Mark R. Saddler

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EDUCATION

Massachusetts Institute of Technology — **Cambridge, MA**
Ph.D. in Computational Neuroscience — 02/2024
Thesis: "Task-optimized models of human hearing link perception and neural coding"

The University of Chicago — **Chicago, IL**
B.A. in Biological Sciences (specialization in neuroscience) — 06/2017
B.S. in Biological Chemistry
B.A. in Chemistry

RESEARCH POSITIONS

DTU Department of Health Technology, Hearing Systems Research Section — **Lyngby, Denmark**
Postdoctoral Researcher (advisor: Torsten Dau) — 02/2024 – Present

MIT Department of Brain and Cognitive Sciences, Lab for Computational Audition — **Cambridge, MA**
Ph.D. Student (advisor: Josh H. McDermott) — 10/2017 – 02/2024

Meta Reality Labs, Audio Research — **Redmond, WA**
Research Scientist Intern (advisor: Antje Ihlefeld) — 05/2022 - 09/2022

Woods Hole Oceanographic Institution, Biology Department — **Woods Hole, MA**
Summer Student Fellow (advisor: Laela Sayigh) — 06/2016 - 08/2016

UChicago Department of Neurobiology, Epilepsy Lab — **Chicago, IL**
Undergraduate Research Assistant (advisor: Wim van Drongelen) — 10/2015 - 06/2017

UCSD Scripps Institution of Oceanography, Marine Physical Laboratory — **San Diego, CA**
Summer Research Intern (advisor: Simone Baumann-Pickering) — 06/2015 - 09/2015

Salk Institute for Biological Studies, Molecular Neurobiology Laboratory — **San Diego, CA**
Summer Research Intern (advisors: Laura Hale and Sreekanth Chalasani) — 06/2014 - 09/2014

PUBLICATIONS AND PREPRINTS

7. **MR Saddler**, JH McDermott (*in press*). Models optimized for real-world tasks reveal the task-dependent necessity of precise temporal coding in hearing. *Nature Communications*. https://doi.org/10.1101/2024.04.21.590435
6. **MR Saddler**, T Dau, JH McDermott (2024). Psychoacoustic Phenomena Explained by Auditory Task Optimization. *Proceedings of the Conference on Cognitive Computational Neuroscience*.
5. J Suresh, **MR Saddler**, V Bindokas, A Bhansali, L Pesce, J Wang, J Marks, W van Drongelen (2023). Emerging activity patterns and synaptogenesis in dissociated hippocampal cultures. *bioRxiv*.
4. **MR Saddler***, R Gonzalez*, JH McDermott (2021). Deep neural network models reveal interplay of peripheral coding and stimulus statistics in pitch perception. *Nature Communications* 12, 7278.
3. **MR Saddler***, A Francl*, J Feather, K Qian, Y Zhang, JH McDermott (2021). Speech denoising with auditory models. *Proc. Interspeech* 2021, 2681-2685.

2. **MR Saddler**, A Bocconcelli, L Hickmott, G Chiang, R Landea-Briones, P Bahamonde, G Howes, P Segre, L Sayigh (2017). Characterizing Chilean blue whale vocalizations with DTAGs: a test of using tag accelerometers for caller identification. *Journal of Experimental Biology* 220, 4119-4129.

1. A Bocconcelli, L Hickmott, G Chiang, P Bahamonde, G Howes, R Landea-Briones, F Caruso, **MR Saddler**, L Sayigh (2016). DTAG studies of blue whales (*Balaenoptera musculus*) in the Gulf of Corcovado, Chile. *Proceedings of Meetings on Acoustics* 27, 040002.

INVITED TALKS

10. Institut de L'Audition, IDA-DTU-ENS Workshop. **Paris, France** (November, 2024)
9. Hearing Systems Presentation Day, DTU. **Lyngby, Denmark** (November, 2024)
8. WSAudiology. **Lynge, Denmark** (October, 2024)
7. Department of Medical and Physical Acoustics Symposium. **Universität Oldenburg, Germany** (July, 2024)
6. Hearing Systems Research Seminar, DTU. **Lyngby, Denmark** (June, 2023)
5. Research Seminar in Systematic Musicology. **Universität Graz, Austria** (June, 2023)
4. Laboratoire des Systèmes Perceptifs, Ecole Normale Supérieure. **Paris, France** (April, 2022)
3. Cog Lunch, MIT Department of Brain and Cognitive Sciences. **Cambridge, MA** (April, 2022)
2. Cog Lunch, MIT Department of Brain and Cognitive Sciences. **Cambridge, MA** (October, 2019)
1. Cog Lunch, MIT Department of Brain and Cognitive Sciences. **Cambridge, MA** (November, 2018)

CONFERENCE PRESENTATIONS

33. **MR Saddler**, T Dau, JH McDermott (August, 2024). Psychoacoustic phenomena explained by auditory task optimization. *Cognitive Computational Neuroscience.* Boston, MA. (**Poster**)

32. A Banerjee, **MR Saddler**, JH McDermott (August, 2024). Neural network models of hearing clarify factors limiting cochlear implant outcomes. *Cognitive Computational Neuroscience.* Boston, MA. (**Poster**)

31. **MR Saddler**, T Dau, JH McDermott (June, 2024). Modeling normal and impaired hearing with artificial neural networks optimized for ecological tasks. *Virtual Conference on Computational Audiology.* (**Talk**)

30. A Banerjee, **MR Saddler**, JH McDermott (June, 2024). Neural network models of hearing clarify factors limiting cochlear implant outcomes. *Virtual Conference on Computational Audiology.* (**Talk**)

29. **MR Saddler**, JH McDermott (February, 2024). The role of temporal coding in hearing: evidence from task optimization. *Association for Research in Otolaryngology*. Anaheim, CA. (**Poster**)

28. A Banerjee, **MR Saddler**, JH McDermott (February, 2024). Understanding cochlear implants using machine learning. *Association for Research in Otolaryngology*. Anaheim, CA. (**Poster**)

27. A Magaro, EN Shook, AJE Kell, **MR Saddler**, JH McDermott (February, 2024). Optimization under ecological realism reproduces signatures of human speech perception. *Association for Research in Otolaryngology*. Anaheim, CA. (**Poster**)

26. **MR Saddler**, JH McDermott (August, 2023). The role of temporal coding in real-world hearing: evidence from machine learning. *International Symposium on Auditory and Audiological Research*. Nyborg, Denmark. (**Talk**)

25. A Banerjee, **MR Saddler**, JH McDermott (July, 2023). Neural network models clarify the role of plasticity in cochlear implant outcomes. *Conference on Implantable Auditory Prostheses*. Lake Tahoe, CA. (**Poster**)

24. **MR Saddler**, JH McDermott (February, 2023). The role of temporal coding in real-world hearing: evidence from machine learning. *Association for Research in Otolaryngology*. Orlando, FL. (**Poster**)

23. A Banerjee, **MR Saddler**, JH McDermott (February, 2023). Neural network models of hearing through a cochlear implant. *Association for Research in Otolaryngology*. Orlando, FL. (**Poster**)
22. Griffith IM*, McPherson MJ*, **MR Saddler***, JH McDermott (February, 2023). Task-optimized models of relative pitch. *Association for Research in Otolaryngology*. Orlando, FL. (**Poster**)
21. **MR Saddler**, JH McDermott (November, 2022). The role of temporal coding in real-world hearing: evidence from machine learning. *Advances and Perspectives in Auditory Neuroscience*. San Diego, CA. (**Poster**)
20. **MR Saddler**, JH McDermott (July, 2022). The role of temporal coding in everyday hearing: evidence from machine learning. *Virtual Conference on Computational Audiology.* (**Talk**)
19. **MR Saddler**, JH McDermott (March, 2022). The role of temporal coding in everyday hearing: evidence from deep neural networks. *Computational and Systems Neuroscience (COSYNE)*. Lisbon, Portugal. (**Poster**)
18. **MR Saddler**, JH McDermott (February, 2022). The role of auditory nerve phase locking in audition: evidence from deep neural networks. *Association for Research in Otolaryngology*. (**Poster**)
17. **MR Saddler**, JH McDermott (November, 2021). The role of auditory nerve phase-locking in human hearing: evidence from deep neural networks. *Advances and Perspectives in Auditory Neuroscience*. (**Talk**)
16. **MR Saddler***, A Francl*, J Feather, K Qian, Y Zhang, JH McDermott (August, 2021). Speech denoising with auditory models. *Interspeech.* Brno, Czechia. (**Poster**)
15. **MR Saddler**, J Feather, A Francl, JH McDermott (June, 2021). Hearing-impaired artificial neural networks replicate speech recognition deficits of hearing-impaired humans. *Virtual Conference on Computational Audiology.* (**Talk**)
14. **MR Saddler**, R Gonzalez, JH McDermott (February, 2021). Deep neural networks reveal interplay of peripheral coding and stimulus statistics in human pitch perception. *Association for Research in Otolaryngology*. (**Poster**)
13. **MR Saddler**, JH McDermott (February, 2021). The role of auditory nerve phase-locking in human hearing: evidence from deep neural networks. *Association for Research in Otolaryngology*. (**Poster**)
12. **MR Saddler**, R Gonzalez, JH McDermott (October, 2020). Deep neural networks reveal interplay of peripheral coding and stimulus statistics in human pitch perception. *Advances and Perspectives in Auditory Neuroscience*. (**Poster**)
11. Medina B, **MR Saddler**, JH McDermott (October, 2020). Investigating deep artificial neural networks trained to do ecological tasks as a normative model for pitch perception. *Society for Advancement of Chicanos/Hispanics and Native Americans in Science*. (**Poster**)
10. Medina B, **MR Saddler**, JH McDermott (October, 2020). Investigating deep artificial neural networks trained to do ecological tasks as a normative model for pitch perception. *Central European Conference on Information and Intelligent Systems*. (**Poster**)
9. **MR Saddler**, J Feather, A Francl, JH McDermott (March, 2020). Hearing-impaired deep neural networks replicate behavioral deficits of hearing-impaired humans. *Computational and Systems Neuroscience (COSYNE)*. Denver, CO. (**Poster**)
8. **MR Saddler**, J Feather, A Francl, R Gonzalez, JH McDermott (January, 2020). Deep neural networks with simulated hearing impairment replicate behavioral deficits of hearing-impaired listeners. *Association for Research in Otolaryngology*. San Jose, CA. (**Talk**)

7. **MR Saddler**, R Gonzalez, JH McDermott (October, 2019). Characteristics of human pitch perception emerge in neural networks optimized to estimate F0 from natural sounds. *Advances and Perspectives in Auditory Neuroscience*. Chicago, IL. (**Poster**)
6. JH McDermott, J Feather, A Francl, **MR Saddler**, Y Zhang, H Sarker (September, 2019). Next-generation hearing aids via neural network models of the auditory system. *MIT-IBM AI Horizons Colloquium*. Cambridge, MA. (**Poster**)
5. **MR Saddler**, R Gonzalez, JH McDermott (February, 2019). Neural networks trained to estimate F0 from natural sounds replicate properties of human pitch perception. *Association for Research in Otolaryngology*. Baltimore, MD. (**Poster**)
4. **MR Saddler**, R Gonzalez, JH McDermott (November, 2018). neural networks trained to estimate F0 from natural sounds replicate properties of human pitch perception. *MIT Quest Symposium on Robust, Interpretable Deep Learning Systems*. Cambridge, MA. (**Poster**)
3. **MR Saddler**, R Gonzalez, JH McDermott (October, 2018). Neural networks trained to estimate f0 from natural sounds replicate properties of human pitch perception. *Speech and Audio in the Northeast*. Cambridge, MA. (**Poster**)
2. **MR Saddler**, A Bocconcelli, L HickmottS, G Chiang, Landea-Briones R, P BahamondeA, Howes G, L Sayigh (June, 2017). Characterizing Chilean blue whale vocalizations with digital acoustic recording tags: a test of using tag accelerometers for caller identification. *Acoustical Society of America and European Acoustics Association*. Boston, MA. (**Poster**)
1. A Bocconcelli, **MR Saddler**, L Hickmott, G Chiang, P Bahamonde, F Caruso, L Sayigh (July, 2016). Acoustic behavior of blue whales (Balaenoptera musculus) in the Gulf of Corcovado, Chile, recorded on DTAGs. *4th International Conference on The Effects of Noise on Aquatic Life*. Dublin, Ireland. (**Poster**)

TEACHING

MIT Department of Brain and Cognitive Sciences

- *TA*: Machine-Motivated Human Vision (9.60) — Spring 2023
- *TA*: Machine-Motivated Human Vision (9.60) — Spring 2022
- *TA*: Introduction to Neural Computation (9.40) — Spring 2020
- *TA*: Perception (9.35) — Spring 2019

MIT Educational Studies Program

- *HSSP Teacher*: Sensational Neuroscience — 06/2019 - 08/2019
- *Splash! Instructor*: Braaaaains! The Neuroscience of Zombies — 11/2018
- *HSSP Teacher*: The Foundations of Intelligence: An Intro to Neuroscience — 06/2018 - 08/2018
- *HSSP Teacher*: Memory and Mind Control: An Intro to Neuroscience — 02/2018 - 04/2018
- *Splash! Instructor*: Introduction to Neuroscience — 11/2017

UChicago Biological Sciences Collegiate Division

- *Lab TA*: Biological Dynamics (BIOS 20236) — Spring 2017
- *Lab TA*: Principles of Physiology (BIOS 20242) — Fall 2016
- *Lecture TA*: Principles of Physiology (BIOS 20242) — Fall 2015

MENTORING AND SERVICE

Journal reviewing (ad hoc) 06/2019 – Present

Journal of the Acoustical Society of America; Nature Communications; Nature Machine Intelligence; eLife; Attention, Perception, & Psychophysics; IEEE Transactions on Audio, Speech and Language Processing; Trends in Hearing; PLoS Computational Biology

MIT OpenMind High-Performance Computing Cluster **Cambridge, MA**
Group Representative 06/2019 – 02/2024

MIT Division of Student Life **Cambridge, MA**
Graduate Resident Advisor in Baker House 08/2018 - 07/2023

MIT Center for Brains Minds + Machines **Cambridge, MA**
Summer Research Program Mentor 04/2020 - 09/2021

UChicago College Housing **Chicago, IL**
Assistant Resident Head (RA) of Thangaraj / Tufts House 04/2015 - 06/2017

UChicago Emergency Medical Service **Chicago, IL**
Emergency Medical Responder (EMR) 03/2014 - 01/2017

AWARDS

2023 Travel Award (Association for Research in Otolaryngology, Orlando)
2022 Best Video Pitch Award (Virtual Conference on Computational Audiology)
2022 Travel Award (Association for Research in Otolaryngology)
2021 K. Lisa Yang Integrative Computational Neuroscience (ICoN) Center Graduate Student Fellowship
2021 Travel Grant (Interspeech 2021, Brno, Czechia)
2020 Best Poster Award (Advances and Perspectives in Auditory Neuroscience)
2020 Angus MacDonald Award for Excellence in Undergraduate Teaching (MIT)
2019 Best Poster Award (IBM AI Week, Cambridge)
2019 Travel Award (Association for Research in Otolaryngology, Baltimore)
2017 Best Student Paper Award (Acoustical Society of America, Boston)
2017 Phi Beta Kappa (The University of Chicago)
2017 Francis E. Knock Prize in Biological Chemistry for highest GPA in major (The University of Chicago)
2016 Woods Hole Oceanographic Institution Academic Programs Office Conference Travel Grant
2016 Woods Hole Oceanographic Institution Summer Student Fellowship
2013 University Scholar Award (The University of Chicago)
2013 National Merit Scholarship

GRADUATE COURSEWORK

Cumulative GPA: 5.0 / 5.0

- Systems Neuroscience (9.011)
- Quantitative Methods and Computational Models in Neurosciences (9.014)
- Computational Cognitive Science (9.660)
- Applied Machine Learning (6.862)
- Audition: Neural Mechanisms, Perception and Cognition (9.285)
- Matrix Methods in Data Analysis, Signal Processing, and Machine Learning (18.0651)
- Automatic Speech Recognition (6.345)

SKILLS AND INTERESTS

Software: Python, MATLAB, Tensorflow, PyTorch, JAX, SLURM, online psychophysics (MTurk/Prolific), LaTeX
Interests: hiking, running, soccer, skiing, teaching, marine mammals