovisual and semantic features.” The Society for Neuroscience - Annual Meeting, Washington D.C., Nov 2023
- K. Moore & J.A. Traer, “The perceptual relevance of bounce patterns in auditory physical inference.” U. Iowa Neuroscience Research Day, Oct, 2023.
- J.J.. Stolley & J.A. Traer, “Hearing distortion to hear sound sources” U. Iowa Neuroscience Research Day, Oct, 2023.
- J.A. Traer & J. H. McDermott, “Intuitive Physics in Auditory Scene Analysis,” Association for Research in Otolaryngology (ARO), Baltimore, MD, Feb 2019.
- J.A. Traer & J. H. McDermott, “Environmental Sound Recognition in Reverberation as Causal Inference,” Association for Research in Otolaryngology (ARO), Baltimore, MD, Feb 2019.
- J.A. Traer & J. H. McDermott, “Human inference of force from impact sounds: perceptual evidence for inverse physics,” Acoustical Society of America (ASA), Minneapolis, MN, May 2018.
- J.A. Traer & J. H. McDermott, “Human recognition of environmental sounds is not always robust to reverberation,” Acoustical Society of America (ASA), Minneapolis, MN, May 2018.
- J.A. Traer & J. H. McDermott, “Statistics of Resonant Modes Allow Auditory Inference of Material from Impact Sounds,” Association for Research in Otolaryngology (ARO), San Diego, CA, Feb 2018.
- J.A. Traer & J. H. McDermott, “Investigating audition with a generative model of impact sounds,” Acoustical Society of America (ASA), Boston, MA, Jun 2017.
- M. Cusimano, J.A. Traer & J. H. McDermott, “Auditory perception of object properties as inverse acoustics,” Acoustical Society of America (ASA), Boston, MA, Jun 2017.
- J.A. Traer & J. H. McDermott, “Ecological Acoustics and the Effect of Material and Force on Impact Sounds,” Association for Research in Otolaryngology (ARO), Baltimore, MD, Feb 2017.
- J.A. Traer & J. H. McDermott, “Statistics of natural reverberation enable perceptual separation of sound and space,” Speech and Audio in the North-East (SANE), Cambridge, MA, Oct, 2016.
- J.A. Traer & J. H. McDermott, “Human Perception of Reverberation Incorporates Natural Statistics,” Association for Research in Otolaryngology (ARO), Baltimore, MD, Feb 2015.

- J.A. Traer & J. H. McDermott, “The Perception of Reverberation is Constrained by Environmental Statistics,” Association for Research in Otolaryngology (ARO), San Diego, CA, 2014.
- J.A. Traer, P. Gerstoft, P. D. Bromirski, & P. M. Shearer, “Shallow water microseism generation,” American Geophysical Union (AGU), San Francisco, CA, Dec 2011.
- J.A. Traer, P. Gerstoft, & W. S. Hodgkiss, “Ocean bottom mapping with ambient noise and adaptive array processing ,” American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, Dec 2009.
- J.A. Traer, P. Gerstoft, L. A. Brooks, P. D. Bromirski, W. S. Hodgkiss, & D. P. Knobles “Low-frequency acoustic signature of tropical storms Ernesto and Florence,” Acoustical Society of America (ASA), Paris, France, Jun 2008.

Invited Talks

- **Oct 2024** **U. Iowa, Dept. of Music** Guest lecture for “Music and the Mind” course (Anthony Arnone)
- **Sep 2023** **U. Iowa, Dept. of Music** Guest lecture for “Music and the Mind” course (Anthony Arnone)
- **Oct 2022** **U. Iowa, College of Engineering** Artineer’s speaker series on Arts and Engineering
- Apr 2022 **U. Iowa, Dept. of Psychiatry** Computational Psychiatry Collaboration Group Meeting Series
- Apr 2022 **U. Iowa, Dept. of Psychiatry** Computational Psychiatry Collaboration Group Meeting Series
- Oct 2021 **U. Iowa, Neuroscience graduate program** Neuroscience Research Day
- Jun 2021 **Conference on Computer Vision and Pattern Recognition (CVPR)** Sight and sound workshop. Talk Online: <https://sightsound.org>; <https://www.youtube.com/watch?v=GQ6pphJqj0I>
- Feb 2021 **U. Iowa, Math Dept.** Mathematical Biology Seminar Series
- Feb 2021 **U. Iowa, Neurology Dept.** Dan Tranel’s research group meeting
- Apr 2019 **U. Iowa, Dept. Psych. Brain** Hosted by Mark Blumberg.
- Mar 2019 **Australian hearing Hub** Hosted by David McAlpine
- Feb 2019 **Johns Hopkins University** Hosted by Jason Fischer
- Sep 2018 **Acoustical Society of America, Boston chapter meeting**
- Dec 2018 **MIT Brain and Cog. Sci Dept.** Cog Lunch seminar series
- July 2016 **MIT Brain and Cog. Sci Dept.** Departmental annual retreat
- Oct 2014 **MIT Brain and Cog. Sci Dept.** Cog Lunch seminar series

RESEARCH SUPPORT

Current and completed awards

- 2021–2022 **Iowa Initiative for Artificial Intelligence (IIAI)** “Characterizing Naturalistic Sound Features Relevant for Mental Disorders in Human Behavior and Brain Function with Computational Models” Award amount: \$10,000. Co-Principle Investigator.
- 2016–2020 **IBM-MIT cognitive computing initiative**
- 2014–2017 **NIH F32 NRSA postdoctoral fellowship**
- 2012 **Awarded postdoctoral fellowship at Woods Hole Oceanographic Institute** Declined.

Grant applications in preparation

- **In prep.** **Keck Foundation** “A new mathematical foundation to elucidate dynamic global brain states”. Invited for Phase I application in Aug 2024
- **In prep.** **Eagles Foundation** “Characterizing Dynamic Brain States in Autism with Topological Data Analysis”. Letter of intent submitted, Aug 2024

PROFESSIONAL SERVICE

Departmental, Collegiate, and Professional service

- **Aug 2024–present** **Departmental service (U. Iowa)** Behavioral and Cognitive Neuroscience “brownbag” Seminar Coordinator
- **Jan 2024–present** **Departmental service (U. Iowa)** Neuroscience Awards Committee
- 2009–2011 **Professional service** Acoustical Society of America (ASA) student council member (student council website administrator)
- 2009–2011 **Professional service** Acoustical Society of America (ASA) diversity committee member

Journal and Conference Reviewing

Listing includes all journals refereed since 2016.

Recent referee activity is highlighted to reflect the same date range as the rest of this CV.

- **Journal of Cognition (ScienceDirect)**
- **Communications Biology (Nature)**
- **PLOS Computational Biology**
- **Conference on Neural Information processing Systems (NeurIPS)**
- **IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR)**
- Journal of the Acoustical Society of America
- Scientific Reports (Nature)
- Cognitive Neuropsychology (ScienceDirect)
- Sensors (MDPI)
- Perception (SAGE)
- Brain Sciences (MDPI)
- Symmetry (MDPI)