# BOSTON UNIVERSITY
## Center for Brain Recovery

**ANNUAL REPORT | 2025**


# The Future of Rehabilitation is Personalized

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***On the front cover:*** *Visualization of the stroke pattern found to be most associated with aphasia severity in our patients, comprising left hemisphere temporal and perisylvian regions. Emerson Kropp, CBR undergraduate intern 2024. Read more about this research on page 18.*



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# From the Director

**The Center for Brain Recovery (CBR)** has made significant strides in advancing our understanding of neurological disorders and developing innovative approaches to rehabilitation. Our interdisciplinary team spanning neuroscience, engineering, computer science, and healthcare has enabled several breakthrough research outcomes over the past year.

For instance, our high-density functional near-infrared spectroscopy (HD-fNIRS) system now enables us to monitor brain activity during real-world interactions, providing important insights into how the brain functions during everyday activities. This system, developed through our NIH/NIBIB grant, represents a significant advancement over traditional laboratory-based assessments, allowing us to observe brain responses during natural conversations in individuals with stroke and dementia.

> "Looking forward, the Center for Brain Recovery is poised to transform rehabilitation through precision medicine approaches."

Our machine learning algorithms continue to improve with our recent work showing the importance of brain and behavioral features in predicting recovery and prognosis. Our recently launched therapy calculator that mined data from the commercial platform Constant Therapy, provides personalized predictions of recovery potential based on practice patterns, empowering patients to make informed decisions about their rehabilitation journey. Furthermore, our BiLex computational modeling approach has enabled us to create "digital twins" of bilingual patients with aphasia, allowing us to simulate language recovery trajectories and optimize treatment protocols without waiting for real-world data collection.

Simultaneously, our clinical research continues to grow, with several studies examining brain health, brain damage and recovery using a suite of technologies including eye-tracking, fMRI, noninvasive brain stimulation and other approaches. Finally, our focus on the real-world success for individuals with neurological disorders continues with our Intensive Cognitive Communication Rehabilitation program, where we address a significant need in brain injury rehabilitation by integrating both functional strategy implementation and direct impairment-based therapy in an accessible virtual format, helping participants bridge the gap between injury recovery and successful return to academic environments.

Our upcoming initiatives include expanding our continuous brain monitoring technologies for home use in individuals with dementia as they perform real-world tasks in their natural environments. We are also developing more sophisticated predictive models that incorporate multimodal data sources, including advanced neuroimaging, cognitive assessments, and digital biomarkers. These models will enable us to create increasingly personalized treatment recommendations based on individual neural, cognitive, and functional profiles. Our ultimate goal is to establish a comprehensive rehabilitation approach where patients receive precisely tailored interventions—ranging from intensive individual therapy to group programs and vocational training—based on predictive analytics that maximize their recovery potential. This vision of precision rehabilitation represents the future of neurological care and remains our guiding principle as we continue to bridge the gap between cutting-edge neuroscience and meaningful patient outcomes.

*Dr. Swathi Kiran*

Dr. Swathi Kiran
Founding Director
BU Center for Brain Recovery

# From the Assistant Directors

## The Center for Brain Recovery Celebrates Its 3rd Operating Year

Since its humble beginnings, the Center has conducted groundbreaking research to support those that have been afflicted with dementia, aphasia, and other TBIs (traumatic brain injuries). To continue supporting the communities that we serve, we are asking for your help to ensure our programs survive and help us expand our research to become the world's global hub of interdisciplinary researchers.

**Where We Are**
Recently, we introduced a new travel support initiative which allows our CBR personnel to collaborate with our colleagues internationally. So far, the program has contributed $11,448.00 in support. The Center has dedicated funds toward the Conversation, Health, Art, Technology (CHAT) program to install temporary personnel to provide resources to this support group. The Center completed its search for a marketing staff member to help us reach out to audiences and help communicate the vast research and initiatives the Center is conducting.

**Where We Want to Go**
Each year, the Center applies for various foundation and federal grants to fuel our research. CBR operates on a non-recurring annual budget to help support our mission. Despite these critical financial support systems, the Center has finite resources to contribute towards its programs. We are looking to raise more funds to allow programs like CHAT and ICCR to become more accessible to the public and support critical staffing to deliver and run these programs.

$7.9M

*Awarded to CBR Faculty in Alignment with CBR's Mission*

29

*Grant Proposals Submitted*

33

*Faculty & Collaborators*

## How can we get there? With your help.

**CHAT is looking for additional participants and additional funding to continue its operations.**
Without public support, we cannot expand the program to increase participation and cannot retain an ambassador long-term to operate the program.

Please consider donating today to help support this vital program.

**Want to Learn More?**
See page 21 for more details or contact our Program Director, Meredith MacEachern, at mermac@bu.edu for more information.

Matthew VanDemark
Assistant Director, Finance and Administration
BU Center for Brain Recovery

**ICCR is looking for additional participants and funding to continue its operations.**
The Intensive Cognitive and Communication Rehabilitation (ICCR) program is dedicated to young adults (up to age 36) who have stroke, traumatic brain injury (TBI), or any other acute brain injury (ABI) who desire to return or pursue a college degree. Participants are charged a fee semesterly for services provides.

A gift to the Center for Brain Recovery allows us to provide scholarships to those who need financial support. Please consider donating today to help support this integral program.

**Want to Learn More?**
If you know someone interested or who may benefit from this program, please contact Program Director, Meredith MacEachern, at mermac@bu.edu for more information or see page 20.

**To Support Any Of Our Initiatives, Please Go to**
bu.edu/cbr/about/how-you-can-help/

## Advancing Neurorehabilitation and Cognitive Research

At the Center for Brain Recovery (CBR), we are proud of our continuous efforts to expand the boundaries of neurorehabilitation and cognitive neuroscience research. Our collaborative work with leading experts across various disciplines allows us to investigate and develop innovative solutions to support individuals affected by conditions like post-stroke aphasia, dementia, and traumatic brain injuries.

**Where We Are**

Over the past year, CBR has submitted several groundbreaking grants in partnership with leading institutions. Notable projects include CoNNECT – Comprehensive Neurorehabilitation: Navigation, Education, Care, and Technology, which integrates technology into patient care, in collaboration with Lou Awad (BU, Physical Therapy), Conor Walsh (Harvard University, Engineering and Applied Sciences), and David Lin (MGH, Translational Neurorecovery). Our collaboration with Archana Venkataraman (BU, Engineering), Prakash Ishwar (BU, Engineering), and Margrit Betke (BU, Computer Science) on the project Machine Learning Methods for Predicting Post-Stroke Aphasia and Language Recovery aims to enhance recovery predictions through advanced computational methods. The Language Impairment in Dementia and Stroke project, in collaboration with Einat Liebenthal (McLean Hospital, Psychiatry) and Andreas Charidimou (BU, Neurology), takes a multimodal, naturalistic approach to studying cognitive impairments in dementia and stroke. Additionally, the Impact of Cerebral Small Vessel Disease on Cognition in Alzheimer's Disease project, in collaboration with Michael Alosco (BU ADRC), Vijaya Kolachalama (BU, Computational Biomedicine) and Andreas Charidimou (BU, Neurology), seeks to explore the relationship between cerebral small vessel disease and cognitive decline in Alzheimer's patients. The Functional Reorganization and Recovery of the Language and Domain-General Multiple Demand Systems in Aphasia, in collaboration with Ev Fedorenko (MIT, Brain and Cognitive Sciences), will investigate the recovery of language systems post-stroke. Finally, the Brain-to-Brain Coupling as a Biomarker of Successful Communication in Aphasia, in collaboration with Meryem Yücel (BU, Engineering), David Boas (BU, Engineering), and Erin Meier (Northeastern University, Communication Sciences and Disorders) seeks to explore how brain synchrony enhances communication in individuals with aphasia.

Maria Varkanitsa

Maria Varkanitsa, PhD.
Assistant Scientific Director
BU Center for Brain Recovery

**Where We Want to Go**

The CBR continues to push forward with exciting new initiatives, with several grants planned for submission in the coming months. We plan to submit a proposal for Home-Based tDCS and Constant Therapy for Enhancing Language Recovery in Post-Stroke Aphasia, in collaboration with Rajani Sebastian (JHU, Physical Medicine and Rehabilitation), which aims to evaluate home-based interventions combined with brain stimulation to facilitate language recovery. Other upcoming submissions include a project that aim to leverage AI to improve early detection and longitudinal monitoring of different types of aphasias and dementia, a project that investigates neuroinflammatory mechanisms and potential interventions to change the course of disease progression in Alzheimer's disease and related dementias, and a large-scale, multi-site program focused on developing predictive models and detailed phenotyping of aphasia recovery to guide personalized rehabilitation strategies.

With the continued support of our collaborators and funding partners, we remain focused on advancing research and developing new interventions that will improve the quality of life for individuals living with neurological conditions.

**The CBR Internship Program: Empowering the Next Generation of Researchers**

As part of our commitment to advancing research and training future leaders in the field, the CBR is proud to offer an internship program that provides students with skills and knowledge necessary to contribute to transformative research in brain rehabilitation and support individuals affected by neurological conditions. If you are interested in learning more about this program, please visit page 18.

34
*Student Members*

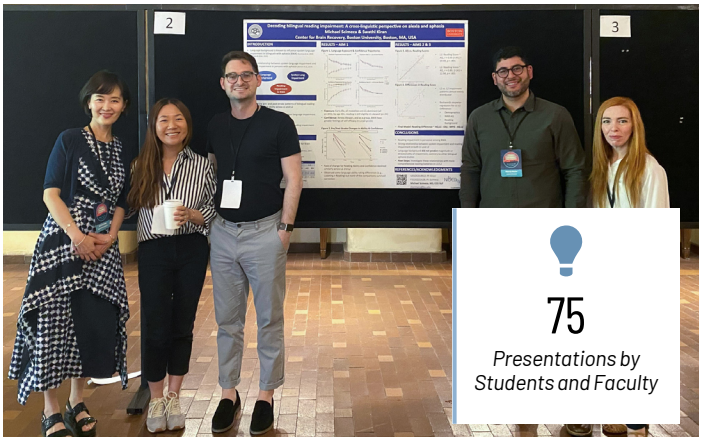
150
*Publications*

# Highlights of FY2025


*The 2nd annual Neuroscience of the Everyday World Conference at Boston University, co-hosted by the Tianqiao & Chrissy Chen Institute brought together over 450 registrants from around the world. This 2-day event featured 14 guest speakers and representatives from 4 industry partners. August 2024.*


*CBR Founding Director Dr. Swathi Kiran received the "Honors of the Association" from the American Speech-Language-Hearing Association (ASHA) and joined the NIH-National Institutes of Deafness and Communicative Disorders (NIDCD) Advisory Council. December 2024.*


*Dr. Sigfus Kristinsson from the University of South Carolina joins virtually for his CBR Seminar Series presentation. May 2025.*




*Four CBR researchers attended and presented at the Clinical Aphasiology Conference in New Mexico. May, 2025.*

# Mission Statement & Strategic Plan

Now in its third year, the mission of the **Center for Brain Recovery continues to be a nexus of interdisciplinary group of researchers** (e.g., clinicians, neuroscientists, engineers) to address the complex problem of treating, curing, and preventing brain disorders.

Neurological disorders such as stroke, brain injury, Alzheimer's disease, Parkinson's disease etc. are devastating illnesses that alter the way brain functions, and in many cases causes permanent deterioration of function. Recent advances in clinical research, drugs and other therapies, neuroscientific methods, and computational modeling have made landmark discoveries in understanding these neurological diseases. Despite this, we still do not know how, when and why brain disorders occur and how to best capitalize on neuroplasticity mechanisms that can enable recovery. To tackle such complex and intractable problems, we need a wide range of expertise and experience cross many disciplines (sciences, medicine, and engineering) to come together.

- **Infrastructure for innovation:** The Center for Brain Recovery is providing this infrastructure for conducting innovative and interdisciplinary work to understand how the brain works and when and why brain disorders occur. The Center will also work to develop interventions to improve brain function and harness mechanisms of brain plasticity to restore neurological function.
- **Understanding the brain:** Recent advances in clinical research, drugs and other therapies, neuroscientific methods, and computational modeling have made landmark discoveries in understanding these neurological diseases. Despite this, we still do not know how, when and why brain disorders occur and how to best capitalize on neuroplasticity mechanisms that can enable recovery. To tackle such complex and intractable problems, we need a wide range of expertise and experience cross many disciplines (sciences, medicine, and engineering) to come together.
- **Implementing innovative technologies:** The Center for Brain Recovery has advanced multiple groundbreaking research projects across neurological disorders, developing innovative fNIRS brain monitoring technologies (ninjaNIRS system and 3D-printable ninjaCap) that enable real-world assessment of brain activity in Parkinson's and aphasia patients while addressing inclusivity challenges across diverse populations. The center's AI and machine learning initiatives include lesion-aware neural networks predicting post-stroke aphasia recovery, algorithms personalizing therapy dosage, and multimodal AI systems differentiating dementia types, complemented by extensive biomarker discovery work including plasma protein risk scores for Alzheimer's, the Boston Criteria v2.0 for Cerebral Amyloid Angiopathy, and digital tools like clock drawing tests that predict brain pathology.
- **People focused approach:** Clinical trials have validated novel rehabilitation approaches including propulsion neuroprosthetics for stroke, music-based rhythmic stimulation for Parkinson's, and conversation group therapy for aphasia, while the Boston Latino Aging Study and cross-linguistic research address health disparities in underserved populations.


*Main themes of activities at the Center for Brain Recovery.*

# Research Projects

The following are the key accomplishments of **CBR faculty** in each of the CBR specific research themes.

## 1. Continuous Brain Monitoring in Real-World Settings

**Technical Innovations and Inclusivity:** A groundbreaking collaboration led by **Meryem Yücel**, **David Boas**, **Alice Cronin-Golomb**, **Swathi Kiran**, and **Terry Ellis** resulted in a major publication addressing a critical barrier in fNIRS research. Their study, "Inclusivity in fNIRS Studies: Quantifying the Impact of Hair and Skin Characteristics on Signal Quality with Practical Recommendations for Improvement," provides the field with essential guidelines for improving signal quality across diverse populations, ensuring that brain monitoring technologies are accessible to all individuals regardless of hair type or skin characteristics.

*Meryem Yücel*

*David Boas*

*Alice Cronin-Golomb*

*Swathi Kiran*

*Terry Ellis*

**Hardware Development:** The team has made remarkable progress in developing next-generation brain monitoring systems. **David Boas** and **Meryem Yücel**'s groups introduced two hardware platforms: the ninjaNIRS system, an open hardware solution for wearable whole-head high-density fNIRS, and the ninjaCap, a fully customizable 3D printable headgear for multimodal brain imaging. These innovations, along with a co-localized optode-electrode design for simultaneous fNIRS and EEG recording, represent significant advances in making brain monitoring more accessible and versatile.

**Clinical Applications in Movement Disorders:** The monitoring of brain activity during naturalistic movement has yielded important insights. **Alice Cronin-Golomb**'s team, in collaboration with **Meryem Yücel** and **Terry Ellis**, published findings on prefrontal cortex activity patterns during dual-task walking in Parkinson's disease, demonstrating distinct neural signatures that could serve as biomarkers for disease progression. **Terry Ellis**, in collaboration with **Lou Awad**, published a randomized controlled trial showing that autonomous music-based rhythmic auditory stimulation can amplify walking activity in Parkinson's disease patients, with brain monitoring revealing the neural mechanisms underlying these improvements.

*Lou Awad*

**Language and Cognitive Assessment: Swathi Kiran**'s group, working with the fNIRS team, published research on cortical activity patterns during conversational responses, comparing young neurotypical individuals, older adults, and individuals with aphasia. The group have successfully expanded their work to study early language changes in individuals with Alzheimer's disease and related dementias, providing valuable insights into how the brain functions in natural settings and how neurological conditions affect everyday communication.

## 2. Neural and behavioral biomarkers of brain health, during recovery and with neurological decline

**Digital and AI-Based Biomarkers: Vijaya Kolachalama**'s and **Rhoda Au**, in their Nature Medicine publication on "AI-based differential diagnosis of dementia etiologies on multimodal data", demonstrate that artificial intelligence can accurately differentiate between various dementia types using integrated clinical, imaging, and digital data. Additionally, their work on privacy-preserving voice analysis for dementia assessment addresses critical ethical considerations in digital biomarker development.

*Vijaya Kolachalama*

*Rhoda Au*

**Blood and Fluid Biomarkers:** The Framingham Heart Study team, led by **Rhoda Au** with contributions from **Hugo Aparicio** and **José Rafael Romero**, published multiple studies on plasma biomarkers. Notable findings include the development of plasma protein risk scores for mild cognitive impairment and

Alzheimer's disease, and the identification of sex differences in tau, astrocytic, and neurodegenerative plasma biomarkers. **Yorghos Tripodis**'s statistical expertise was crucial in analyzing these complex biomarker relationships.

*Hugo Aparicio*

*Rafael Romero*

*Andreas Charidimou*

**Imaging Biomarkers for Vascular Disease: Andreas Charidimou** published the Boston Criteria v2.0 for Cerebral Amyloid Angiopathy in Neurology, establishing new diagnostic standards for this important vascular contribution to dementia. **José Rafael Romero**'s team identified associations between MRI-visible perivascular spaces and early white matter injury, providing new imaging markers for cerebral small vessel disease progression.

**Neural markers predicting recovery in stroke**: **Maria Varkanitsa**, **Swathi Kiran**, and their colleagues published in Cortex on "Using unsupervised dimensionality reduction to identify lesion patterns predictive of post-stroke aphasia severity", showing advanced computational methods can identify specific brain lesion patterns that predict language recovery outcomes. Likewise, Falconer, **Varkanitsa**, and **Kiran** published research in Cortex examining "Temporal Variability of Dynamic Functional Connectivity as a Predictor of Network Changes and Recovery in Post-stroke Aphasia." This work reveals how changes in brain network connectivity over time can predict recovery trajectories in stroke patients.

*Maria Varkanitsa*

## 3. Develop a suite of Data Science and AI approaches to predict human cognitive function and patient trajectories.

**Machine Learning for Outcome Prediction: Prakash Ishwar, Swathi Kiran, Maria Varkanitsa, Margrit Betke** and **Archana Venkataraman** developed a novel lesion-aware edge-based graph neural network for predicting language ability in post-stroke aphasia patients. In a different project the team has also made remarkable progress in machine learning applications for bilingual populations. **Swathi Kiran**, **Prakash Ishwar** and **Margrit Betke** worked on paper together to personalize the amount of dosage of therapy stroke patients will need to improve their outcomes, which is currently under review in Scientific Reports. **Swathi Kiran**'s team and their collaborators at UT-Austin published a major study in Stroke titled "Machine Learning Predictions of Recovery in Bilingual Poststroke Aphasia: Aligning Insights With Clinical Evidence." This research demonstrates how machine learning can predict recovery patterns in bilingual stroke patients, addressing a critical gap in personalized medicine.

*Margrit Betke*

*Prakash Ishwar*

*Archana Venkataraman*

**Digital Cognitive Assessment Platforms: Rhoda Au'**s team, working with Honghuang Lin and **Vijaya Kolachalama**, published multiple studies validating digital cognitive assessment tools. Their work on the association between digital clock drawing tests and amyloid/tau PET biomarkers demonstrates that simple digital tasks can predict complex brain pathology. The team also developed the Global Research Integration Platform (GRIP), an open-source digital voice processing toolkit for worldwide dementia research.

**Statistical Innovations: Yorghos Tripodis** made significant methodological contributions, including work on cognitive factor-based selection to increase power in Alzheimer's clinical trials. His statistical expertise was essential to multiple large consortia studies, including genome-wide association studies of dementia and analyses of the DIAGNOSE CTE cohort.

*Yorghos Tripodis*

**Wearable Technology Integration:** A collaboration between multiple faculty resulted in a publication in Nature Medicine demonstrating that smartwatch and smartphone-based assessments can detect mild cognitive impairment. This work, involving **Rhoda Au** and conducted with industry partners, shows the potential for consumer devices to serve as screening tools for cognitive decline.

# Research Projects

## 4. Enable socially impactful research to reduce barriers that impact access to care including social determinants of health

**Hispanic/Latino Population Studies: Rhoda Au**'s Boston Latino Aging Study (BLAST) has produced multiple publications addressing cognitive health in Latino older adults. Studies from BLAST examined sleep apnea risk, stress coping strategies, and their associations with cognitive performance in this underserved population. Jairo Martinez (**Cronin-Golomb**'s student) was elected as Hispanic Neuropsychological Society student representative, reflecting the center's commitment to training diverse researchers.

**Social Determinants of Health: Michelle Stransky**'s work on resource navigation in primary care, published in Pediatrics, demonstrates how addressing economic factors during early life can impact long-term health outcomes. Her research on using electronic health records to identify health disparities provides tools for population-level interventions.

*Michelle Stransky*

**Multicultural and Cross-Linguistic Research: Swathi Kiran** and her collaborators published important research in the American Journal of Speech-Language Pathology on cross-linguistic and multicultural effects on animal fluency performance in persons with aphasia highlighting how cultural and linguistic backgrounds affect assessment outcomes. The center's commitment to multilingual populations is further demonstrated through a paper published in Cortex on understanding how language therapy affects multilingual individuals.

**Access to Care: Elizabeth Hoover'**s contribution to development of the Aphasia Therapy Finder, an evidence-based implementation tool, addresses disparities in access to appropriate aphasia therapy.

*Elizabeth Hoover*

## 5. Clinical Trials for Neurological Disorders

**Rehabilitation Technologies: Lou Awad**'s team completed groundbreaking trials of propulsion neuroprosthetics for stroke rehabilitation. Their publication in IEEE Open Journal of Engineering in Medicine and Biology demonstrated that these devices improve overground walking in community settings. A notable patent application was filed for "Biomechanical measurement devices and uses thereof for phenotype-guided movement assessment, intervention, and active assistance device control."

**Rhythm-Based Interventions: Terry Ellis** led a successful randomized controlled trial of autonomous music-based rhythmic auditory stimulation for Parkinson's disease, published in npj Parkinson's Disease. This innovative approach, developed with **Lou Awad** and collaborators, showed significant improvements in walking activity and represents a scalable intervention for movement disorders.

**Telehealth Interventions: Terry Ellis** and her team published results from a decentralized feasibility randomized controlled trial of telehealth mindful exercise for knee osteoarthritis, demonstrating the viability of remote interventions for chronic conditions.

**Conversation-Based Therapies: Elizabeth Hoover**'s multisite randomized controlled trial on conversation group treatment for chronic aphasia, published in the American Journal of Speech-Language Pathology, provides strong evidence for the effectiveness of group-based language interventions.

## 6. Patient advocacy and outreach efforts

**Recruitment Efforts:** The Center for Brain Recovery (CBR) has significantly expanded its outreach and recruitment activities over the past year, establishing strong collaborations and streamlining processes to ensure broad participation in our research. **Maria Varkanitsa**, **Rafael Romero** and other neurologists BMC at have developed a system to identify and recruit individuals with post-stroke aphasia and other neurological conditions. **Maria Varkanitsa** and her team use BMC's EPIC EHR system and collaborate with the Department of Neurology to weekly identify adults with neurological conditions for CBR studies, sending opt-out letters and following up with potential participants as needed. These efforts expand an already comprehensive database of 1021 participants, including 512 individuals with post-stroke aphasia, 31 individuals with Alzheimer's disease and related dementias, and 478 healthy adults. This large patient repository is an important asset for researchers interested in collaborating with faculty at the Center for Brain Recovery.

# Research Spotlight

## Using digital twins to predict recovery and decline in neurological disorders

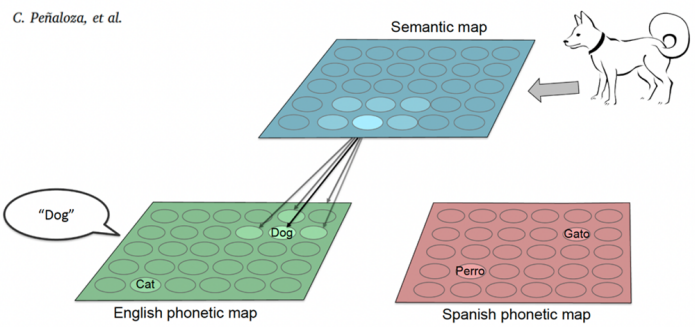
*Swathi Kiran, Risto Miikulainen, Marissa Russell-Meill, Shalom Henderson, Erie Shivers*

### About the Project

Dr. Swathi Kiran and her collaborators have pioneered a novel approach to neurological disorders using "digital twins" - individually configured computational models that simulate a person's unique language learning history and neurological symptoms. Called "BiLex", this framework uses self-organizing maps BiLex, a framework that uses self-organizing maps (SOMs) to model bilingual language processing through interconnected semantic and phonetic representations for two languages. This represents a significant departure from large language models (LLMs), which rely on massive-scale statistical pattern matching. Instead, BiLex uses brain-inspired architecture that mimics the topographical organization observed in biological neural systems, requiring much less data while maintaining biological plausibility.

The BiLex framework has been successfully applied to three major clinical scenarios. First, it accurately models healthy bilingual adults' naming performance across languages by training individual models based on each person's age of acquisition, language exposure, and proficiency levels. Second, when extended to stroke patients with aphasia, the model can simulate brain lesions and predict both impairment patterns and treatment outcomes with remarkable accuracy. Third, the framework has been adapted to model neurodegenerative processes in dementia by simulating progressive deterioration of neural representations, successfully matching the decline patterns observed in primary progressive aphasia patients.

The implications of this digital twin approach are a game changer for personalized medicine in neurology. Unlike population-based models, these individually configured simulations enable clinicians to predict recovery trajectories, optimize treatment selection, and even simulate counterfactual scenarios (such as what would happen if a different language were chosen for therapy). BiLex's early success demonstrates that computational models grounded in biological principles and constrained by neurophysiological principles can provide powerful tools for understanding and treating language disorders. Future directions include integrating additional cognitive domains, incorporating neuroimaging data, and extending the approach to other neurological conditions, ultimately enabling truly individualized assessment and treatment planning.




*This figure depicts the structure of the BiLex Model. This computational model has three interconnected maps: one that represents word meanings shared between both languages and two that capture the pronunciation and structure of words in each language individually.*

*Marissa Russell-Meill*

*Risto Miikkulainen*

**GET INVOLVED**

Help us advance research by spreading the word or joining our study! We are seeking healthy Spanish-English bilinguals as well as people who have aphasia or dementia, whether they speak one or two languages. Your participation will contribute to improving clinical diagnosis and literacy interventions for individuals with language difficulties after stroke. If you meet our criteria, consider signing up to be a participant and help make a difference!

To learn more about our studies, visit the Participate page on our website bu.edu/cbr/participate/.

# Research Spotlight

## Using machine learning to predict aphasia severity in post-stroke aphasia

*Xinyi Hu, Maria Varkanitsa, Emerson Kropp, Margrit Betke, Prakash Ishwar, Swathi Kiran*

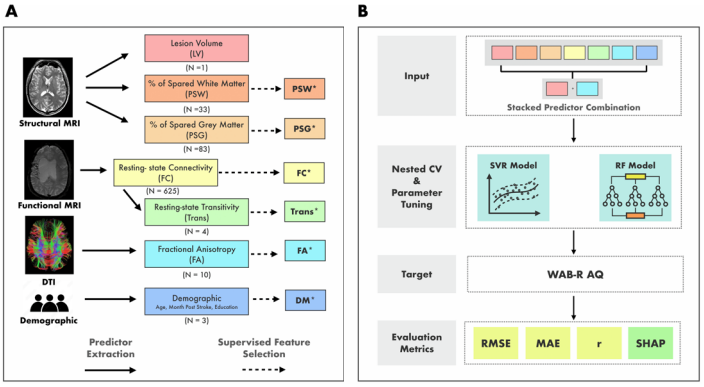
### About the Project

Recovering language after a stroke is complex. While brain injury size and location are important, new research from the Center for Brain Recovery shows that language recovery also depends on how the brain is structured and functions as a whole.

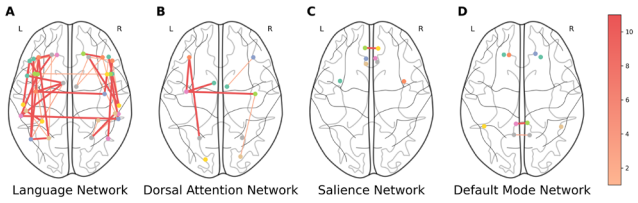
In this study, Xinyi Hu and the rest of the research team used artificial intelligence (AI) and machine learning to predict aphasia severity (a condition that affects language ability) based on data from multiple brain imaging techniques. These included structural Magnetic Resonance Imaging (MRI) (to view brain anatomy and identify stroke lesions), diffusion MRI (to derive metrics of the microstructural integrity of the brain tissue), and resting-state functional MRI (to assess how different brain regions naturally communicate). The metrics obtained were input into Support Vector Regression (SVR) and Random Forest (RF) models, to identify brain features most critical for post-stroke language recovery.

SVR models were the most accurate ones in predicting language abilities using a combination of structural and functional brain data. The study found that functional connections between brain regions, particularly between both hemispheres and within the language network, played a key role in predicting recovery.

This work highlights how AI can drive precision medicine by helping clinicians tailor rehabilitation strategies to each patient's unique brain profile, moving beyond one-size-fits-all care.




*(A) We collected brain scans and demographic data from all participants and processed the scans to extract key features related to stroke damage, brain structure, and activity. Colored boxes indicate different brain data types, with asterisk-marked features selected by AI for predicting language recovery. (B) 127 feature combinations were tested using Support Vector Regression (SVR) and Random Forest (RF) to predict how severe a person's aphasia was (WAB-R AQ). Model accuracy was determined via statistical techniques.*




*This figure highlights key brain connections identified by Support Vector Regression (SVR). Darker, thicker lines indicate more frequently selected connections for predicting aphasia severity. The color bar shows selection frequency (1–11 times), revealing essential brain networks for language recovery after stroke.*

*Xinyi Hu*

*Maria Varkanitsa*

### Research Team

This research was conducted by an interdisciplinary team including Xinyi Hu (Data Science and Computing), Maria Varkanitsa (Speech Language and Hearing Sciences), Emerson Kropp (Human Physiology), Margrit Betke (Department of Computer Science), Prakash Ishwar (Department of Electrical and Computer Engineering), and Swathi Kiran (Speech Language and Hearing Sciences). Their collaboration highlights the integration of neuroscience, AI, and engineering to advance precision medicine in neurorehabilitation.

# Research Spotlight

## What do we know about neuroplasticity after a stroke?

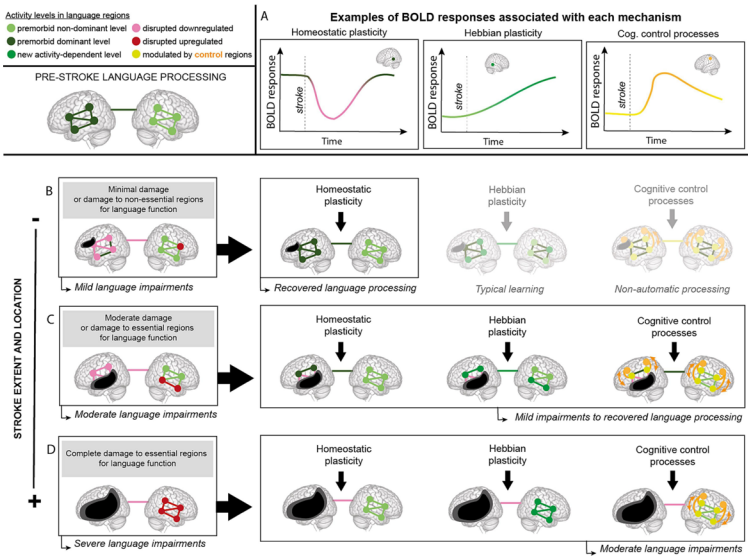
*Disentangling neuroplasticity mechanisms in post-stroke language recovery, Brain and Language, 2024*
*Anne Billot and Swathi Kiran*

### About the Project

Dr. Anne Billot and Dr. Swathi Kiran were invited to write a review of neuroplasticity in the journal Brain and Language. In their review, they discussed how the brain recovers language abilities after a stroke. In summarizing the extant body of literature on this topic, Drs. Billot and Kiran focused on three key mechanisms that work together during recovery. First, "homeostatic plasticity" helps the brain maintain stability by adjusting activity levels in different regions. As an example, when a stroke damages language areas in the left hemisphere, right hemisphere regions often become more active to compensate. Second, "Hebbian plasticity" allows the brain to learn and form new connections through repeated practice, which is essential for relearning language skills. A lot of rehabilitation outcomes capitalize on the premise of Hebbian plasticity. Third, "cognitive control processes" help the brain adapt to dynamic demands by engaging additional cognitive resources when language tasks become difficult.

Drs. Billot and Kiran explain that these mechanisms interact differently depending on how severe the stroke is. The figure shows how brain activity changes over time for each mechanism. In B, when a stroke causes minimal damage to language areas, the brain can often recover completely through homeostatic plasticity alone. This means undamaged language areas return to normal activity levels. The brain doesn't need to work extra hard because most of the language network still works efficiently. In C, with moderate damage to language regions, homeostatic plasticity isn't enough for full recovery. The brain needs assistance from cognitive control regions (the yellow areas) to help the spared dominant and non-dominant language regions to reach new levels of activity. Over time and with practice, these new connections strengthen through Hebbian plasticity, leading to partial or complete recovery. In D, if a stroke severely damages all essential language regions, complete recovery is unlikely. The person must constantly use cognitive control networks (requiring more mental effort) to communicate. With practice, the right hemisphere (non-dominant side) develops new connections through Hebbian plasticity, but language abilities remain limited.

A key aspect of this review was a series of commentaries provided by experts in the field of neuroplasticity with different perspectives. These researchers, while commending the overall framework, raised questions about whether these mechanisms can truly be separated, why brain imaging results sometimes seem contradictory, and what roles the right hemisphere and areas around the stroke damage play in recovery. In their response, Dr. Billot and Dr. Kiran addressed these unresolved questions, but also discussed exciting future directions, like using brain stimulation to enhance recovery, developing computer models that simulate individual recovery patterns, and considering factors beyond just brain changes—such as mental health, sleep, and social support. Dr. Billot and Dr. Kiran emphasized that understanding these mechanisms better could lead to more personalized treatments for people recovering from stroke-related language problems.




*This figure depicts the Adaptive Plasticity Control Framework to explain neuroplasticity. See text for details.*

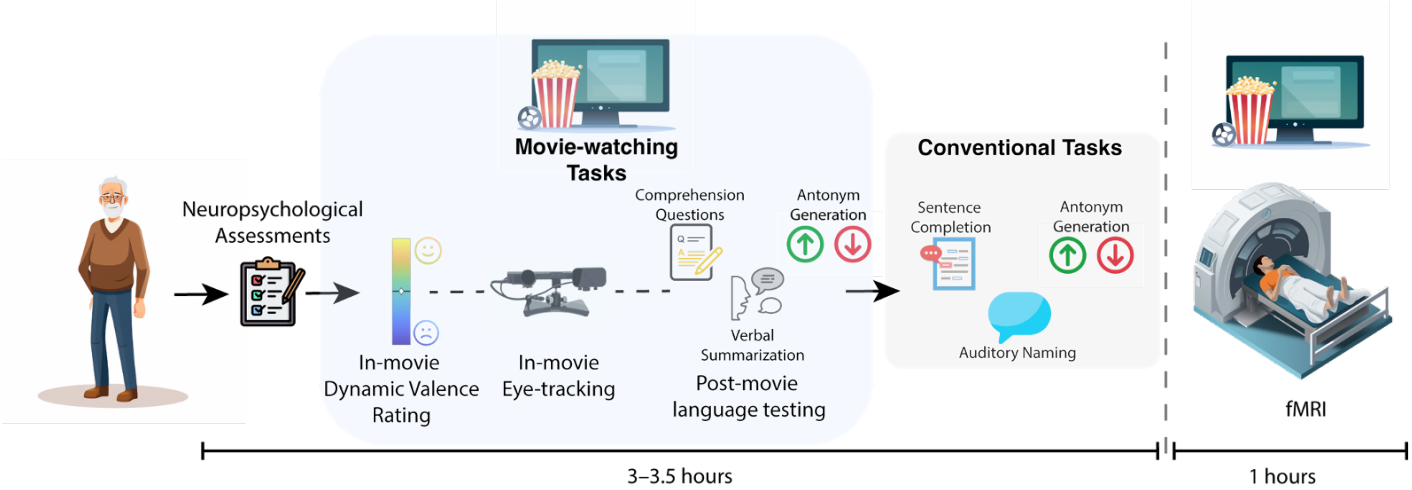
*Anne Billot*

*Swathi Kiran*

# Research Spotlight

## Naturalistic Assessment of Language and Emotion Brain Recovery Through Real World Language Studies

*Manuel Marte, Bryce Gillis, Einat Liebenthal, Swathi Kiran*

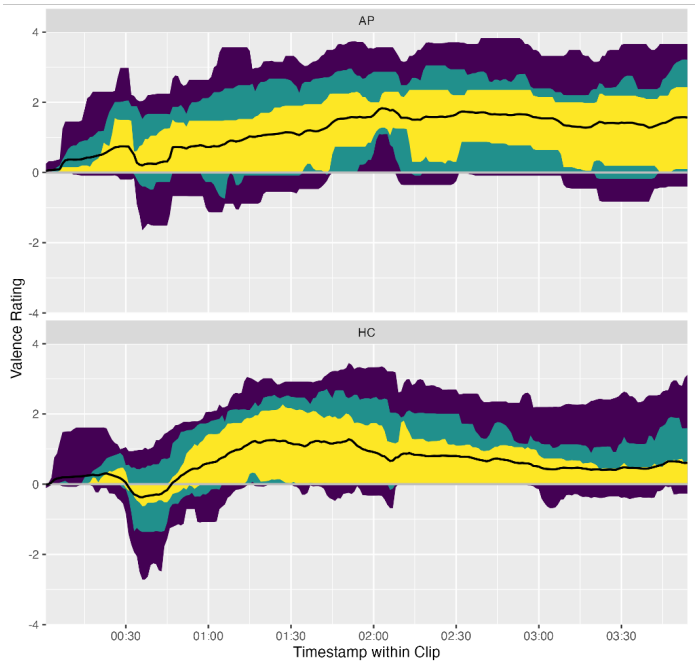



*This figure depicts the experimental timeline and components of the naturalistic movie-watching paradigm comparing movie-based tasks with conventional language tasks, and neuroimaging.*

### About the Project

When we think about how people communicate in everyday life, we're usually juggling multiple things at once: following conversations, reading facial expressions, picking up on emotional tone, and understanding context. Yet when we assess language abilities after stroke, we use very controlled, structured tests that don't capture this complexity. Manuel Marte's PhD research takes a different approach by studying how people with aphasia (language difficulties after stroke) process information while watching movie clips – a more natural activity that better reflects real-world communication. Using eye-tracking technology, continuous emotional rating tools, and simple behavioral tasks, this work examines how people coordinate their attention, how they emotionally respond, and measure their understanding of what's happening in the scene. Manuel's early findings suggest this approach reveals abilities that might be missed in traditional testing. For example, while someone might struggle with naming objects during an assessment, they may show preserved emotional understanding and appropriate attentional patterns during movie-watching.

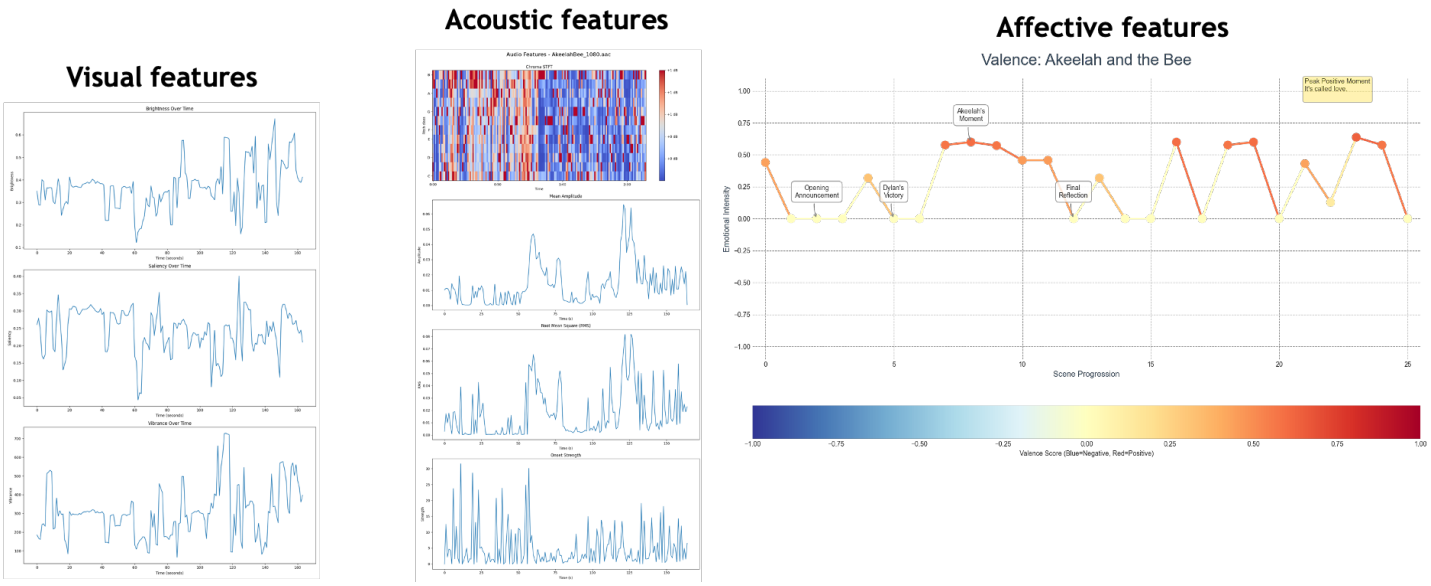
The ideal outcome is that this research transforms how we think about evaluation and treatment of communication difficulties after stroke by helping us identify and build upon abilities that are implicated in more realistic contexts.



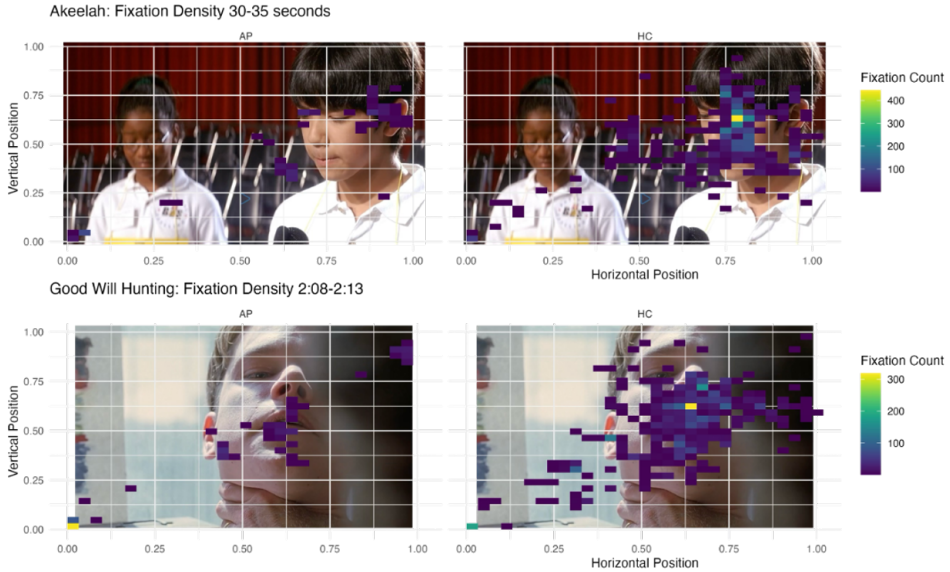

*This figure displays continuous emotional valence ratings over time for persons with aphasia (AP) and healthy controls (HC) during movie viewing, with colored bands representing rating distributions and black lines showing mean ratings.*

## Research Team

This research was conducted by an interdisciplinary team including Manuel Marte (Boston University, Center for Brain Recovery), Bryce Gillis (McLean Hospital), Einat Liebenthal (McLean Hospital), and Swathi Kiran ( Boston University, Speech Language and Hearing Sciences). Each member played a significant role in managing the distinct aspects of the project including recruitment, testing, and database management of the aphasia patients and the age-matched healthy controls.




*This figure illustrates multimodal feature extraction from movie stimuli, showing visual brightness changes, acoustic patterns, and emotional valence ratings across time.*




*This figure compares eye fixation density patterns between persons with aphasia (AP) and healthy controls (HC) during two movie clips, showing differences in distribution of visual attention.*

### WANT TO GET INVOLVED?

Please inquire with the Center about joining as an intern. There are many potential sub-projects primarily centered around clinical application of computational methods – NLP, language models, and computer vision severity, allowing the research team to identify brain features most critical for post-stroke language recovery.

# Achievements & Awards

The CBR team earned various awards and achievements over the course of the past year, including:

## FACULTY

**Swathi Kiran**
- Received "Honors of the Association" from the American Speech-Language-Hearing Association (ASHA)
- Joined the NIH-National Institutes of Deafness and Communicative Disorders (NIDCD) Advisory Council

**Elizabeth Hoover**
- "Fellow of the Association" Award from the American Speech Language Hearing Association (ASHA)

**Prakash Ishwar**
- Best paper titled "On neural collapse in contrastive learning with imbalanced datasets" 4th IEEE International Workshop on Machine Learning for Signal Processing (IEEE MLSP 2024) workshop

**Terry Ellis**
- Best platform presentation titled "Amplifying real-world walking activity through autonomous music-based rhythmic auditory stimulation: A single-blind randomized controlled trial". Degenerative Disease Special Interest Group of the Academy of Neurologic Physical Therapy. American Physical Therapy Association, Combined Sections Meeting, Houston, TX, USA, February 13-15, 2025.

## STUDENTS AND TRAINEES

**Erin Carpenter (Kiran Group)**
- Academy of Neurologic Communication Disorders and Sciences (ANCDS) Student Fellowship Award

**Manuel Marte (Kiran Group)**
- ASHA Research Mentoring-Pair Travel Award, American Speech-Language-Hearing Association Convention 2024
- NIH/NIDCD RSCA Student Fellowship Award 2023 Clinical Aphasiology Conference
- NIH/NIDCD Academy of Aphasia Young Investigator Travel Fellowship for Academy of Aphasia

**Michael Scimeca (Kiran Group)**
- NIH/NIDCD Academy of Aphasia Young Investigator Travel Fellowship for Academy of Aphasia
- ASHA Research and Mentoring Pair Travel Award

**Marissa Russell-Meill (Kiran Group)**
- NIH/NIDCD Academy of Aphasia conference grant
- ASHA Research-Mentor-Pair Travel Award
- Academy of Aphasia Student Award Awarded to the most scientifically meritorious student paper presented as a platform talk at the Academy of Aphasia conference.
- NIH/NIDCD Academy of Aphasia conference grant

**Shalom Henderson (Kiran Group)**
- NIDCD Research Symposium Clinical Aphasiology Fellowship

**Anna Serrichio (Kiran Group)**
- NIDCD Research Symposium in Clinical Aphasiology Fellowship

# Achievements & Awards

**Mohammad Aldabbagh (Kiran Group)**
- Received the Student Research Award provided by UROP to investigate how macro-scale cortical functional connectivity and tissue spareness along a gradient differ in patients with left hemisphere stroke compared to healthy controls, and how these differences predict clinical assessment scores. The study builds on recent findings that suggest a hierarchical organization of cortical functional connectivity, with unimodal primary areas at one end and the heteromodal default-mode network at the other, and language function occupying a central position along this gradient. He presented his work at the Society for Neurobiology of Language Conference in Brisbane, Australia.

**Alexandra Piper-Wagner (Kiran Group)**
- Received the Student Research Award provided by UROP to identify the presence of differential attrition in aphasia RCTs and to investigate various factors that may influence attrition rates. These factors include the type of control group, study demographics, and the nature of the intervention. By analyzing these elements, the project seeks to understand how differential attrition may impact study outcomes and provide insights into mitigating potential biases in future research.

**Shraddha Kinger (Cronin-Golomb Lab)**
- Justice, Equity, Diversity & Inclusion (JEDI) award from BU's Department of Psychological and Brain Sciences

**Nishaat Mukadam (Cronin-Golomb Lab)**
- Walter G. McMillen Award for Parkinson's Disease Research, American Psychological Association, Division 20 (Adult Development and Aging)

**Jairo Martinez (Cronin-Golomb Lab)**
- Hispanic Neuropsychological Society Student Representative
- Co-Chair of Student Association Committee

**Courtney (Aul) Guida (Cronin-Golomb Lab)**
- Received a BU Graduate Internship Fellowship for her work at the non-profit Boston VA Research Institute

**Averi Giudicessi (Cronin-Golomb Lab)**
- National Research Service Award, NIH (National Institute on Aging)
- Massachusetts Neuropsychological Society's Relevance Award in 2025

**Kenny Kim (Boas Lab)**
- Received the BME Best Dissertation Award for his work developing high density speckle contrast optical spectroscopy technology for imaging human cerebral blood flow responses to brain activation.

**Varuna Jasodanand (Kolachalama Lab)**
- Placed 1st in the poster event held at the 12th Annual BU-CTSI Translational Science Symposium

**Shreyas Puducheri (Kolachalama Lab)**
- Placed 2nd in the poster event held at the Beth Israel Lahey Health AI & ML Symposium.

**Olivia Zhou (Kolachalama Lab)**
- Placed 2nd in the poster event held at the Beth Israel Lahey Health AI & ML Symposium.

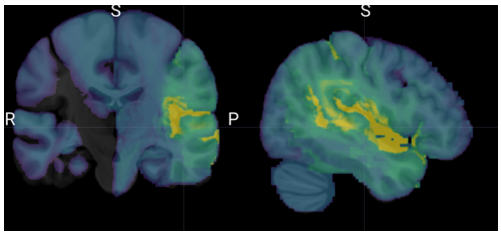
**Krish Kapadia (Kolachalama Lab)**
- Placed 2nd in the poster event held at the Beth Israel Lahey Health AI & ML Symposium.

**Lingyi Xu (Vijaya B. Kolachalama's Lab)**
- Placed 3rd at the Evans Day poster event.


*Dr. Kiran alongside PhD students Marissa Russell-Meill and Manuel Marte at the ASHA Award Ceremony. December, 2024.*

# The CBR Internship Program

*Conversation between Undergraduate Student Emerson Kropp, PhD Student Marissa Russell-Meill, and Research Assistant Erie Shivers at the 2nd Annual Neuroscience of the Everyday World Conference.*




*This figure shows the visualization of the stroke pattern found to be most associated with aphasia severity in our patients, comprising left hemisphere temporal and perisylvian regions.*

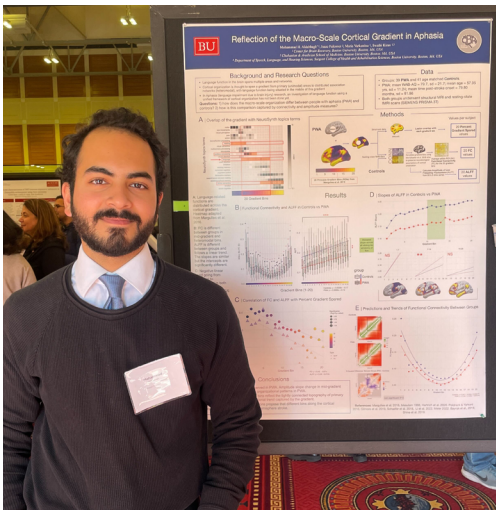
**Using Unsupervised Dimensionality Reduction to Identify Lesion Patterns Predictive of Post-Stroke Aphasia Severity**

Emerson Kropp is an undergraduate student at Boston University at the Center for Brain Recovery as he completes his premedical bachelor's degree in Health Science / Human Physiology. He is also a certified EMT and alongside his work with the CBR he has gained experience with hands-on patient focused care and research.

Kropp's research is focused on the impacts of lesion volume and location in stroke patients with aphasia. The goal of this project is to apply non-negative matrix factorization (NMF) to data on brain regions damaged in strokes causing aphasia. In this way, NMF identifies large-scale stroke patterns which are represented across our patients, and some of these representations are much more correlated with aphasia and language ability than others.

**Looking Ahead**

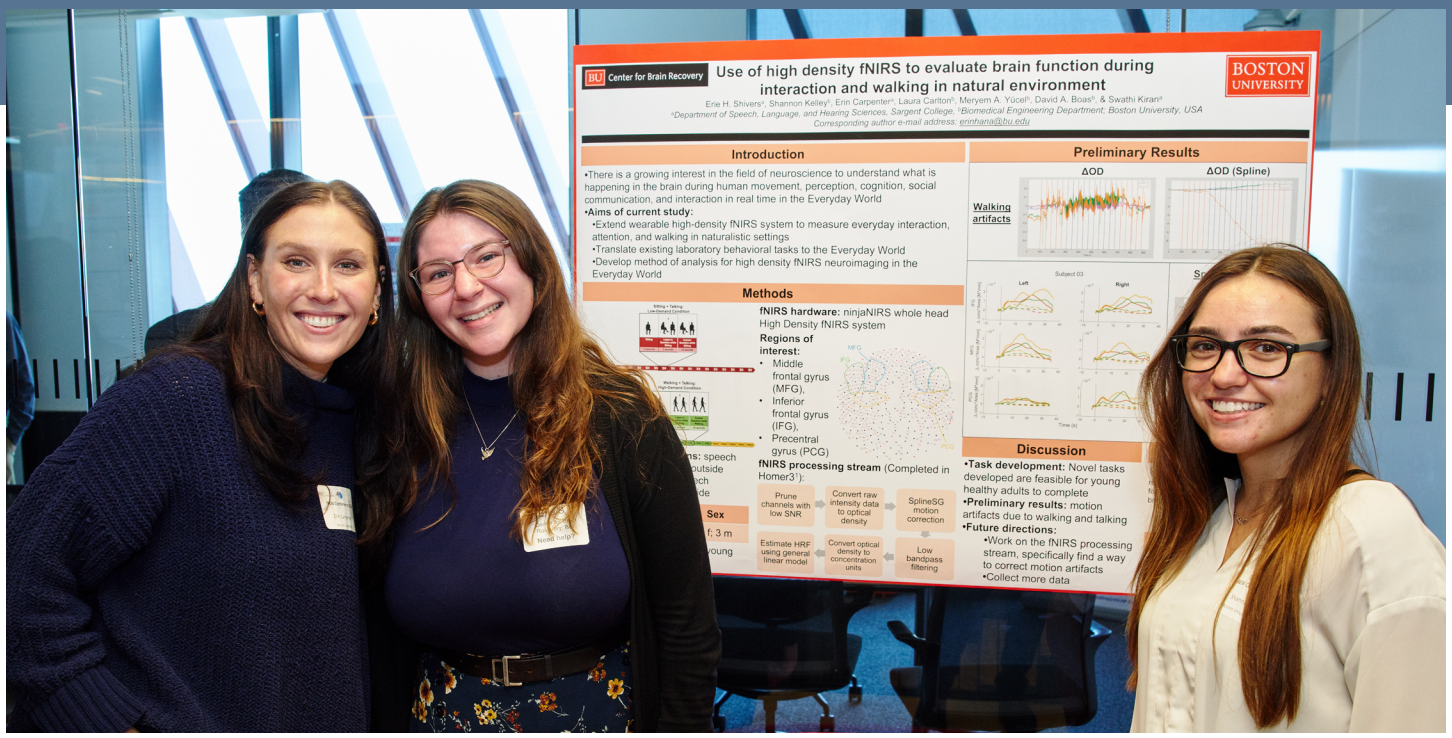
This manuscript was published in the prestigious journal *Cortex*. Kropp explains, "my hope is that this technique may provide insight into specific topographical stroke patterns significant for language dysfunction which could benefit future targeted treatment efforts." Kropp is looking forward to pursuing a career in neurology and his time with the CBR is helping him pursue his research interests alongside a team of passionate students and professionals in the field. As a member of the CBR team, he has led workshops on how to create lesion masks on neuroimaging data using ITKSnap, performed research under the guidance of professionals in the lab alongside his peers, and assisted in multiple projects in the lab. This coming fall, Kropp will be assisting core faculty member **Andreas Charidimou** and working on projects funded by the Alzheimer's Association.




*Mohammad Aldabbagh presenting his research at the Society for Neurobiology of Language conference in Brisbane, Australia.*

**Reflection of the Macro-Scale Cortical Gradient in Aphasia**

Undergraduate student Mohammad Aldabbagh presented his work, "Reflection of the Macro-Scale Cortical Gradient in Aphasia" at the Undergraduate Research Opportunity Program (UROP) annual symposium at BU and then at the Society for Neurobiology of Language (SNL) conference in Brisbane, Australia. He explained that at the UROP event, "I had the chance to discuss my research with faculty members, students, and their families — I learned to discuss my work with a diverse set of backgrounds and interests." He continued, explaining that at SNL, "my conversations were more focused on the methodological and technical aspects of the project given the type of people who attended the conference (researchers and trainees working in the field of my project). This helped me grasp where my project is situated amidst the broad landscape of aphasia and language research." Aldabbagh's project initially started with mentorship from Isaac Falconer, where they discussed the foundation and the scope of the project, then received guidance from Swathi Kiran and Maria Varkanitsa on the abstract submissions, data analysis, and poster presentation. His peers at the CBR also provided feedback on a weekly basis, as the project was often discussed during MD and research meetings



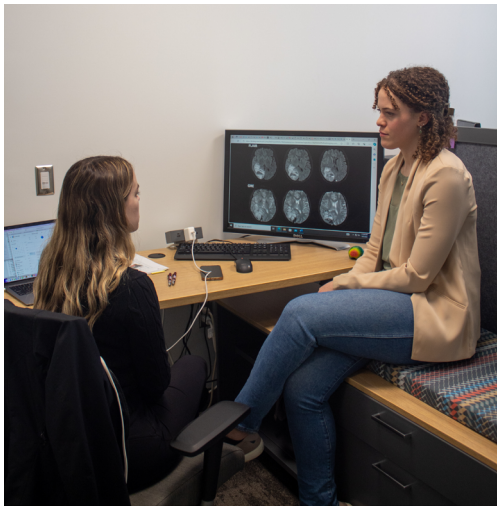

*PhD Student Erin Carpenter with Erie Shivers and Shannon Kelley, presenting their research at the Neuroscience of the Everyday World Conference. August 2024.*

My experience in the Center for Brain Recovery internship program has been incredibly impactful for me and my career as a researcher. I joined the center as an undergraduate intern in the fall of 2023 on the U01 Neuroscience of the Everyday World (NEW) project, under the mentorship of PhD candidate, Erin Carpenter. Under Erin's guidance, I began taking on more responsibility for the NEW project and upon graduating in the Spring, I was hired as a full-time research assistant at the center and took over as project lead for the NEW project. Now, under a year later, I am mentoring six undergraduate interns over two projects. From my experience, being an intern at the Center for Brain Recovery provides you with a plethora of opportunities where hard work is directly rewarded and recognized. I am incredibly grateful for having been part of the internship program and am honored to be able to mentor so many wonderful students and help them achieve their goals.

**— Erie Shivers,** Research Assistant

Mentoring undergraduate interns as a PhD student has been a valuable experience for both my research and leadership development. By guiding students through each phase of the research process—from data collection and analysis to manuscript preparation—I've strengthened my ability to adapt mentoring approaches to individual learning styles and experience levels. The interdisciplinary nature of our team, bringing together students from programs of study such as neuroscience, human physiology, speech language and hearing sciences, and computer science, creates a rich environment full of diverse perspectives and mutual learning. This collaborative atmosphere improves the quality of our research while also helping prepare students for the increasingly interdisciplinary field of communication sciences and disorders

**— Marissa Russell-Meill,** PhD Student, MS, CCC-SLP



*Marissa Russell-Meill talks with fellow PhD student, Nicole Carvalho.*

# The ICCR Program

**Meredith MacEachern, CCC-SLP**
Clinical Director | ICCR Program

### About the Program

The ICCR program is a comprehensive, contextualized cognitive rehabilitation program for young adults with ABI who wish to enter or return to college-level or higher education but are unable to do so due to their cognitive and communication challenges. The ICCR program uses individual, group, and functional-based therapy to simulate a college semester in which therapeutic support is provided and both impairment-based and functionally focused therapy tasks are integrated within the program. The program is offered year-round and runs entirely on Zoom.

To learn more, contact the program's Clinical Director, Meredith MacEachern, at mermac@bu.edu.

### Testimonials from Student Participants

"After suffering an ABI, I had very little hope of going to college. [ICCR] taught me many strategies to overcome my memory problems. Everyone was very supportive and made me feel like I could do it! Now, I have completed three college courses and have done well! I still use all of the studying methods I learned while in the program, and they continue to help me be successful!"

**ICCR STUDENT PARTICIPANT**

"[ICCR was] able to help me recover my cognitive abilities and coordinate strategies to help me compensate when I encounter issues due to my memory loss. Thanks to their help, I was able to return to my doctoral program successfully as I have gotten straight A's since I re-enrolled."

**ICCR STUDENT PARTICIPANT**

Research from the program indicates that participants in the ICCR program are more than 2x as likely to enter higher education compared to control group.

### Testimonials from Student Clinicians

"Over the course of one semester, our clients make gains towards academic, cognitive, and social goals that are measured on standardized tests, but more importantly through students' subjective experiences. Students are supported in developing their target skills in a safe and well-paced environment that further enhances confidence and independence. ICCR is a community dedicated to growth and knowledge that adapts to every learner!"

**ICCR STUDENT CLINICIAN**

"My favorite part of ICCR was the camaraderie forged between the students. For many of them, this was the first time they had peers with similar experiences, who were in the same stage of life and working towards the same goals. To see them celebrating the successes of their fellow students and flourishing with the supportive environment of this functional, intensive, and contextualized treatment program is something I am always grateful I got to be a part of."

**ICCR STUDENT CLINICIAN**

# The CHAT Program

**About the Program**

*CHAT (Conversation, Health, Art, Technology) is an Aphasia Resource Group that meets weekly to practice communication in a supportive environment while also providing participants with access to discuss and participate in ongoing research relevant to their condition.*

The program provides a regular meeting for the Center for Brain Recovery's aphasia community, fosters a supportive environment for aphasic communication, and connects participants with researchers.

CHAT
APHASIA
Resource Group

*The typical Conversation, Health, Art, Technology (CHAT) session is a blend of meaningful conversations, health-focused discussions, artistic expressions, and insights into some of the latest technological advancements for individuals with aphasia .*

**Testimonials from CHAT Participants**

"Most of us were barely able to speak, and then every week you would get better and better."

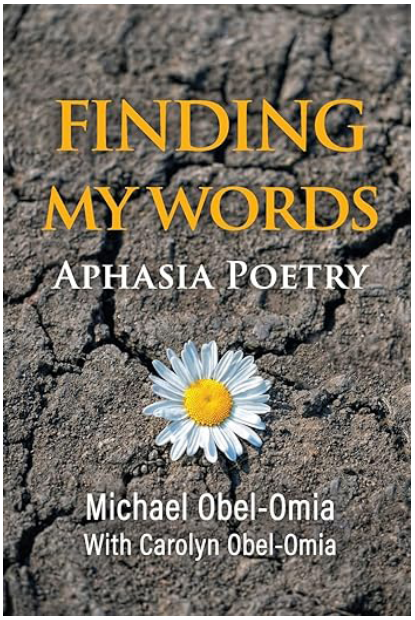
**CHAT PARTICIPANT**

"It's easier to communicate because they understand what you're going through."

**CHAT PARTICIPANT**

**Ways to Get Involved**

- **Participants:**
  Sign up at http://eepurl.com/ije5kv or contact letschat@bu.edu.
- **Researchers:**
  Want to discuss your research with the group? Connect with us by emailing letschat@bu.edu.




*Poetry book created by CHAT Program participant.*

**SUPPORT OUR PROGRAMS**

You can help support the continued success of the Center for Brain Recovery by contributing to our research fund. For more information on how to help, visit the Support Our Work page on our website bu.edu/cbr/about/how-you-can-help/.

# Events


*Dr. Swathi Kiran opened day one of the Neuroscience of the Everyday World (N.E.W.) Conference, welcoming the audience to the event and introducing the first keynote speaker.*

450

*Conference Attendees*

14

*Speakers & Panelists*

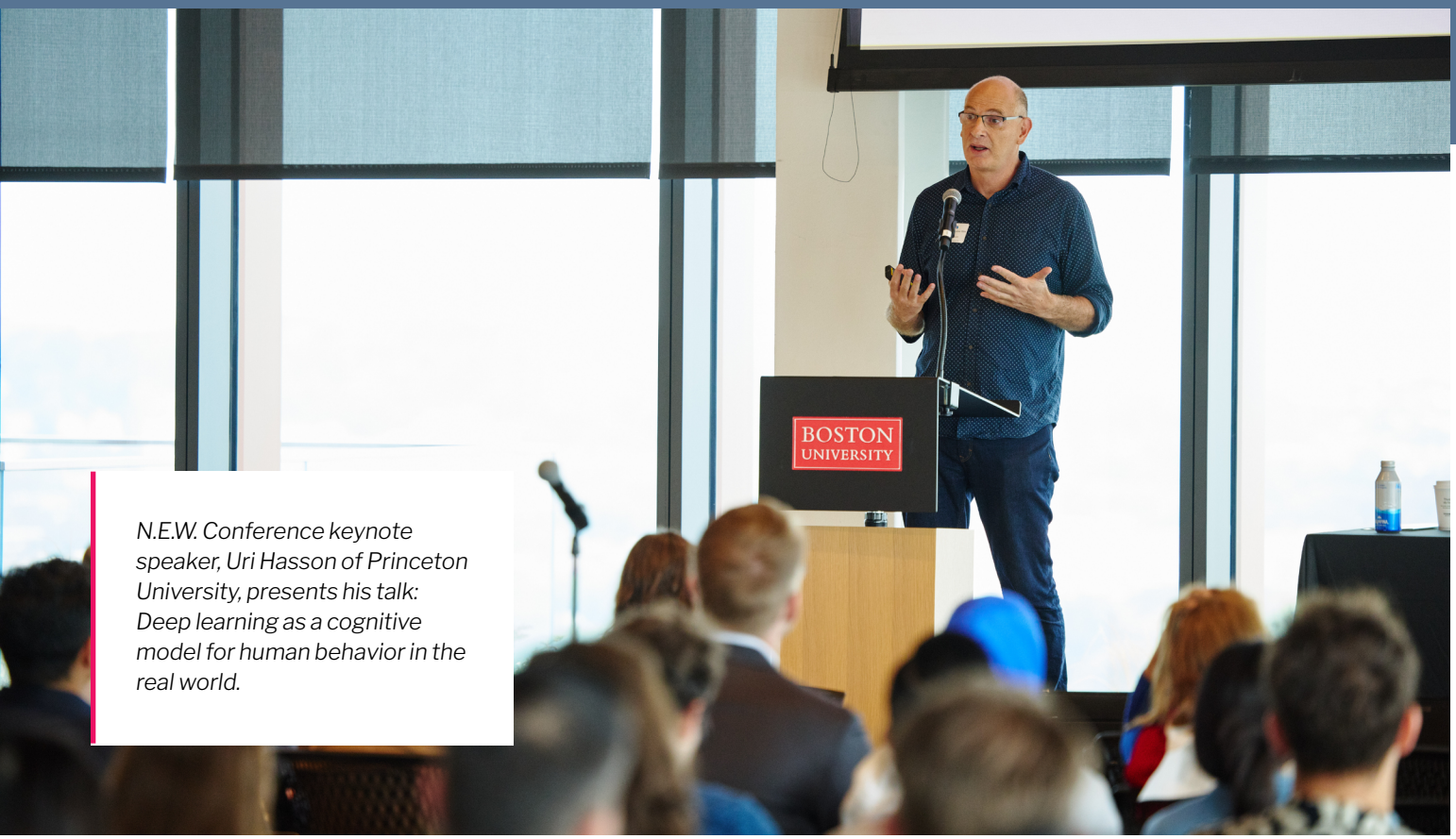
40

*Poster Presenters*

## NEUROSCIENCE OF THE EVERYDAY WORLD (N.E.W.) CONFERENCE 2024

On August 26th and 27th, 2024, the Boston University Center for Brain Recovery, the Neurophotonics Center and Rafik B. Hariri Center for Computing, co-hosted the second annual Neuroscience of the Everyday World Conference at Boston University sponsored by the Tianqiao and Chrissy Chen Institute. The event brought together over 450 attendees from 25 countries around the world, highlighting researchers focused on the study of human brain function and continuous brain measurement in real-world activities. The conference featured 14 notable speakers and panelists as well as offered students and researchers the opportunity to present their work during the poster sessions, highlighting 40 posters across the two-day conference.

*Poster presenter, Katelyn Pickunka from Smith College, explains her research to fellow N.E.W. Conference attendees.*




*N.E.W. Conference keynote speaker, Uri Hasson of Princeton University, presents his talk: Deep learning as a cognitive model for human behavior in the real world.*

## CBR BRAIN AND BEHAVIOR RESEARCH SEMINAR SERIES

Youtube: @BUCenterforBrainRecovery

**SEPTEMBER 9TH, 2024**
**Andrew DeMarco**, Georgetown University, Department of Rehabilitation Medicine
- "Innovation and interpretability in lesion-symptom mapping"

**OCTOBER 28TH, 2024**
**Haris Themistocleous**, University of Oslo, Department of Special Needs Education
- "AI in Clinical Therapy and Assessment: A Paradigm Shift in Speech-Language Pathology"
- Watch the recording on Youtube

**NOVEMBER 25TH, 2024**
**Erin Meier**, Northeastern University, Department of Communication Sciences and Disorders
- "Leveraging Wearable Technologies to Increase Ecological Validity of Aphasia Assessment"
- Watch the recording on Youtube

**DECEMBER 16TH, 2024**
**Holly Robson**, University College London, Language & Cognition
- "Speech comprehension impairments in Wernicke's-type aphasia. Can basic science open pathways to new interventions?"
- Watch the recording on Youtube

**JANUARY 28TH, 2025**
**Sofia Vallila Rohter**, MGH Institute of Health Professions, Cognitive Neuroscience Group
- "Rehabilitation as Learning: Examining learning and strategy use in people with aphasia"
- Watch the recording on Youtube

**FEBRUARY 24TH, 2025**
**Michael Alosco**, Boston University Chobanian & Avedisian School of Medicine, CTE Center
- "Beyond Chronic Traumatic Encephalopathy: Long-Term White Matter and Vascular Consequences of Repetitive TBIs"
- Watch the recording on Youtube

**APRIL 14TH, 2025**
**Preeti Sunderaraman**, Brown University and Butler Hospital, Department of Psychiatry and Human Behavior
- "Innovations in Financial Management Assessment – Preliminary Evidence from a simulated technology task"

**MAY 12TH, 2025**
**Sigfus Kristinsson**, University of South Carolina, Communication Sciences and Disorders
- "Personalized Aphasia Treatment: Current Challenges, Ongoing Research, and Future Directions"
- Watch the recording on Youtube

**JUNE 30TH, 2025**
**Stacy Andersen**, Boston University Chobanian & Avedisian School of Medicine, New England Centenarian Study
- "Characterizing cognitive function and resilience to Alzheimer's disease using digital technologies"
- Watch the recording on Youtube

# Events

## STROKE ONWARD PANEL

On April 28th, 2025, the Center for Brain Recovery co-hosted the Care Onward Panel in collaboration with Stroke Onward, bringing together survivors, neurologists, rehabilitation clinicians, researchers, and caregivers to discuss transition care and psychosocial support for stroke and aphasia patients. The list of panelists included numerous accomplished professionals with diverse perspectives and expertise on the topics of stroke and aphasia.

The Care Onward Panel successfully promoted a valuable dialogue amongst panelists and the audience, but this conversation was just the beginning. There is still much work to be done and this event stressed the importance of having multiple voices and perspectives in the room when it comes to rehabilitation and transition care for stroke and aphasia patients.

### PANELISTS

**Dr. David Lin**
Massachusetts General Hospital

**Dr. Joan Breen**
Whittier Hospital

**Dr. Jess Pisenga**
Boston Medical Center

**Lynn Blaney**
Mass General Brigham

**Meredith MacEachern**
Boston University

**Steve Parnell**
Stroke Survivor


*Panelists share their insights on stroke recovery & rehabilitation.*

*Attendees listen attentively as panelists offer their perspectives.*

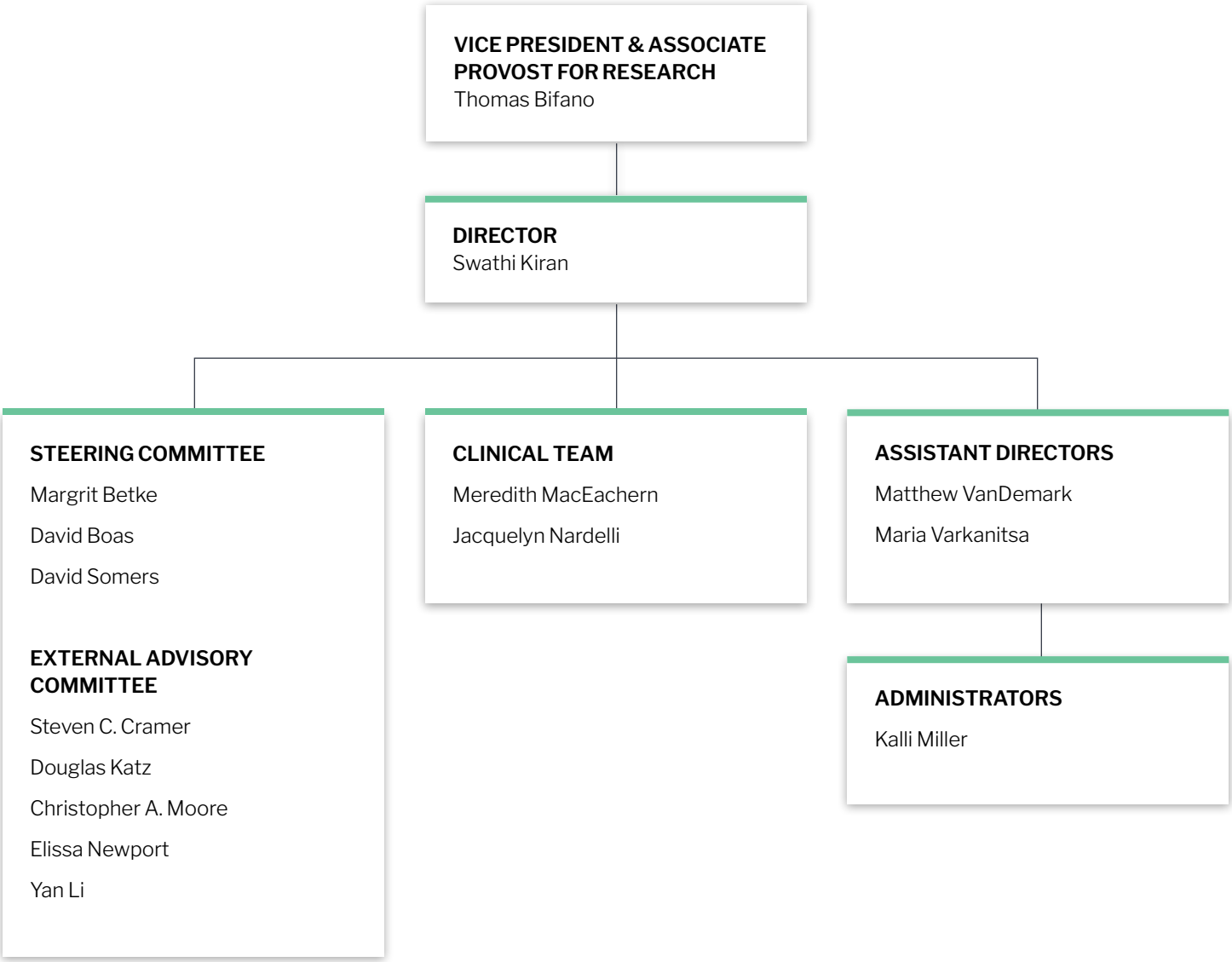
*Stroke Onward founders, Debra Meyerson and Steve Zuckerman, engage with panelists.*

*At the end of the spring semester, CBR students, staff, and faculty went to Lucky Strike for a team bonding and end of the academic year celebration.*

*During the second to last week of April, 2025, ICCR student participants joined our ICCR staff members and student clinicians in-person in Boston for their "Immersion Week" activities.*


*On March 19, 2025, President Melissa Gilliam visited the Center for Brain Recovery. We had the opportunity to share with her insights into our Center's core research objectives, methodologies, upcoming initiatives, and accomplishments.*

# Organizational Chart



# Leadership & Staff

## Core Team

**Swathi Kiran**
Founding Director
Center for Brain Recovery

**Matthew VanDemark**
Assistant Director, Finance and Administration

**Maria Varkanitsa**
Assistant Scientific Director

**Berk Tellioglu**
Research Specialist

**Charlotte Derose**
Media and Website Assistant

**Meredith MacEachern**
ICCR Clinical Director

**Jaquelyn Nardelli**
ICCR Supervisor

**Ollie Combs**
CHAT Group Ambassador

**Kalli Miller**
Marketing and Events Specialist

**Erie Shivers**
Research Assistant

**Emerson Kropp**
Research Assistant

**Brianna Boadu**
Administrative Assistant

## External Advisory Committee

**Douglas Katz**
Neurology Professor, BUSM

**Elissa Newport**
Director, Center for Brain Plasticity and Recovery

**Steven C Cramer**
Professor of Neurology, UCLA

**Christopher A. Moore**
Dean Emeritus,
Boston University

**Yan Li**
Executive Director of Scientific Programs, Tianqiao and Chrissy Chen Institute

# Faculty & Students

## Steering Committee

**Margrit Betke**
Professor, Computer Science

**David Boas**
Director, Neurophotonics Center, Distinguished Professor, BME

**David Somers**
Professor, Psychological and Brain Sciences

## Core Faculty

**Hugo Aparicio**
Assistant Professor, NEU

**Rhoda Au**
Professor, ANAT/NEU

**Anne Carney**
Lecturer, SLHS

**Alice Cronin-Golomb**
Professor, PBS

**Michael Esterman**
Assistant Professor, PSY

**Prakash Ishwar**
Professor, EECS

**Vijaya Kolachalama**
Assistant Professor, ANAT/NEU

**Rafael Romero**
Associate Professor, NEU

**Yorghos Tripodis**
Research Professor, SPH

**Meryem Yücel**
Research Associate Professor, BME

**Teresa Ellis**
Professor, PT

**Archana Venkataraman**
Associate Professor, EECS

# Core Faculty

**Lou Awad**
Assistant Professor, PT

**Elizabeth Hoover**
Clinical Professor, SLHS

**Michelle Stransky**
Research Assistant Professor, BMC

**Andreas Charidimou**
Assistant Professor, NEU

# Postdoctoral

**Shalom Henderson**
Postdoctoral Associate

**Anna Serrichio**
Postdoctoral Researcher

# PhD Students

**Erin Carpenter**
PhD Candidate

**Nicole Carvalho**
PhD Student

**Manuel Marte**
PhD Candidate

**Marissa Russell-Meill**
PhD Student

**Michael Scimeca**
PhD Student

# Faculty & Students

## Affiliated Graduate Students

**Zijian Chen**
PhD Student, EEC

**Xinyi (Selena) Hu**
PhD Student, CDS

**Sha (Stan) Lai**
PhD Student, CS

**Sharon Wang**
PhD Student, GMS

**Jadelyn Kurtz**
MS Student, SAR

**Cassie Lee**
MS Student, CDS

## Undergraduate Students

**Mohammad Aldabbagh**
CAS, Neurobiology

**Amelia Andre**
CAS, Neuroscience

**Mohita Belwariar**
SAR, Health Science

**Helen Blans**
CAS, Neuroscience

**Kelvin Fang**
CAS, Biology

**Cindy Frempong**
CDS, Data Science

**Alexandra Guy**
CAS, Neuroscience

**Loriane Hamel**
SAR, Behavior & Health

**Natalie Hu**
Tufts University, Cognitive & Brain Science

**Xiaoting Jiang**
CAS, Neuroscience

**Arpana Kumari**
CAS, Neuroscience / Psychology

**Chae Eun (Hannah) Lee**
SAR, Human Physiology

**Bonnie Little**
CAS, Neuroscience

**Jose Luis De Los Santos**
ENG, Biomedical Engineering

**Jacie Owens**
CAS, Neuroscience

**Ashley Palombizio**
SAR, Health Science

**Alex Piper-Wagner**
SAR, Human Physiology

**Ligia Sibauste**
SAR, Speech, Language & Hearing Sciences

**Divya Sivakumar**
CAS, Neuroscience

**Sihyun Sung**
CAS, Neuroscience

**Maria Valiente**
SAR, Human Physiology

**María Coro Vizcaíno**
CAS, Neuroscience

**Isabel Yu**
CAS, Neuroscience

# Faculty Spotlight

## What is your current research focus, and how does it align with the Center for Brain Recovery's mission?

### Alice Cronin-Golomb

Professor & Director of Graduate Studies, PBS

"My principal research focus is on perception, cognition, motor function, mood, sleep, and other aspects of daily function in aging and age-related neurodegenerative disease. My main methodology is behavioral and includes cognitive neuroscience, neuropsychological assessment, neuroimaging, and visual psychophysics.

A main emphasis of my Vision and Cognition Lab is on the non-motor symptoms of Parkinson's disease and their interaction with motor symptoms. I also have a long-standing interest in perception and cognition in Alzheimer's disease and healthy aging and actively collaborate on projects in these areas. Our engagement in basic research and development of interventions to enhance quality of life in persons with compromised brain function aligns very well with CBR's mission.

### Archana Venkataraman

Associate Professor, EECS

"My lab uses the power of data science, particularly artificial intelligence, to better extract information from noisy and complex biomedical data sets in order to improve our understanding and treatment of neurological and psychiatric disorders. We use an interdisciplinary mindset to address questions like: 'How do we extract better information from imaging data?' and 'How do we combine different sources of information to get a more complex, comprehensive patient picture?'.

Depending on the project, sometimes we're in the early stages of research and we'd like to identify biomarkers or create diagnostic modules. In other projects, we might want to identify clinical or therapeutic targets that are difficult yet important to identify for neuroradiologists and surgeons. We use non-invasive, easily acquired data to help improve their decision making.

### Elizabeth Hoover

Clinical Professor, SLHS

"Our research is focused on socially oriented treatments for aphasia. We are currently investigating the benefits of conversational group treatment for people with aphasia through a multi-site, multi-year, randomized clinical trial. Conversation treatment is a naturalistic, dynamic intervention that has previously been considered as an adjunct to traditional language-based aphasia therapies. However, there is evidence that this intervention may provide both language, and communication benefits to individuals with aphasia. Our work is building on this efficacy and elucidating the critical ingredients within the intervention, such that we might better understand how different variations of the treatment can support individuals with different profiles of aphasia. In other words, which version of the treatment might work better for whom based on their goals. This work aligns with the mission of the CBR in terms of trying to maximize benefits for individuals in the community. Conversation treatment is a cost-effective intervention which can be offered to manage changing goals and help support social connectedness in the community.

**Read the full length features on the CBR website:**

- Alice Cronin-Golomb
- Archana Venkataraman
- Elizabeth Hoover

# Faculty Publications

**CBR FACULTY PUBLISHED THE FOLLOWING SELECTED ARTICLES**. Articles published by two or more Center-affiliated faculty are indicated by * (an asterisk).

**Aparicio, H. J.**, & Springer, M. V. (2025). Racial and Ethnic Disparities in Stroke Incidence and Outcomes. Current Cardiovascular Risk Reports, 19(1), 1–8. https://doi.org/10.1007/S12170-025-00766-9

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# Faculty Publications


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