

Morgan B. Talbot

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EDUCATION

Massachusetts Institute of Technology and Harvard Medical School: MD-PhD candidate, approx. May 2027

Brown University: Bachelor of Science with Honors in Neuroscience, magna cum laude, May 2018

Princeton University in Beijing: Summer study abroad/Mandarin language immersion program, June-August 2015

RESEARCH EXPERIENCE

Kreiman Lab: Brain-inspired Continual and Curriculum Learning, Boston, MA, *PhD Candidate*. Sept. 2021-present

- Developing novel approaches for human perception-aligned modulation of visual stimuli, with applications in medical education. Received Dean's Innovation Award in Artificial Intelligence from Harvard Medical School for this work
- Developed a novel, brain-inspired replay algorithm that enables convolutional neural networks to learn continuously in video streaming environments without forgetting prior knowledge
- Developed concepts underlying automated curriculum design algorithms that optimize a sequence of tasks to be learned by a machine learning model (curriculum learning in a continual learning setting)

Mass. General Hosp. Center for OCD and Related Disorders, Boston, MA, *PhD Student Researcher*. April 2022-present

- Developing unsupervised machine learning approach to cluster patient-specific longitudinal symptom prediction models in parameter-space, with the goal of discovering clinically actionable mental illness subtypes
- Applied interpretable machine learning methods to predict body dysmorphic disorder patients' response to cognitive behavioral therapy, to enable predicted non-responders to be offered alternative therapies or additional support

BIDMC Division of Digital Psychiatry, Boston, MA, *Research Assistant*. March-Sept. 2020

- Investigated effects of social and environmental context on mental health assessments and cognitive performance
- Developed and validated robust GPS location classifier by combining survey responses with smartphone GPS data
- Created data analysis pipeline for smartphone-based ecological momentary assessment study (Python and R)

Paradiso Lab: Visual Prosthesis Project (assistive device for people with visual impairment), Providence, RI

Research Assistant and Software/Hardware Engineer. Dec. 2015-May 2019

- Designed and conducted five psychophysical experiments on visual/auditory object localization cues for device, including hardware/software development and data analysis; wrote neuroscience honors thesis on this topic
- Built a visual prosthesis simulator for experiments from scratch, combining computer vision and virtual reality
- Created patient-specific phosphene mapping software, computer vision development suite, 3D printed prosthesis hardware, image database generation tool, color identifier algorithm, and 10 other software/hardware projects
- Helped write and edit patent application, grant applications to NIH, Research to Prevent Blindness, and Brown U.

Project Manager. Sept. 2016-May 2019

- Supervised a team of 14 software developers and research assistants to add advanced functionality to the prosthesis

- Recruited and trained a total of 27 software developers and research assistants, designed 16 student projects

WORK EXPERIENCE

Sophya AI, Cambridge, MA, *Computer Vision Engineer*. April 2018-April 2021

- Invented and prototyped novel computer vision-based video annotation software to help students learn from online video content more efficiently. The software divides video content into “slides” and generates a dynamic video overlay to guide the student’s annotations in real time. This tool was used by medical students worldwide during a series of medical education pilot programs, and was patented in 2022.
- Implemented computer vision cloud functions (Python, OpenCV), and designed backend testing and deployment pipeline, to support online video annotation capabilities in production environment
- Created novel spaced retrieval practice system for students based on cognitive science of learning and memory
- Designed a series of avatar clustering algorithms to facilitate group-based video communications in a metaverse, based on patterns of avatar positioning, user-guided avatar movements, and system-guided avatar movements. Drafted 3 patent applications (now issued) describing these algorithms

VA Center for Neurorestoration & Neurotechnology, Providence, RI, *Research Assistant*. Aug. 2018-May 2019

- Created three free/open-source MATLAB toolboxes, which allow researchers to collect data using customizable, MRI scanner-integrated psychophysical tasks and to easily generate merged datasets, statistics, and data visualizations
- Wrote documents to obtain IRB approval for two research studies I designed with lab PI, coordinated said studies
- Assisted with MRI data analysis, recruiting research participants, running experimental procedures for clinical trials

PUBLICATIONS

- **Talbot, Morgan B.***, Rushikesh Zawar*, Rohil Badkundri, Mengmi Zhang†, and Gabriel Kreiman†. "[Tuned Compositional Feature Replays for Efficient Stream Learning](#)." *IEEE Transactions on Neural Networks and Learning Systems*, 2023. *equal contribution, †corresponding authors
- Singh, Parantak, You Li, Ankur Sikarwar, Weixian Lei, Difei Gao, **Morgan B. Talbot**, Ying Sun, Mike Zheng Shou, Gabriel Kreiman, and Mengmi Zhang. "[Learning to Learn: How to Continuously Teach Humans and Machines](#)." *International Conference on Computer Vision*, 2023.
- Greenberg, Jennifer L., Hilary Weingarden, Susanne S. Hoepfner, Rebecca M. Berger-Gutierrez, Dalton Klare, Ivar Snorrason, Omar Costilla-Reyes, **Morgan B. Talbot**, Katherine E. Daniel, Rachel C. Vanderkruik, Armando Solar-Lezama, Oliver Harrison, and Sabine Wilhelm. "[Predicting response to a smartphone-based cognitive-behavioral therapy for body dysmorphic disorder](#)." *Journal of Affective Disorders*, 2024.

CONFERENCE PRESENTATIONS

- **Talbot, Morgan B.***, Omar Costilla-Reyes*, Hilary Weingarden, Jennifer L. Greenberg, Brynn M. Huguenel, Susanne S. Hoepfner, Adam C. Jaroszewski, Armando Solar-Lezama†, and Sabine Wilhelm†. “Predicting treatment response in patients with body dysmorphic disorder using interpretable machine learning.” Poster presented at 2023 MIT-MGB AI Cures Conference, April 2023, Cambridge, MA. *equal contribution, †senior authors
- **Talbot, Morgan B.** and Michael Paradiso. “Object localization cues for an intelligent visual prosthesis.” Dynamic/digital poster presented at 2018 Society for Neuroscience Conference, November 2018, San Diego, CA.

PATENTS

- **Talbot, Morgan B.**, Vishal Punwani, and Emma K. Giles. “Methods and systems for annotation and truncation of media assets.” U.S. Patent 11,380,365, filed June 23, 2020, issued July 5, 2022.
- Punwani, Vishal, Emma K. Giles, **Morgan B. Talbot**, Mark Liu, Ayse Baybars, Vinay Punwani, and Edwin Walda. “Systems and methods for facilitating external control of user-controlled avatars in a virtual environment in order to trigger livestream communications between users.” U.S. Patent 11,570,405, filed Oct. 19, 2021, issued Jan. 31, 2023.
- Punwani, Vishal, Emma K. Giles, **Morgan B. Talbot**, Mark Liu, Ayse Baybars, Vinay Punwani, and Edwin Walda. “Systems and methods for triggering livestream communications between users based on motions of avatars within virtual environments that correspond to users.” U.S. Patent 11,589,008, filed Oct. 19, 2021, issued Feb. 21, 2023.
- Punwani, Vishal, Emma K. Giles, **Morgan B. Talbot**, Mark Liu, Ayse Baybars, Vinay Punwani, and Edwin Walda. “Systems and methods for triggering livestream communications between users based on proximity-based criteria for avatars within virtual environments that correspond to the users.” U.S. Patent 11,750,774, filed Oct. 19, 2021, issued Sept. 5, 2023.

HONORS AND AWARDS

- Dean’s Innovation Award for the Use of Artificial Intelligence in Education, Research, and Administration, Harvard Medical School, 2024
- Medical Scientist Training Program grant recipient, Harvard Medical School and Massachusetts Institute of Technology, 2019
- Richard E. Whalen Award for Excellence in Undergraduate Research in Neuroscience and Behavioral Biology (honors thesis award), Brown University, 2018
- Neuroscience Award for Excellence in Academics and Research, Brown University, 2018
- Elected to Sigma Xi honor society, Brown University, 2018
- Elected to Phi Beta Kappa honor society as junior, Brown University, 2017
- Undergraduate Teaching and Research Award (stipend award for full-time summer research), Brown University, 2017
- 1st place in Chinese public speaking contest (advanced level), Brown University & University of Rhode Island, 2016
- Dean’s Award (stipend award for full-time summer research), Brown University, 2016

TEACHING EXPERIENCE

Biological and Artificial Intelligence (Harvard University), Cambridge, MA, *Teaching Assistant*. Jan. 2024-present.

- Led two tutorial sessions: one on developing intuition for basic machine learning concepts, and another on natural language processing, transformers, and self-supervised learning
- Developed 7 machine learning research project proposals for students to build upon, spanning multiple topics in computer vision and natural language processing
- Reviewed 39 proposals for 1-semester machine learning research projects and provided detailed feedback
- Hold weekly office hours to discuss projects with students

Neural Systems (Brown University), Providence, RI, *Teaching Assistant*. Sept.-Dec. 2017

- Designed 14 lesson plans focusing on conceptual understanding of course material, co-taught 26 classroom sessions
- Graded short-answer test questions, proofread exam paper drafts, held weekly TA hours to assist individual students

COMMUNITY ENGAGEMENT EXPERIENCE

Harvard/MIT Equitable Access to Research Training MD-PhD Summer Program *Volunteer*. Jan. 2022-present

- Work as part of a team of students to develop the mission, structure, format, and admissions criteria of a new summer program for undergraduate students underrepresented among physician-scientists
- Designed and facilitated a 90-minute workshop for inaugural class of students entitled “Framing Diversity, Equity, and Inclusion in Research and Medicine”
- Reviewed over 30 applications to summer program in each of 2023 and 2024, participated in admissions committee in both years and admissions decision subcommittee in 2024
- Serve as program secretary and summer event programming committee member

Brown HOPE (housing/homelessness service organization), Providence, RI, *Advocacy Director*. Oct. 2016-May 2018

- Designed and implemented Homeless Community Survey to assess public policy priorities of Rhode Islanders who are experiencing homelessness, authored report on results with mentorship from local advocacy/service leaders
- Organized advocacy project to address housing discrimination by landlords in Rhode Island, based on results of Homeless Community Survey; created opportunities for homeless survey respondents to lobby state government

Olneyville ESOL Program, Providence, RI, *Volunteer English Teacher*. Sept.-Dec. 2015

- Designed 12 lesson plans for 1.5 hour biweekly free English classes for adult speakers of other languages
- Coordinated lesson content with a co-teacher, who taught the same students on alternate days