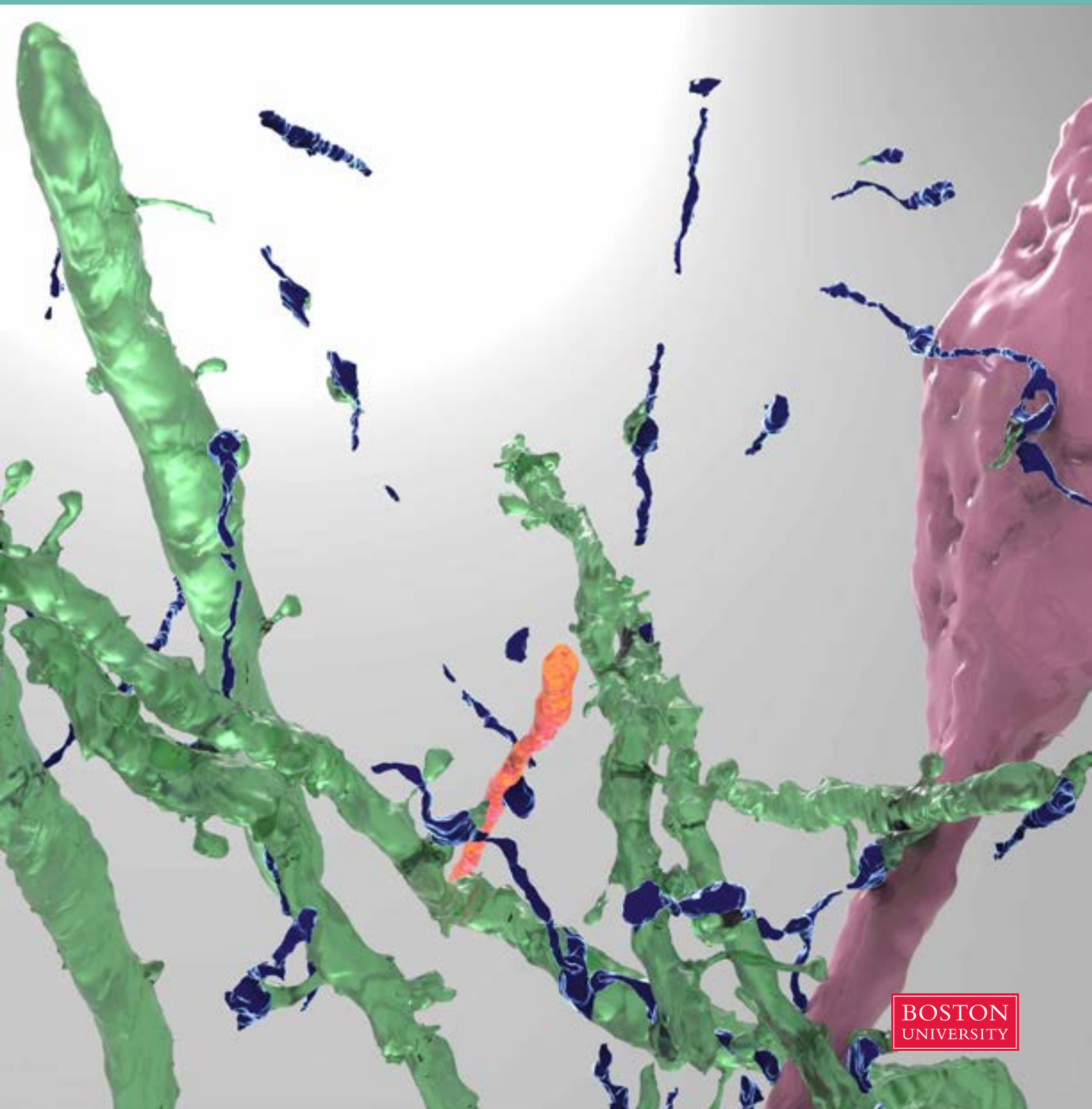
BOSTON UNIVERSITY
CENTER FOR SYSTEMS NEUROSCIENCE

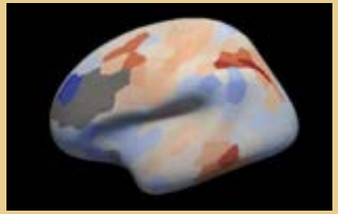
Annual Report | 2023

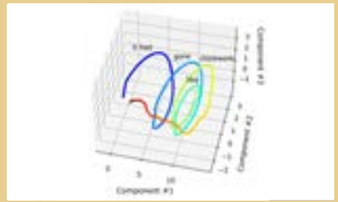


Boston University
Center for Systems Neuroscience
Annual Report

2023

Research Spotlights





Front cover photo: *This 3D representation of neural interactions in the subgenual cingulate cortex was reconstructed using high-throughput electron microscopy; Source: "Serial Prefrontal Pathways Are Positioned to Balance Cognition and Emotion in Primates." J Neuroscience 2020 Oct 21;40(43):8306-8328. doi: 10.1523/JNEUROSCI.0860-20.2020. Epub 2020 Sep 28. The image was developed by Research Fellow Jess Holz and Postdoctoral Associate Mary Kate Joyce, PhD, in the Neural Systems Laboratory led by Professor Helen Barbas, and won first prize in the 2022 Boston University Research Photo Contest (Category: Research Imaging).*

LETTER FROM THE DIRECTOR

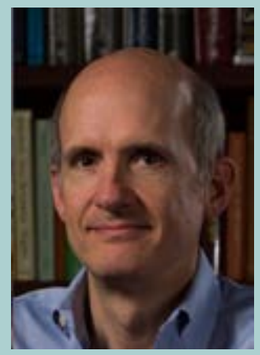
WELCOME TO THE ANNUAL REPORT of the Boston University Center for Systems Neuroscience (CSN). Our center brings together investigators from multiple different departments at Boston University on both the Charles River Campus and the School of Medicine, facilitating discoveries in neuroscience based on innovative interdisciplinary interactions.

The Center builds on important successes of systems neuroscience at Boston University to foster collaborations and enhance recruitment of new researchers. The Center for Systems Neuroscience has supported and participated in hiring of many vibrant new junior faculty members. In addition, to support development of innovative new techniques at Boston University, the CSN executive committee selects CSN Distinguished post-doctoral fellows supported by Center funding. These CSN fellows work with a range of junior faculty in departments including Biology, Psychological and Brain Sciences, Biomedical Engineering and Anatomy and Neurobiology.

The Center for Systems Neuroscience has played an active role in obtaining and administering large scale grant support, including Office of Naval Research MURI awards for interdisciplinary projects as well as ONR DURIP grants associated with those projects, as well as participating in additional multi-investigator grant applications and training grant applications. The Center has done extensive work to publicize neuroscience at Boston University with an official CSN twitter account with over 1440 followers (@buCSNneuro) and a Center Director account with over 2400 followers (@HasselmoMichael).
The Center for Systems Neuroscience brings together researchers in numerous events described in detail in this annual report. These events include a lunchtime series of hybrid and in-person seminars that bring together 60-240 attendees for each seminar. The Center also organized a symposium on October 3-4, 2022 on Engineering the Brain for Discovery and Clinical Applications, that brought together researchers from CSN and the Biological Design Center in the Kilachand building.

The information in this annual report illustrates the successes of the faculty affiliated with the Boston University Center for Systems Neuroscience. We appreciate the support of the Boston University administration, and in particular the support of Vice President and Associate Provost for Research Gloria Waters.

Prof. Michael Hasselmo
Director
BU Center for Systems Neuroscience



"The Center builds on important successes of systems neuroscience at Boston University to foster collaborations and enhance recruitment of new researchers."

FROM THE ASSOCIATE DIRECTORS

AS ASSOCIATE DIRECTOR, I FOCUSED on the development and submission of grant applications targeting research and training in computational neuroscience:

1) A joint DMS/NIGMS proposal to develop a new mathematical theory for the organization of brain rhythms and their interactions (with CSN members Profs. Nancy Kopell and Uri Eden, and collaborators at MGH/Harvard Medical School; Total Funds Requested: $1,199,508).

2) An NIH R01 proposal to characterize the pathological and physiological rhythms associated with human epilepsy (with CSN member Prof. Uri Eden and collaborators at MGH/Harvard Medical School and Columbia University; Total Funds Requested $4,344,717).

3) An NIH T90/R90 training grant (Total Funds Requested: $3,181,801). If successful, this award will support 6 graduate students and 6 undergraduate students pursuing research in computational neuroscience. I served as the lead program director, responsible for proposal development and submission, with co-directors Profs. Mike Hasselmo and Uri Eden. In addition to the three program directors, the proposed training faculty include 18 other CSN members, from multiple departments across the University (Mathematics & Statistics, PBS, BME, Biology, Sargent College, and the School of Medicine).

4) We also resubmitted an NIH UE5 to develop online resources for the rigorous analysis of neural data (with CSN member Prof. Uri Eden, Total Funds Requested: $269,340). We note that funding decisions for all proposals are still pending.

Through these efforts, we have continued to grow computational neuroscience within the CSN and BU. The training grant proposal represents significant efforts from many CSN faculty – and the Associate Provost for Research, Gloria Waters – to strengthen our computational neuroscience training program. I expect that, through our many collaborative efforts within CSN, we will continue to establish BU as a leader in the field.

Prof. Mark Kramer
Associate Director
BU Center for Systems Neuroscience

IN MY ROLE AS ASSOCIATE DIRECTOR, I participated in a range of activities for supporting grant applications and outreach for neuroscience at Boston University. I chaired the successful NeuroBoston meeting that was held in the Kilachand building on Nov. 14, 2022, attracting nearly 150 neuroscientists from several schools across the Northeast. I served as the President of the International and Behavioural Neural Genetics Society, and served on the Executive Committee and Program Committee to organize the 2023 Genes, Brain and Behavior meeting in Galway, Ireland, attracting over 120 attendees.

I continued to participate in ongoing interdisciplinary grants including work with Dr. Kantak on the recently awarded U01DA055299 on the genetic basis of premorbid risk trait and cocaine addiction traits in rats, and am serving as a co-sponsor for post-doctoral fellows and a committee member for multiple graduate students.

As a longstanding faculty member of the DEIJ Committee for the Graduate Program for Neuroscience since 2020, I co-organized a symposium in March 2023 on "Equitable Approaches to Understanding Genes and Environment in Brain Health and Disease," with speakers including Dr. Alicia Martin (Harvard), Dr. Shoumita Gupta (Boston University), Dr. E. Kate Webb (McLean Hospital, Harvard), and Dr. Danielle Dick (Rutgers). The event included a pre-meeting dinner with speakers and students.

I represented the CSN at the recent NIHNIDA Genetics and Epigenetics Cross-Cutting Research Team (GECCRT) meeting at the NIDA headquarters in Bethesda, MD and I will be giving a talk at the upcoming International Behavioral Neuroscience Society (IBNS).

With sadness I announce that I am stepping down from my position as Associate Director of the CSN for the BU Med campus as I will be moving my lab to Northeastern University in the fall of 2023. It has been an honor and a pleasure serving and representing the interests of the CSN on the MED campus since 2021. I wish the Center all the continued success!

Prof. Camron Bryant
Associate Director
BU Center for Systems Neuroscience

HIGHLIGHTS OF FY2023

- Ongoing support and participation in meetings and reviews of ONR MURI grant N00014-19-1-2571 obtained by Center members Profs. Yannis Paschalidis, Michael Hasselmo, Chantal Stern, John Baillieul, and Roberto Tron, providing $7.5 million for five years of research funding. The grant was supplemented with an additional DURIP award. This grant built on previous ONR MURI grants supported by the Center.
- Funding of four Center for Systems Neuroscience Distinguished Fellows: Dr. Cristina Delgado Sallent, Dr. Caitlin Lienkaemper, Dr. Ian More and Dr. Florencia Fernandez-Chiappe.
- Ongoing research for Kilachand Type A/B Funding that led to submission of a white paper on May 15, 2023 for an additional ONR MURI application.
- Active participation in training grant applications, including applications by CSN Associate Director Prof. Mark Kramer, and Neurophotonics Center director Prof. David Boas, as well as support for successful training grant application by GPN director Prof. Shelley Russek.
- Participation in successful search and recruitment of Prof. Lynne Chantranupong in the Dept. Biology and Prof. Matthias Stangl in the Dept. of Biomedical Engineering.
- Maintenance of Center webpage and Twitter accounts with over 1,440 followers for the Center (@buCSNneuro) and over 2,400 followers for the Center Director (@HasselmoMichael) with posting of notices on Twitter, Facebook and LinkedIn to publicize Center events and accomplishments of Center faculty. Further publicity via the role of Center Director Prof. Michael Hasselmo as Editor-in-Chief of the journal *Hippocampus*.
- Series of lunchtime seminars organized by the Center for Systems Neuroscience.
- Successful symposium on October 3-4, 2022 focused on Engineering the Brain for Discovery and Clinical Applications, to promote interactions of CSN and the Biological Design Center (BDC), organized by Prof. Mo Khalil (BDC) and Prof. Benjamin Wolozin and Prof. Steve Ramirez

CENTER FOR SYSTEMS NEUROSCIENCE AT A GLANCE

87
Faculty Members

5
Staff Members

163
Currently Funded R&D Projects

$73.5M
Funding for R&D

4
CSN Distinguished Fellows

295
Peer-reviewed Publications

18
Center Events

MISSION STATEMENT & STRATEGIC PLAN

THE CENTER FOR SYSTEMS NEUROSCIENCE (CSN) at Boston University was established to provide a unifying collaborative and administrative structure designed to further enhance research, foster collaboration, and enhance recruitment of new researchers in multiple Colleges and Departments on both the Charles River Campus and Medical Campus in the field of systems neuroscience.

The Center is interdisciplinary and interdepartmental in nature and University-wide in scope. The mission of the Center is to advance research in Systems Neuroscience at Boston University with the following specific goals:

- **To enhance the profile and reputation of Boston University** for research in Systems Neuroscience, establishing an internationally recognized academic center of excellence that will attract talented young investigators for training in the experimental techniques and mathematical theories of systems neuroscience.

- **To foster collaborative research.** The Center will foster collaborations from different fields of research to make experimental and conceptual breakthroughs in our understanding of the function of brain circuits, including analysis of neural phenomena in experiments at the system level and testing of computational theories of neural function. This will include fostering collaborations between researchers in the College of Arts and Sciences, the College of Engineering, the College of Health and Rehabilitation Sciences: Sargent College, the School of Medicine and others as appropriate. The Center will be synergistic and will work collaboratively with other centers at Boston University including the Neurophotonics Center, the Photonics Center, the Center for Information and Systems Engineering, the Biological Design Center and the Cognitive Neuroimaging Center.

- **To support cutting-edge research.** The primary research goal of the Center is to examine how systems of interacting neurons mediate behavioral function. This includes investigating the brain systems underlying functions such as perception and attention, learning and memory, speech and hearing, decision-making, movement and planning. The Center will support research including the study of population function within individual regions, as well as systems of interacting regions, spanning from recordings of single neurons within individual brain regions to functional imaging of large scale activity within interacting brain regions. Understanding brain systems is also relevant to furthering our understanding of the etiologies of neurological and psychiatric diseases and impairments.

- **To generate and provide access to technical innovations** appropriate for enhancing understanding of neural systems. The recent federal BRAIN initiative has highlighted the need for the generation of novel techniques for studying the brain. These techniques will include techniques for large-scale network recording capabilities, to observe the selective activity of individual neurons within large populations using voltage recording or voltage and calcium imaging. Techniques will also include elucidating the role of populations of neurons using circuit manipulations such as optogenetic interventions that increase or decrease neural activity in identified populations during behavior.

- **To link neural mechanisms to human behavior.** The Center for Systems Neuroscience will foster collaborative research linking human behavior to neural mechanisms by improving access to imaging techniques through a new Cognitive Neuroimaging Center. Work in the Center will enhance understanding of the large-scale macroscopic activity within human brain structures associated with cognitive functions such as memory, spatial navigation, attention and perception, and speech and language, using state-of-the-art functional magnetic resonance imaging techniques.

- **To develop new computational models** that account for current experimental data and generate predictions to guide new experiments. The Center will build upon current strengths at Boston University in the development of theoretical and computational models as well as statistical techniques for data analysis to foster collaborations between experimentalists in departments such as Biology, Psychological & Brain Sciences, and Speech, Language and Hearing Sciences with faculty from Mathematics and Statistics, Biomedical Engineering, Physics and the Data Science Center.

The CSN will promote interdisciplinary research in the field of Systems Neuroscience and play an active role in research training in this area. These activities will include:

1. Bringing together students, researchers and faculty in an open, interactive environment with the goal of developing new collaborations to address specific questions in systems neuroscience. These events may take the form of weekly seminars, colloquia, external speaker series, mini-symposia, or more extensive conferences and workshops.

2. Fostering collaboration among researchers via shared mentoring of graduate students and post-doctoral fellows.

3. Providing seed funding whose aim is to foster collaborations between different faculty members in the Center.

4. Developing and supporting large-scale collaborative projects that bring together researchers across schools and colleges to focus on problems in systems neuroscience with the goal of obtaining external funding.

5. Facilitating mentoring relationships between junior and senior faculty to support research and career development.

6. Outreach and Education. The Center will design and hold educational events focusing on the brain that are open to the larger community, including students and alumni. ■

Many researchers at the Center for Systems Neuroscience collect neuroimaging data using this MRI scanner, located on the first floor of the Rajen Kilachand Center for Integrated Life Sciences & Engineering.

Principal Investigator Mark Howe guides PhD student Zicheng Zhang as she microfabricates optical fiber arrays under a stereoscope, arrays which will allow researchers to record optical measurements of neural activity in a rodent brain to better understand connections between neural dynamics and behavior.

RESEARCH SPOTLIGHTS

SPOTLIGHT: ROBERT REINHART

Can Electrical Stimulation Improve Memory in Old Age?

ROBERT REINHART SUSPECTED THAT his latest research, published in a leading journal in August, would receive some attention. Sure enough, headlines in USA Today, Nature, The Boston Globe, among others, touted his discovery that electrical stimulation to the brain can improve memory. But it was the messages that filled Reinart's email inbox and voicemail that really blew him away.

"A lot of them are these really personal, tragic, heartfelt stories. That just makes your heart melt—and you want to get back to everyone and you want to help them," he says. "We had to have an emergency lab meeting the other day, just to prepare and plan to respond to so many people."

Reinhart, an assistant professor of psychological and brain sciences and the director of the Cognitive & Clinical Neuroscience Laboratory, studies human cognition with the goal of developing drug-free therapeutics for people suffering from brain disorders. He was recently honored for his work, receiving the 2022 Science and PINS Prize for Neuromodulation.

For his latest research, published in Nature Neuroscience on August 22, 2022, Reinhart and the members of his lab focused on adults aged 65 and older. Utilizing a soft cap covered in electrodes, they administered both low- and high-frequency electrical stimulation for 20 minutes on 4 consecutive days, while reading subjects a list of 20 words. They then tested those subjects' immediate recall of the words as well as their memory of them one month later. The results showed improvements in both short- and long-term memory.

> "This is what our work speaks to: drug-free, novel therapeutics to help people with a variety of different disease states and clinical symptoms. I think there's a real appetite for alternative drug-free approaches without the side effects."

What's been the response to your paper so far?

It's been a strong positive response from scientists around the country, around the world, and from the public, who've flooded my inbox. I love interacting with the public and I feel like it's our responsibility as scientists to communicate what the public has bankrolled—the cost and risk is socialized for much of research. It's a wonderful way to disseminate research.

How do you see your research helping people? What are the clinical implications?

There are lots of problems with drugs and with current procedures—surgical procedures, behavioral and cognitive behavioral therapy—with people not responding to treatments or having side effects and persistence of symptoms. This is what our work speaks to: drug-free, novel therapeutics to help people with a wide variety of different disease states and clinical symptoms. I think there's a real appetite for alternative drug-free approaches without the side effects.

How far out are we from having these kinds of tools appear in a doctor's office? There's precedent for these types of tools, but we need bigger studies for them to be replicated and to ensure that it's efficacious and safe.

Does the stimulation that you're introducing to the brain mimic natural brain activity?

The brain communicates via nerve impulses. There's rhythmic activity in the brain. We're targeting those rhythms

and causally augmenting them with the stimulation to put them into a different mode of functioning. So, for example, in schizophrenia and Alzheimer's disease, there's an asynchronous, rhythmic pattern. And the general idea is that we're trying to resynchronize these patterns of activity that have been implicated in memory processing. Time is a crucial parameter in how the brain communicates with itself, and we're going in and trying to have an effect on that dimension of brain activity.

Utilizing a soft cap covered in electrodes, Robert Reinhart's research team administered both low- and high-frequency electrical stimulation to study the positive effects of such stimulation on memory tasks. Photo from the BU Arts & Science blog.

How closely might eventual real-world use of this technology mirror your research?

We're figuring out what parameters are the ones that we need to hone in on to maximize the benefit from the stimulation—like how intense is the stimulation within acceptable safety limits, the duration of each stimulation dose, interval spacing, optimal spacing between the sessions. We have a number of grants that we're proposing now.

One thing we determined was that the frequency parameter is important. We're manipulating the timing of brain activities and how they communicate. There's processes that rise and fall in the brain at blindingly fast speed, and we can directly augment those rhythms that coordinate information flow and the timing of information to exploit the natural plasticity of the brain. We've known for a long time that certain pieces of brain tissue have specific functions—but the timing and the frequency of the brain activities in those regions can also be discovered and then exploited for translation. That was an important discovery with this latest work.

> "Time is a crucial parameter in how the brain communicates with itself, and we're going in and trying to have an effect on that dimension of brain activity."

Who might benefit most from your research?

Our research is geared toward people who are not responding well to drugs or first line treatments and standard care—they need something else.

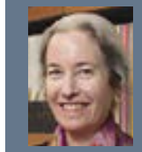
Are you beginning to understand how this might impact people with different conditions differently?

That's a question for the future. We're very interested in people who don't respond to treatment and their individual differences. But condition by condition, we don't have that much experience yet. I should say, one of the latest views in psychiatry is a dimensional approach, RDoc [Research Domain Criteria], where you view symptoms of various brain disorders along a spectrum of wellness. So, there might not be as clear of a line between what is considered "typical" versus "pathological"—there's actually dimensions in which they overlap. And we target certain components of executive functioning which are likely to have implications across a wide variety of cognitive brain disorders and at different points along the wellness spectrum

* * *

This article and interview, authored and edited by Marc Chalufour, originally appeared in the ***BU Arts & Sciences blog*** on October 13, 2022.

To read the full article and interview visit: tinyurl.com/ynpth4cs ■



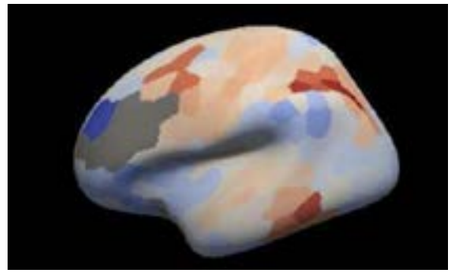
SPOTLIGHT: CHANTAL STERN

On the Frontiers of Cognitive Neuroimaging Research

PROFESSOR CHANTAL STERN'S RESEARCH focuses on mapping the human brain using functional magnetic resonance imaging (fMRI) with the primary goal of studying how the human brain encodes, stores, and subsequently recognizes visual, spatial, and verbal information.

What are the research goals of your lab?

My research is focused on using neuroimaging methods to study the human brain and human cognition. My early work focused on memory, especially long-term and episodic memory. Lately much of my work focuses on navigation, which has a relationship to memory. What I've always wanted to do here at BU is create something where investigators collaborate in a way that helps us understand cognition from the cellular level all the way up to human thought.



This visual representation, which was generated using neuroimaging data from an abstract reasoning task (see Morin et al., 2023 Cerebral Cortex), helps researchers in the Cognitive Neuroimaging Laboratory understand how we can utilize resting-state data to predict individual-subject activity while they perform cognitive tasks.

Can you offer an example of a research question that threads those levels together?

As an example of how we link animal studies with human studies, if you were to ask me something about a long-term memory or episodic memory—that is, a memory about myself—I can tell you about it. I can tell you a story about what I did last week, or a month ago, etc. Now, you can't ask an animal to tell you a story involving personal memory, but the question remains: Does that kind of memory exist in an animal? That's the sort of question that Professor Howard Eichenbaum, who recruited me to Boston University, was very interested in. How could we determine whether a rat's memory system functioned in ways similar to a human. A lot animal research is conducted within the framework of navigation, which is how I started looking at navigation in humans.

Can you describe a recent study?

We're currently running a set of navigation studies using a virtual foraging task, which is very similar to animal foraging tasks. Another study we just published examines the interactions between memory and attentional systems. A graduate student in my lab, Kylie Isenburg, re-analyzed an existing set of neuroimaging data to study network-level activity in the brain when people were doing a long-term memory guided attention task compared to a task driven purely by attention to an external stimulus. The brain processes information differently depending on whether it is responding to internal thoughts, like a memory, versus an external stimulus. An external stimulus that motivates you to get up from your chair could be, for instance, a fire alarm, whereas an internal stimulus might be you simply deciding, okay, I'm going to get myself a sandwich now, and remembering the kind of sandwich I enjoyed yesterday. Our study results showed that different brain networks shift their connectivity based on whether attention was driven by a memory or an external stimulus, and how this large-scale network connectivity is important for the integration of external information with internal memories.

By what path did you come to specialize in cognitive neuroimaging research?

[At Harvard and at the Martinos Center at MGH] I was the first neuroscientist on the team that developed fMRI. At the time I joined, the team's feeling was, "We think this imaging technique could have important applications for studying the brain, but we really don't know, and we're not neuroscientists." And yes, it turns out that fMRI has become a hugely important technique for studying the human brain, in part because it is truly noninvasive. Consider positron emission tomography (PET) imaging, for instance, where you have to either be injected or inhale a radioisotope to be scanned. An fMRI scan, on the other hand, detects changes in blood-oxygen levels in the brain. For instance, as you listen to me talking right now, there is a change in the level of blood oxygenation in the parts of your brain involved in language, comprehension, attention, and memory. The fMRI scan can detect the changes in those areas.

* * *

This excerpted interview, edited by Jim Cooney, originally appeared in the ***Rajen Kilachand Center for Integrated Life Sciences & Engineering blog*** on June 26, 2023.

To read the full interview visit: tinyurl.com/mr3h7cnu ■

SPOTLIGHT: EMILY STEPHEN

How Does a Statistics Professor Map the Human Brain?

SINCE HER UNDERGRADUATE STUDIES Statistics Professor Emily Stephen has been fascinated by the ways that statistics can unfurl the secrets of the brain. Her work with speech perception began at BU as a PhD student studying with Professor of Speech, Language, and Hearing Sciences Frank Guenther at Sargent College; Now, she collaborates with neuroscience colleagues at BU to decode and understand speech across spatial scales.

"Academically, I consider myself a computational neuroscientist," said Stephen. "I study the brain and I use data science and statistical methods to do that. Statistics is what allows you to kind of skim over the details that you don't know, and use it for a really valuable purpose."

Though well adept at analyzing and employing the data in statistical models, Stephen isn't a neuroscientist by practice, relying on collaboration with neuroscientists at BU to supply the data she needs to create statistical models of the brain's underlying dynamics.

"I'm a statistician," Stephen said. "I don't have a lab, but everything I do requires data. So everything I do requires making friends with someone who collects data and helping them. I've been able to do that with people at BU."

> "I'm a statistician. I don't have a lab, but everything I do requires data. So everything I do requires making friends with someone who collects data and helping them. I've been able to do that with people at BU."

Interdepartmental collaborations at BU—like Stephen's relationship with statistics and neuroscience— allow faculty to innovate and elevate each other, achieving greater advancements in their fields than they could alone.

"Interdisciplinary work is challenging and I'm still learning how to do it," said Stephen. "It's easy to get going on things at BU, which I was a little bit worried about. It's not a concern amongst departments here."

Stephen primarily studies how the brain processes auditory speech and how the brain encodes the different parts of speech when we hear it.

Understanding speech is more work for our brain than one might think. "There's different aspects of speech that need to be split apart and then put back together in order to understand a sentence if you're listening to it," said Stephen.

According to Stephen, one part of your brain may be responsible for encoding the "puh" sound the letter 'P' makes in the word 'pumpernickel', and another part of the brain may be responsible for more temporal aspects of encoding speech, like the time it takes the brain to register the many syllables of 'pumpernickel' versus 'pie'.

These are nuanced phenomena, and answering them from a purely neuroscientific perspective leaves you with a blurry image. Stephen sees statistics as a way to get that image to a higher resolution without employing invasive medical procedures.

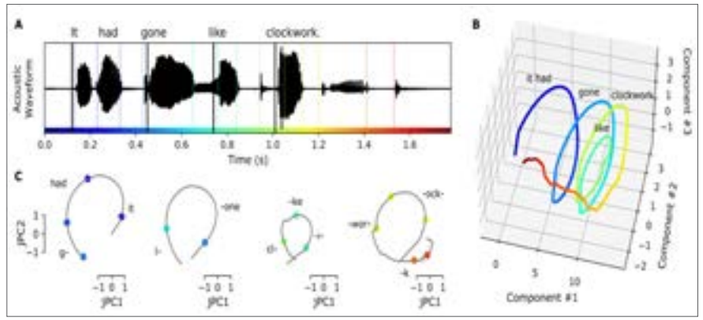
Most neuroscience recordings are non-invasive. Electroencephalogram (EEG) recordings, which detects the electrical activity in your brain, are taken by placing electrodes on the scalp. While these recordings produce reliable markers of brain states like epilepsy or seizures, they leave gaps in the understanding of what the brain is actually doing to produce these observable markers.

"One of the problems is that these non-invasive recordings, even though they produce very reliable effects of the condition, we don't always know where they come from in terms of the underlying cellular dynamics, what the actual neurons are doing in the brain that causes you to observe these kind of reliable effects in the higher spatial scale outside the brain," says Stephen.

Stephen uses statistics to map and model these underlying cellular dynamics of auditory speech perception based on the data neuroscientists can get from these noninvasive brain readings. "It's really difficult to study speech because it's in humans," said Stephen. "We can't cut open their brains to record them whenever we want."

Currently, powerful speech research comes from epilepsy patients who have electrodes implanted to record directly from the brain, limiting the crop of volunteers; Finding ways to get the same data non-invasively would allow healthy people to volunteer for studies without having to undergo surgery.

There are hundreds of thousands of neurons that contribute to the effects we can see from EEG, but most of the current theoretical models for neurons are being done with small sets of hundreds to a thousand neurons at maximum.



Professor Emily Stephen builds statistical models to analyze neural recordings across spatial scales. In the figures above, brain activity (recorded using electrocorticography) is rendered in visual models to analyze auditory perception of the spoken phrase, 'It had gone like clockwork,' over time. Image courtesy of Stephen Lab.

"It's important to be able to describe interactions between small subsets of neurons, but you're always going to miss higher level processing if you don't ever look at and if you don't have a way of describing the higher level dynamics," says Stephen.

Stephen believes that to understand the brain fully, we have to be able to visualize how the individual neuron interacts with and affects the whole brain.

Think about the brain like a community:

"If you want to talk about important functions or behaviors of a community, you can't look at one person. You have to look at everyone," Stephen said, "It's not that the community doesn't impact the one person or that the one person impacts the community, it's just that even the concept of a community requires more people."

So, if we know that different aspects of speech are registered by different parts of the brain, we ideally have to be able to look at and analyze the activity of all the neurons at once to get a full appreciation for how speech is encoded.

Stephen's ultimate goal is to simultaneously model small and higher-level brain dynamics to get a complete picture of how neurons are interacting spatially by building intermediate models, noting, "There are important things in the brain that wouldn't even make sense to talk about on the scale of a thousand neurons, but that become extremely important when you're looking at a million neurons."

> "There are important things in the brain that wouldn't even make sense to talk about on the scale of a thousand neurons, but that become extremely important when you're looking at a million neurons."

Stephen's statistical models will facilitate a more precise and detailed image of the emergent effects associated with small scale brain activity, enhancing the information extracted from the reliable effects of noninvasive brain recordings like EEG.

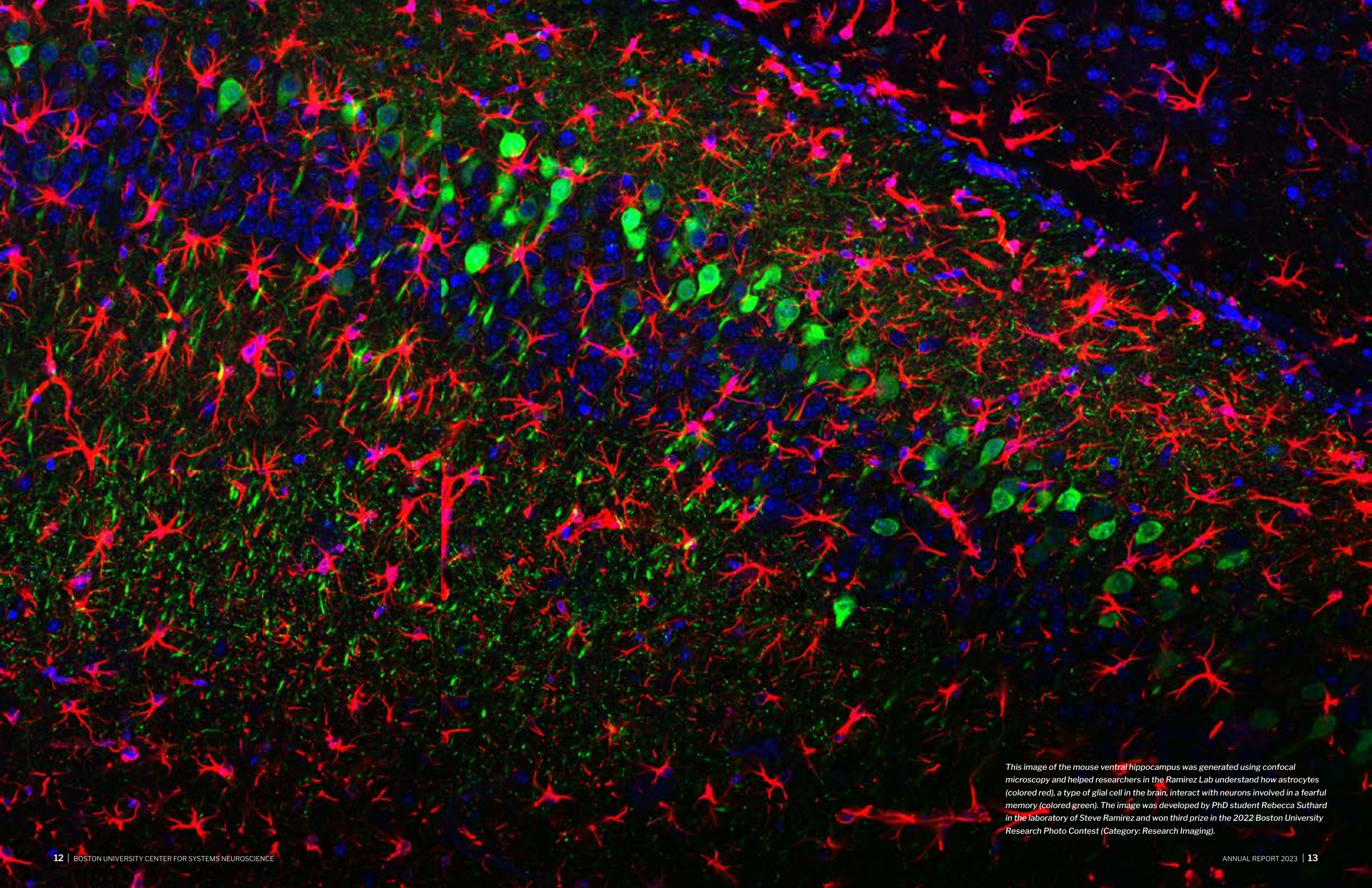
Through her interdisciplinary approach to research at BU, Stephen is actively modeling the effectiveness of looking to the greater community to understand the complicated nature of the brain.

"This is statistics applied to neuroscience, but it's still really statistics. I'm not collecting any necessarily new data, but I'm going to be able to develop models that will be really valuable for neuroscience."

* * *

This article, authored by Abby Hagen, originally appeared in the BU Arts & Sciences blog on April 13, 2023.

To read the full article visit: tinyurl.com/mhzwpts9 ■



This image of the mouse ventral hippocampus was generated using confocal microscopy and helped researchers in the Ramirez Lab understand how astrocytes (colored red), a type of glial cell in the brain, interact with neurons involved in a fearful memory (colored green). The image was developed by PhD student Rebecca Suthard in the laboratory of Steve Ramirez and won third prize in the 2022 Boston University Research Photo Contest (Category: Research Imaging).

LEADERSHIP & STAFF

Michael Hasselmo
Director

610 Commonwealth Ave., 703
617-353-1397
hasselmo@bu.edu

Camron Bryant
Associate Director

72 East Concord St, 606C
617-638-4249
camron@bu.edu

Mark Kramer
Associate Director

111 Cummington Mall, 224
617-353-4591
mak@math.bu.edu

Jun Shen
Center Manager

610 Commonwealth Ave., 702A
617-358-2769
junshen@bu.edu

Jessie Priestley
Center Administrator

610 Commonwealth Ave., 702B
617-358-3297
prstly@bu.edu

THE CENTER FOR SYSTEMS NEUROSCIENCE has a small staff that includes partial support for the Center Director, Professor Michael Hasselmo, and the Associate Directors, Professors Mark Kramer and Camron Bryant, as well as part-time funding for the Center Manager, Dr. Jun Shen, and full-time funding for the Center Administrator, Jessie Priestley.

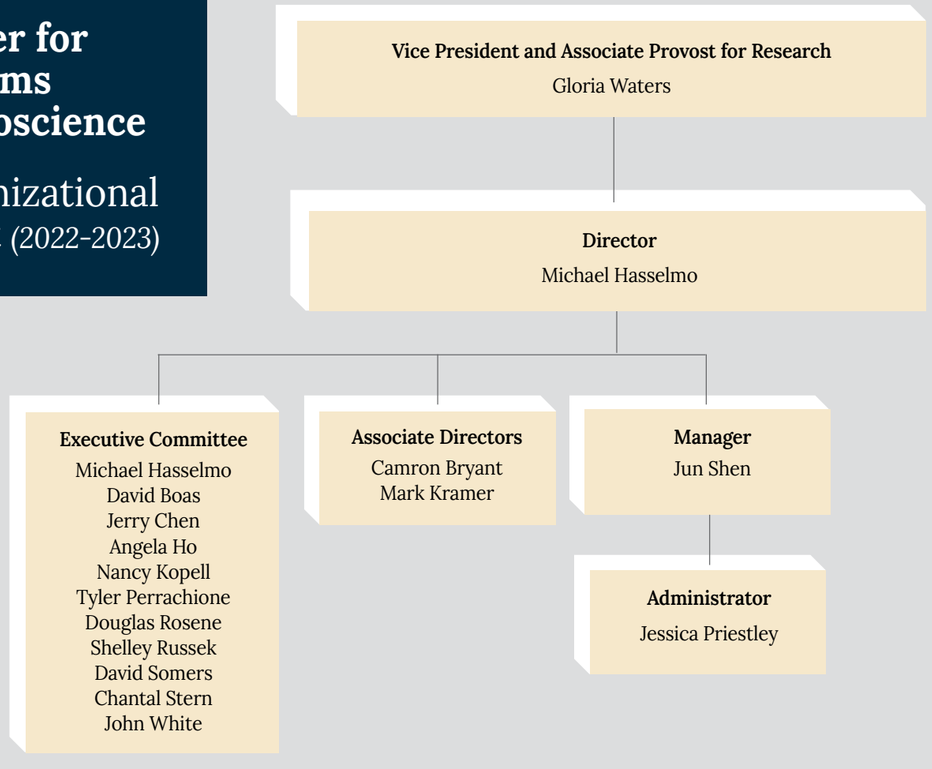
The director and associate directors oversee preparation of grant applications and presentations for grant reviews, participate in search committee meetings and seminars, and oversee pilot funds and Center seminars.

Together, the director and two administrators oversee the Center budget and annual reports, the organization of grant review materials, the organization of Center seminars and symposia, and numerous other administrative tasks.

A research subject receives an electroencephalogram (EEG) as part of a study conducted under principal investigator Laura Lewis, whose lab integrates neuroscience and engineering to develop advanced methods for multimodal imaging.

Center for Systems Neuroscience

Organizational Chart (2022-2023)



FACULTY

Jelle Atema
Professor, Biology

5 Cummington Mall, BRB 307
617-358-4392
atema@bu.edu

Thomas Bifano
Professor, Mechanical Engineering

8 St. Mary's St., PHO 712
617-353-8908
tgb@bu.edu

Jerry Chen
Associate Professor, Biology

24 Cummington Mall
617-353-2432
jerchen@bu.edu

Ian Davison
Associate Professor, Biology

5 Cummington Mall, 406
617-358-6902
idavison@bu.edu

John Baillieul,
Professor, Mechanical Engineering

110 Cummington Mall, ENG 323
617-353-9848
Johnb@bu.edu

David Boas
Professor, Biomedical Engineering

610 Commonwealth Ave., 804
617-358-1709
dboas@bu.edu

H. Steven Colburn
Professor,
Biomedical Engineering

44 Cummington Mall, ERB 414A
617-353-4342
colburn@bu.edu

Rachel Denison
Assistant Professor, Psychological & Brain Sciences

677 Beacon St.
617-353-4893
rdenison@bu.edu

Helen Barbas
Professor, Health Sciences

635 Commonwealth Ave.
617-353-5036
barbas@bu.edu

Camron Bryant
Associate Professor, Pharm. & Experimental Therapeutics

72 East Concord St., L606C
617-358-9581
camron@bu.edu

Alice Cronin-Golomb
Professor, Psychological & Brain Sciences

900 Commonwealth Ave., 2nd Fl
617-353-3911
alicecg@bu.edu

Brian DePasquale
Assistant Professor, Biomedical Engineering

44 Cummington Mall, ERB 413
617-353-2816
bddepasq@bu.edu

Margrit Betke
Professor, Computer Science

111 Cummington Mall
617-353-8919
betke@bu.edu

Chandramouli Chandrasekaran
Assistant Professor, Psychological & Brain Sciences

700 Albany St., W702; CRC: 677
617-358-8359
cchandr1@bu.edu

Alberto Cruz-Martin
Assistant Professor, Biology

24 Cummington Mall
617-358-3291
acmartin@bu.edu

Anna Devor
Professor, Biomedical Engineering

610 Commonwealth Ave., 902
adevor@bu.edu

Michael Economo
Assistant Professor, Biomedical Engineering

24 Cummington Mall, 201
mne@bu.edu

Jeffrey Gavornik
Assistant Professor, Biology

24 Cummington Mall
617-358-0444
gavornik@bu.edu

Stephen Grossberg
Professor,
Mathematics and Psychology

677 Beacon St.
617-353-7858
steve@bu.edu

Michael E. Hasselmo
Director, CSN; Professor, Psychological and Brain Sciences

610 Commonwealth Ave., 703
617-353-1397
hasselmo@bu.edu

Uri Eden
Professor, Mathematics & Statistics

111 Cummington Street, 406
617-353-9553
tzvi@bu.edu

Oded Ghitza
Professor, Biomedical Engineering

44 Cummington Mall
617-358-1948
oghitza@bu.edu

Frank Guenther
Professor, Speech, Language, & Hearing Sciences

635 Commonwealth Ave.
617-353-7531
guenther@bu.edu

Angela Ho
Associate Professor, Biology

24 Cummington Mall, LSEB 503
617-353-2093
aho1@bu.edu

David H. Farb
Professor, Pharmacology & Experimental Therapeutics

72 East Concord St.
617-638-4300
dfarb@bu.edu

Simone V. Gill
Associate Professor, Occupational Therapy

677 Beacon St.
617-353-7513
simvgill@bu.edu

Xue Han
Professor, Biomedical Engineering

610 Commonwealth Ave., 805B
617-358-6189
xuehan@bu.edu

Marc Howard
Professor, Psychological & Brain Sciences

610 Commonwealth Ave., 705A
marc777@bu.edu

Christopher V. Gabel
Associate Professor, Physiology & Biophysics

72 East Concord St.
617-638-4390
cvgabel@bu.edu

David Greer
Professor, Neurology

725 Albany St., Suite 7B
617-353-7513
dgreer@bu.edu

David A. Harris
Professor, Biochemistry

72 East Concord St.,
Silvio Conte Building
617-638-4346
daharris@bu.edu

Mark Howe
Assistant Professor, Psychological & Brain Sciences

610 Commonwealth Ave., 905A
617-353-0425
mwhowe@bu.edu

Plamen Ivanov
Research Professor, Physics

590 Commonwealth Ave., SCI 210
617-353-4733
plamen@buphy.bu.edu

Ronald J. Killiany*
Professor, Anatomy & Neurobiology

700 Albany St., 701
617-358-8276
killiany@bu.edu

Laura Lewis
Assistant Professor, Biomedical Engineering

610 Commonwealth Avenue, 805A
617-353-0879
ldlewis@bu.edu

Heng-Ye Man
Professor, Biology

24 Cummington Mall, LSEB 512
617-358-4283
hman@bu.edu

Robert Joseph
Associate Professor, Anatomy & Neurobiology

650 Albany St., L-816
617-358-5811
rmjoseph@bu.edu

Swathi Kiran
Professor, Speech, Language, & Hearing Sciences

635 Commonwealth Ave., 326
617-358-5478
kirans@bu.edu

Jen-Wei Lin
Associate Professor, Biology

5 Cummington Mall, 101
617-353-3443
jenwelin@bu.edu

Joseph McGuire
Associate Professor, Psychological & Brain Sciences

677 Beacon St, 212
617-353-7670
jtmcg@bu.edu

Kathleen M. Kantak
Professor, Psychological & Brain Sciences

2 Cummington Mall, 205
617-353-9201
kkantak@bu.edu

Nancy Kopell
Professor, Mathematics & Statistics

111 Cummington Mall, 288
617-353-5210
nk@bu.edu

Sam Ling
Associate Professor, Psychological & Brain Sciences

677 Beacon St., 315
617-353-9485
samling@bu.edu

Ann McKee
Professor, Neurology & Pathology

150 South Huntington Ave.
617-358-5991
amckee@bu.edu

Melissa Kibbe
Associate Professor, Psychological & Brain Sciences

64 Cummington Mall, 109
617-358-1587
kibbe@bu.edu

Mark Kramer
Professor, Mathematics & Statistics

111 Cummington Mall, MCS 224
617-353-4591
mak@math.bu.edu

Jennifer I. Luebke
Professor, Anatomy & Neurobiology

650 Albany St., Lab X-317
617-358-4200
jluebke@bu.edu

Maria Medalla
Associate Professor, Anatomy & Neurobiology

72 East Concord St., R-903
617-358-1893
mmedella@bu.edu

We at CSN were saddened this year to lose our dear colleague, Professor Ron Killiany, who passed away March 3, 2023.

Pankaj Mehta
Professor, Physics

590 Commonwealth Ave., SCI 323
617-358-6303
pankajm@bu.edu

Mark Moss
Professor, Anatomy & Neurobiology

72 East Concord St., L-1004
617-638-4200
markmoss@bu.edu

Tyler Perrachione
Associate Professor, Speech, Language & Hearing Sciences

610 Commonwealth Ave., 905B
617-358-7410
tkp@bu.edu

Douglas Rosene
Professor, Anatomy & Neurobiology

72 East Concord St., W-701
617-638-4061
drosene@bu.edu

Jerome Mertz
Professor, Biomedical Engineering

24 Cummington Mall, LSEB 248
347-358-0746
jmertz@bu.edu

Tim O'Shea
Assistant Professor, Biomedical Engineering

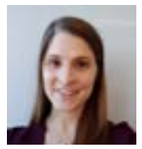
44 Cummington Mall, ERB 521
617-353-2805
toshea@bu.edu

Siddharth Ramachandran
Professor, Electrical & Computer Engineering

8 St. Mary's St., PHO 521
617-353-9881
sidr@bu.edu

Jean-Pierre Roussarie
Assistant Professor, Anatomy & Neurobiology

72 East Concord St., L817
617-358-1896
jproussa@bu.edu



Heidi Meyer
Assistant Professor, Psychological & Brain Sciences

610 Commonwealth Ave., 705B
617-353-4336
hcmeyer@bu.edu

Gabriel Ocker
Assistant Professor, Mathematics & Statistics

111 Cummington Mall, MCS 233F
617-353-9553
gkocker@bu.edu

Steve Ramirez
Assistant Professor, Psychological & Brain Sciences

610 Commonwealth Ave., 905C
617-529-7425
dvsteve@bu.edu

Shelley Russek
Professor, Pharmacology & Experimental Therapeutics

72 East Concord St., L-611
617-358-9566
srussek@bu.edu

Tara Moore
Associate Professor, Anatomy & Neurobiology

700 Albany St., W701
617-358-8278
tlmoore@bu.edu

Yannis Paschalidis
Professor, Electrical & Computer Engr., Computing & Data Sciences

8 Saint Mary's St.
617-353-0434
yannisp@bu.edu

Robert M.G. Reinhart
Associate Professor, Psychological & Brain Sciences

677 Beacon St., 312
617-353-9481
rmgr@bu.edu

Valentina Sabino
Professor, Pharmacology & Experimental Therapeutics

72 East Concord St., R-612
617-358-1311
vsabino@bu.edu

Karin Schon
Assistant Professor, Anatomy & Neurobiology

72 East Concord St., L-1004
617-358-2118
kschon@bu.edu

David Somers
Professor, Psychological & Brain Sciences

64 Cummington Mall, 149C
617-358-1372
somers@bu.edu

Helen Tager-Flusberg
Professor, Psychological & Brain Sciences

64 Cummington Mall, Room 170D
617-358-5919
htagerf@bu.edu

Roberto Tron
Assistant Professor, Mechanical Engineering

110 Cummington Mall, ENG 301
617-353-3951
tron@bu.edu

Benjamin Scott
Assistant Professor, Psychological and Brain Sciences

610 Commonwealth Ave., 705C
617-353-7682
bbs@bu.edu

Emily Stephen
Assistant Professor, Mathematics & Statistics

111 Cummington St., 233B
617-353-8921
estephen@bu.edu

Amanda Tarullo
Associate Professor, Psychological & Brain Sciences

64 Cummington Mall
617-353-3688
atarullo@bu.edu

Lucia Vaina
Professor, Biomedical Engineering

44 Cummington Mall, ERB 315
617-353-2455
vaina@bu.edu

Kamal Sen
Associate Professor, Biomedical Engineering

44 Cummington Mall, ERB 414B
617-353-5919
kamalsen@bu.edu

Chantal Stern
Professor and Chair, Psychological & Brain Sciences

610 Commonwealth Ave., 903
617-353-1396
chantal@bu.edu

Tuan Leng Tay
Assistant Professor, Biology; Anatomy & Neurobiology

24 Cummington Mall, LSE 205
617-358-2146
tltay@bu.edu

Michael Wallace
Assistant Professor, Anatomy & Neurobiology

72 East Concord St., L-814C
617-358-9590
mlwall12@bu.edu

Jean-Jacques Soghomonian
Associate Professor, Anatomy & Neurobiology

72 E Concord St., R-1014
617-638-4511
jjsogho@bu.edu

Robert Stern
Professor, Neurology

72 E Concord St
617-358-5375
bobstern@bu.edu

Julia TCW
Assistant Professor, Pharmacology & Exp. Therapeutics

700 Albany St. W508C
617-358-1034
juliatcw@bu.edu

John White
Professor, Biomedical Engineering

610 Commonwealth Ave., 805C
617-353-1396
jwhite@bu.edu

Benjamin Wolozin
Professor, Pharmacology & Neurology

72 East Concord St., R614
617-358-1995
bwolozin@bu.edu

Meg Younger
Assistant Professor, Biology

24 Cummington Mall, 402
617-358-1144
myounger@bu.edu

Lan Zhou
Professor, Neurology

725 Albany St., 7th Floor
617-638-8456
lanzhou@bu.edu

Jennifer Zuk
Assistant Professor, Speech, Language & Hearing Sciences

635 Commonwealth Ave.
617-353-0368
jzuk@bu.edu

Arash Yazdanbakhsh
Research Assistant Professor, Psychological & Brain Sciences

64 Cummington Mall
617-358-4385
yazden@bu.edu

Ella Zeldich
Assistant Professor, Anatomy & Neurobiology

72 E. Concord St Silvio Conte (K)
617-358-2200
ezeldich@bu.edu

Basilis Zikopoulos
Associate Professor, Health Sciences

635 Commonwealth Ave., 443A
617-353-8375
zikopoul@bu.edu

FACULTY COMMITTEES

The Center charter states that the Director of CSN shall be advised by an Executive Committee and a Scientific Advisory Board.

Membership in the ***Executive Committee*** is determined jointly by the Vice President for Research and the CSN Director. The Committee advises the Director on strategic initiatives, scientific programs and operational activities and cognate Center affiliations. The Executive Committee has been formed and updated with the following members (including the Director and Associate Directors):

Professor Michael Hasselmo
Professor David Boas
Professor Camron Bryant
Professor Jerry Chen
Professor Angela Ho
Professor Nancy Kopell
Professor Mark Kramer
Professor Tyler Perrachione
Professor Doug Rosene
Professor Shelley Russek
Professor David Somers
Professor Chantal Stern
Professor John White

Members of the ***Scientific Advisory Board*** were chosen by the CSN Director and VP for Research in consultation with the Executive Committee. The Board advises the Director as needed on strategic planning and research programs and on initiatives to enhance national visibility of CSN and support multi-institutional initiatives. The Board is comprised of distinguished scientists and leaders of university or government organizations in systems neuroscience. Those who accepted board positions include:

Professor David Badre *(Brown University)*
Professor Bradford Dickerson *(Harvard University)*
Professor Ila Fiete *(MIT)*
Professor Earl Miller *(MIT)*

DISTINGUISHED FELLOWS

THE CENTER HAS A BUDGET for supporting potential pilot projects and innovative new techniques for research. On the recommendation of the Center executive committee, in FY23 these funds were used to support post-doctoral fellows with expertise in techniques that are central to development of new research areas and associated grant applications. These researchers were designated the Center for Systems Neuroscience Distinguished Fellows.

FY23 FELLOWS

Dr. Alexander Ian More
(with Profs. Jenny Luebke, Chand Chandrasekaran, and Maya Medalla)

Using cutting-edge methods to study the role of parvalbumin-positive interneurons (PV) in the macaque dorsolateral prefrontal cortex (DLPFC)

Dr. Florencia Fernandez-Chiappe
(with Prof. Meg Younger)

Using whole-cell patch clamp electrophysiology to study mosquito olfactory circuits

Dr. Cristina Delgado Sallent
(with Profs. Steve Ramirez and Benjamin Scott)

Characterizing brain regions and cell populations essential to ketamine's therapeutic effects

Dr. Caitlin Lienkaemper
(with Prof. Gabriel Ocker)

Building a principled, biologically motivated random model for neural activity

PREVIOUS FELLOWS

Dr. Maria Victoria Moya
(with Prof. Michael Economo)

Developed new optical technology for measuring connections between brain cells; obtained an NIH NRSA F32 post-doctoral fellowship

Dr. Gary Kane
(with Prof. Benjamin Scott)

Used wide field imaging to analyze neural mechanisms underlying the optimization of decision-making

Dr. Brenna Fearey
(with Prof. Mark Howe)

Studied the rules of computation at single neurons across dendritic arbors in the direct and indirect pathways of striatum

Dr. Leah Bakst
(with Prof. Joseph McGuire)

Awarded both an NSF SPRF fellowship (SMA-1809071; 7/1/18-6/30/19) and an NIH F32 fellowship (F32-EY029134)

Dr. Tashauna Blankenship
(with Prof. Melissa Kibbe and Prof. Chantal Stern)

Awarded an NIH NRSA post-doctoral fellowship

Dr. Eric Lowet
(with Prof. Jerry Chen and Prof. Xue Han)

Co-authored a Neuron paper with Prof. Jerry Chen; published voltage-imaging research with Prof. Xue Han

Dr. Joshua Foster
(with Prof. Sam Ling)

Co-authored paper in Journal of Neuroscience ■

This fiber array, microfabricated in the lab of Mark Howe, allows researchers to record optical measurements of neural activity in the brain of a mouse in order to study the neural circuit mechanisms responsible for motivating, selecting, and learning optimal action strategies.

ACHIEVEMENTS & AWARDS

CENTER FACULTY EARNED VARIOUS AWARDS and achievements over the course of the past fiscal year. These include:

John Baillieul, Professor, Mechanical Engineering
- Senior Editor, Proceedings of the IEEE
- Senior Editor, IEEE ACCESS

Jerry Chen, Assistant Professor, Biology
- Associate Editor, Science Advances

Alice Cronin-Golomb, Professor, Psychological & Brain Sciences
- Bernice Grafstein Award for Outstanding Accomplishments in Mentoring, Society for Neuroscience

Michael Economo, Assistant Professor, Biomedical Engineering
- NSF Career Award

Melissa Kibbe, Associate Professor, Psychological & Brain Sciences
- Associate Editor, Developmental Psychology

Heidi Meyer, Assistant Professor, Psychological & Brain Sciences
- Cecile Kaplan Dalton Career Development Professor, Boston University

Yannis Paschalidis, Professor, Electrical & Computer Engineering, Computing & Data Sciences
- Distinguished Service Award, College of Engineering, Boston University
- International Federation of Automatic Control Fellow
- Vice President for Publication Activities, IEEE Control Systems Society
- American Automatic Control Council, Alternate Director, Board of Directors
- General Co-Chair, 64th IEEE Conference on Decision and Control
- General Chair, IEEE Infocom 2023 Workshop, 14th International Workshop on Wireless Sensor, Robot and UAV Network

Steve Ramirez, Assistant Professor, Psychological & Brain Sciences
- Chan-Zuckerberg Science Diversity Leadership Award
- Matthew Pecot Fellowship from the McKnight Foundation
- Pew Foundation Biomedical Scholars
- Gordon Optogenetics Chair
- HHMI Gilliam Fellowship

Robert M.G. Reinhart, Associate Professor, Psychological & Brain Sciences
- Promotion to Associate Professor of Psychological & Brain Sciences, Boston University
- Grand Prize Winner, Science & PINS Prize for Neuromodulation, American Association

Shelley Russek, Professor, Pharmacology & Experimental Therapeutics
- NIH T32 training grant

Benjamin Scott, Assistant Professor, Psychological & Brain Sciences
- Graduate student Rifqi Affan was awarded a NIH DSPAN fellowship
- Scialog Fellow for the Molecular Biology of Cognition

Chantal Stern, Professor, Psychological & Brain Sciences
- Fellow of the UC Irvine Center for the Neurobiology of Learning and Memory
- Selected as Chair of the Department of Psychological & Brain Sciences, Boston University

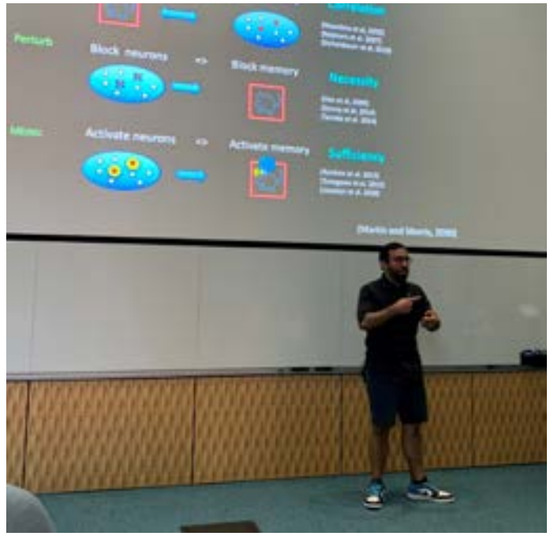
Tuan Leng Tay, Assistant Professor, Biology; Anatomy & Neurobiology
- Young Investigator Grant, Brain & Behavior Research Foundation
- Spivack Neuroscience Pilot Award
- Patricia McLellan Leavitt Research Fund Award
- Neurobiology host & Medical Campus Coordinator, Emerging Scholars in Integrative Biology 2023 Program, Department of Biology, Boston University

Meg Younger, Assistant Professor, Biology
- Searle Scholars Award
- Klingenstein-Simons Fellowship Award in Neuroscience
- Smith Family Awards Program for Excellence in Biomedical Research ■

The Center for Systems Neuroscience occupies several floors of the Rajen Kilachand Center for Integrated Life Sciences & Engineering located on the Charles River Campus at Boston University

EVENTS

THE CENTER CONTTINUED TO FUND a series of talks featuring internal BU speakers and external speakers, as well as candidates for faculty positions in relevant departments. The seminars and symposia continued to bring together a strong audience of 60-240 researchers from a wide range of fields. These talks were publicized to the BU community and to the public, and brought together researchers in departments including the CAS departments of Psychological & Brain Sciences, Biology, Physics, and Mathematics & Statistics; the Sargent School departments of Health Sciences and Speech, Language & Hearing Sciences; the School of Medicine departments of Anatomy & Neurobiology and Pharmacology & Experimental Therapeutics; and the School of Engineering departments of Biomedical Engineering and Electrical & Computer Engineering.



Steve Ramirez presents findings from his lab at a CSN seminar

FALL 2022

September 14th
Prof. David Freedman, University of Chicago, Department of Neurobiology
- "Neural Circuit Mechanisms of Abstract Decision Making"
- An event hosted by Prof. Chand Chandrasekaran

September 21st
Prof. Aryn Gittis, Carnegie Mellon University, Biological Sciences
- "Circuit-Based Strategies For Long-Lasting Motor Recovery Following Dopamine Depletion"
- An event hosted by Prof. Mark Howe


Professor Matt Nassar (Brown University) presents at a CSN-hosted seminar

October 3rd – 4th
SYMPOSIUM: Engineering the Brain for Discovery and Clinical Applications
- An event organized by Profs. Mo Khalil, Steve Ramirez, and Ben Wolozin
- Anna Devor, Boston University - "Understanding the brain's spontaneous activity with neurophotonics"
- Chand Chadrasekaran, Boston University - "Leveraging nonlinear dimensionality reduction, graph clustering, and weighted nearest neighbors to identify candidate cell types in neural circuits"
- Christina Kim, University of California, Davis - "Linking function to molecules: New approaches for labeling activated circuits"
- Jason Shepherd, University of Utah - "Intercellular signaling by endogenous capsid-forming proteins – a new paradigm for gene delivery"
- Mo Khalil, Boston University - "Learning to program new cellular functions"
- Canan Dagdeviren, MIT - "Minimally-invasive Neural Drug Delivery System (MiNDS)"
- Robert Reinhart, Boston University - "Personalized neuromodulation: Aligning neural rhythms to improve human cognition"
- Aleena Garner, Harvard University - "A cortical circuit for audio-visual predictions"
- Laura Lewis, Boston University - "Imaging the sleeping human brain"
- Marom Bikson, CUNY - "Neurovascular-modulation and how a wearable brain stimulation might treat brain disorders from age-related cognitive decline to long-COVID"
- Ben Wolozin, Boston University - "Engineering iPSCs to model brain disease and develop therapies"
- Kevin Guckian, BioGen - "Oligonucleotide drug discovery in the CNS"

October 19th
CSN Post-Doctoral Fellows Present
- Dr. Vicky Moya: "A scalable approach for mapping microconnectivity in transcriptomically defined neuron types"
- Dr. Brenna Fearey: "Context-dependent modulation of population activity in distinct striatal neuronal subtypes during visually guided navigation in a virtual environment"
- An event hosted by the Center for Systems Neuroscience

October 26th
Prof. Erin Calipari, Vanderbilt University, Department of Pharmacology
- "Neuronal sub-populations in the nucleus accumbens represent distinct valence-free parameters to drive behavior"
- An event hosted by Prof. Camron Bryant

November 2nd
Dr. David Leopold, National Institute of Mental Health, Cognitive Neurophysiology and Imaging
- "Single-unit fMRI mapping: New perspectives on brain organization"
- An event hosted by Prof. Laura Lewis

December 14th
Prof. Maithe Arruda-Carvalho, University of Toronto, Department of Psychology
- "Pathway-Specific Synaptic Maturation and the Ontogeny of Behavior"
- An event hosted by Prof. Heidi Meyer


Graduate students Kaitlyn Dorst (left) and Albit Caban, both researhers in the lab of Steve Ramirez, enjoy a catered event in the courtyard

Researchers participating in the CSN Symposium (back row from left to right): Kevin Guckian, Robert Reinhart, Camron Bryant, Aleena Garner, Anna Devor, Laura Lewis, Jason Shepherd, Chand Chandrasekaran, David Boas; (front row from left to right) Ben Wolozin, Christina Kim, Marom Bikson, Michael Hasselmo

SPRING 2023

February 2nd
Prof. Randy Buckner, Harvard University
- "Large-scale network organization in the human brain"
- An event hosted by BBC and CSN

February 9th
Prof. Heidi Meyer, Boston University
- "Mechanisms of fear regulation across the landscape of adolescence"
- An event hosted by BBC and CSN

February 23rd
Prof. Brad Postle, University of Wisconsin-Madison
- "Controlling the contents of visual working memory"
- An event hosted by BBC and CSN

March 1st
Prof. Justus Kebschull, Johns Hopkins University
- "Using comparative transcriptomics and connectomics for understanding brain structure"
- An event hosted Prof. John White and CSN

March 15th
Prof. Vincent Pieribone, Yale University
- "New approaches to optical voltage imaging for in vivo physiology"
- An event hosted by Prof. Jerry Chen, NPC, and CSN

March 22nd
Prof. Guosong Hong, Stanford University
- "Seeing the sound: An ultrasound-mediated intravascular light source for noninvasive brain modulation"
- An event hosted by Prof. Chen Yang, NPC and CSN

April 13th
Prof. Steve Ramirez, Boston University
- "Memory engrams in health and disease"
- An event hosted by BBC and CSN

April 20th
Dr. Hannah Payne, Columbia University
- "Hippocampal coding during visually-guided navigation in freely moving birds"
- An event hosted by BBC and CSN

April 24th – 28th
M Dougherty – Olfactory Artist in Residence
- Hosted by BU Arts Initiative in partnership with the Department of Biology and CSN

April 27th
Prof. Alireza Soltani, Dartmouth College
- "Of mice, monkeys, and humans: Behavioral and neural adjustments to uncertainty across mammals"
- An event hosted by BBC and CSN

May 4th
Prof. Matt Nassar, Brown University
- "Dynamic representations for behavioral flexibility"
- An event hosted by BBC and CSN ■

Xue Han presents findings from her lab in the Howard Eichenbaum Colloquium Room

RESEARCH PROJECTS

THE FACULTY CONDUCT RESEARCH in a number of different areas. These include:

1. Learning and memory function
2. Speech and hearing
3. Attention and perception
4. Developmental and degenerative disorders
5. Decision and action
6. Neurophotonics and circuit mapping
7. Computational neuroscience

There are numerous research projects within these areas that are described in the publications listed in this annual report and funded by an extensive range of research grants. This annual report will not provide details about all of the research projects, focusing instead on the projects directly related to funds from the Center for Systems Neuroscience.

List of Current Grants and Pending Applications

The Center for Systems Neuroscience was directly involved in obtaining multiple grants over the past several years: 1) an Office of Naval Research Multi-disciplinary University Research Initiative (ONR MURI) grant worth $7.5 Million to Prof. Michael Hasselmo, 2) an ONR DURIP grant associated with the ONR MURI worth $557,580 to Prof. Chantal Stern, 3) an NSF MRI grant worth $1,582,077 to Prof. Chantal Stern, 4) a second ONR MURI grant obtained by Prof. Yannis Paschalidis with assistance from Profs. Michael Hasselmo and Chantal Stern worth $7.5 Million, and 5) an ONR DURIP grant obtained in 2021 as a supplement to this second MURI grant. In addition, as listed in the supplemental spreadsheet, faculty affiliated with the Center for Systems Neuroscience have obtained numerous grants, including a number of additional grants obtained by faculty who received support from start-up funds or post-doctoral fellowships provided by the Center.

ONR MURI Grant 2016-2022, $7,500,000. Center Director Michael Hasselmo is the principal investigator on an Office of Naval Research MURI grant that was awarded in 2016 entitled: Neural Circuits Underlying Symbolic Processing in Primate Cortex and Basal Ganglia (PI: Michael Hasselmo, Program officer: Tom McKenna) - 07/01/16-05/31/21, with no-cost extension to Nov. 30, 2022, ONR MURI N00014-16-1-2832. This grant provided five years of support totaling $7,500,000. The ONR program officer is Dr. Tom McKenna. The projects on this MURI grant support research in the laboratories of Prof. Hasselmo, Prof. Marc Howard and Prof. Chantal Stern at Boston University in collaboration with Prof. Earl Miller at MIT and Prof. David Badre at Brown University. The Center prepared the final report for this grant that was submitted on March 29, 2023.

ONR DURIP Grant, $557,580. In affiliation with this ONR MURI grant, Prof. Chantal Stern applied for an Office of Naval Research DURIP grant that was awarded in 2017: ONR Defense University Research Instrumentation Program (DURIP) grant: High-performance computing cluster for cognitive neuroscience analysis and modeling. (PI: Chantal Stern, PO: Tom McKenna) 6/01/2017-6/30/2018. ONR DURIP N00014-17-1-2304. This grant provided $557,580 for purchase of computational resources for data analysis and modeling by neuroscience faculty including Chantal Stern, Marc Howard, Michael Hasselmo, Sam Ling, Joseph McGuire, Chandramouli Chandrasekaran, and Karin Schon.

NSF MRI Grant, $1,582,077. The director of the Cognitive Neuroimaging Center Chantal Stern was awarded a grant that supports neuroimaging work that is an integral part of systems neuroscience research at Boston University. She obtained an NSF Major Research Instrumentation grant (PI: Chantal Stern, Program officer: John Yellen) Title: MRI: Acquisition of a 3-Tesla Magnetic Resonance Imaging (MRI) Scanner for Cognitive and Systems Neuroscience 9/1/2017-8/31/2018, NSF BCS 1625552. This grant provided $1,582,077 for 70% of the purchase of a Siemens fMRI scanner that was installed in the Kilachand Center.

ONR MURI Grant 2019-2024, $7,500,000. The CSN director Prof. Michael Hasselmo worked with Profs. Yannis Paschalidis, John Baillieul and Chantal Stern to organize a research team based on multiple discussions with ONR program officer Dr. Marc Steinberg. This grant was selected for funding and started in the fall of 2019. We organized a research team that included Yannis Paschalidis as PI, Michael Hasselmo, John Baillieul, Chantal Stern, Margrit Betke and Roberto Tron from Boston University, and John Leonard and Nick Roy from MIT. Four members were previously members of an earlier MURI run by Michael Hasselmo. This ONR MURI award is entitled: Neuro-Autonomy: Neuroscience-inspired perception, navigation, and spatial awareness for autonomous robots. This provides $7,500,000 over five years to the 2 researchers at MIT and the 6 researchers at BU. This grant involves ongoing monthly meetings of MURI researchers in full team meetings or in sub-group meetings. The third year review in 2022 led to approval of the next two years, and team members made presentations to the ONR on August 9, 2023.

ONR DURIP Grant 2021, $497,047. The BU members of the 2019 MURI N00014-19-1-2571 (Profs. Tron, Paschalidis, Baillieul, Stern, Betke and Hasselmo) participated in an application for an additional ONR DURIP award to supplement this research. This grant was awarded in 2021 as DURIP N00014-21-1-2844 for $497,047 headed by principal investigator Prof. Roberto Tron to support researchers at Boston University affiliated with the ONR MURI grant.

NSF Training Grant in Neurophotonics. Center Director Michael Hasselmo participated as an executive committee member for a grant obtained by Principal Investigator Prof. Thomas Bifano for an NSF Research Traineeship (NRT) grant entitled: "NRT: Neurophotonics." The Center Director has participated on the Executive committee for this grant to select trainees. This grant provides training in neurophotonics for graduate students in multiple programs.

CSN Associate Director Prof. Mark Kramer developed and submitted an NIH T90/R90 training grant (Total Funds Requested: $3,181,801). If successful, this award will support 6 graduate students and 6 undergraduate students pursuing research in computational neuroscience. Prof. Kramer served as the lead program director with co-directors Profs. Mike Hasselmo and Uri Eden. In addition to the three program directors, the proposed training faculty include 18 other CSN members, from multiple departments across the University (Mathematics & Statistics, PBS, BME, Biology, Sargent College, and the School of Medicine).

The Center also participated in training grant applications by Neurophotonics Center director Prof. David Boas, as well as providing materials in support of the successful training grant application by GPN director Prof. Shelley Russek.

NIH R01 Grants. During the period of running the CSN, the Center Director was also principal investigator on NIH R01 grants including NIMH R01 MH060013 and MH061492 and MH052090. In fall 2019, the Center Director also obtained the new funding for another R01 grant MH120073 for five years of support. An application for a new R01 grant was submitted in February, 2023. These grants are administered through the Department of Psychological & Brain Sciences.

The Center also obtained and administered support to a Kilachand Type A/B Project awarded by the Office of the Vice President for Research. The CSN director Prof. Michael Hasselmo worked with Profs. Chantal Stern, Xue Han, Yannis Paschalidis, David Boas, Joseph McGuire, Jerry Chen, and Marc Howard to organize a research team, and prepare a proposal that was selected for funding in October 2022. This team focuses on understanding circuit mechanisms in the neocortex underlying general cognitive function, with the aim of developing innovative approaches to computational modeling of neural circuits and new experimental voltage and calcium techniques to analyze circuit dynamics. This award to the organization of an NSF STC preliminary proposal submitted in 2022 by CSN director Prof. Michael Hasselmo. In addition, this led to the organization of a white paper submitted to the Office of Naval Research on FedConnect on May 15, 2023 for a potential MURI grant including CSN Director Prof. Michael Hasselmo along with Profs. Yannis Paschalidis, Prof. John Baillieul, Prof. Chantal Stern and Prof. Roberto Tron along with faculty at MIT including Prof. Ila Fiete and Prof. Stefanie Jegelka. The Kilachand Fund Award also led earlier to the submission of an NIH R01 collaborative grant by Prof. Hasselmo and Prof. Xue Han proposing the use of voltage imaging techniques to analyze circuit dynamics relevant to the coding of trajectories in problem solving as described in the Kilachand Fund grant.

Affiliated Faculty. The Center for Systems Neuroscience faculty have a number of ongoing research grants. For quantifying the overall support of neuroscience researchers affiliated with the Center, the expenditure and grant figures have been obtained from OSP and edited to avoid overlap with other centers such as the Photonics Center. Please note that this grant information is not included in this external report. ■

PUBLICATIONS

CSN Faculty published the following articles in peer-reviewed journals. Articles published by two or more Center-affiliated faculty are indicated by an asterisk "*".

*__Barbas H__, __Zikopoulos B__, John YJ. The inevitable inequality of cortical columns. Front Syst Neurosci. 2022 Sep 20;16:921468. doi: 10.3389/fnsys.2022.921468. PMID: 36203745; PMCID: PMC9532056.

__Barbas H__, Hilgetag CC. From Circuit Principles to Human Psychiatric Disorders. Biol Psychiatry. 2023 Mar 1;93(5):388-390. doi: 10.1016/j.biopsych.2022.08.007. Epub 2022 Aug 18. PMID: 36114040.

*Pantazopoulos H, Hossain NM, Chelini G, Durning P, __Barbas H__, __Zikopoulos B__, Berretta S. Chondroitin Sulphate Proteoglycan Axonal Coats in the Human Mediodorsal Thalamic Nucleus. Front Integr Neurosci. 2022 Jul 6;16:934764. doi: 10.3389/fnint.2022.934764. PMID: 35875507; PMCID: PMC9298528.

*John YJ, __Zikopoulos B__, García-Cabezas MÁ, __Barbas H.__ The cortical spectrum: A robust structural continuum in primate cerebral cortex revealed by histological staining and magnetic resonance imaging. Front Neuroanat. 2022 Sep 9;16:897237. doi: 10.3389/fnana.2022.897237. PMID: 36157324; PMCID: PMC9501703.

**__Yazdanbakhsh A, Barbas H, Zikopoulos B__. Sleep spindles in primates: Modeling the effects of distinct laminar thalamocortical connectivity in core, matrix, and reticular thalamic circuits. Netw Neurosci. 2023 Jun 30;7(2):743-768. doi: 10.1162/netn_a_00311. PMID: 37397882; PMCID: PMC10312265.

Joyce MKP, Wang J, __Barbas H__. Subgenual and Hippocampal Pathways in Amygdala Are Set to Balance Affect and Context Processing. J Neurosci. 2023 Apr 26;43(17):3061-3080. doi: 10.1523/JNEUROSCI.2066-22.2023. Epub 2023 Mar 28. PMID: 36977583; PMCID: PMC10146557.

Zheng Y, Gindra RH, Green EJ, Burks EJ, __Betke M__, Beane JE, Kolachalama VB. A Graph-Transformer for Whole Slide Image Classification. IEEE Trans Med Imaging. 2022 Nov;41(11):3003-3015. doi: 10.1109/TMI.2022.3176598. Epub 2022 Oct 27. PMID: 35594209; PMCID: PMC9670036.

*Liu H, Cordella C, Ishwar P, __Betke M__, __Kiran S__. Consistent long-term practice leads to consistent improvement: Benefits of self-managed therapy for language and cognitive deficits using a digital therapeutic. Front Digit Health. 2023 Apr 11;5:1095110. doi: 10.3389/fdgth.2023.1095110. PMID: 37114182; PMCID: PMC10126684.

Li H, Sundaram S, Hu R, Lou L, Sanchez F, McDonald W, Agarwal A, Chen CS, __Bifano TG__. Dynamic Control of Contractile Force in Engineered Heart Tissue. IEEE Trans Biomed Eng. 2023 Jul;70(7):2237-2245. doi: 10.1109/TBME.2023.3239594. Epub 2023 Jun 19. PMID: 37021994.

Ma MS, Sundaram S, Lou L, Agarwal A, Chen CS, __Bifano TG__. High throughput screening system for engineered cardiac tissues. Front Bioeng Biotechnol. 2023 May 11;11:1177688. doi: 10.3389/fbioe.2023.1177688. PMID: 37251575; PMCID: PMC10210164.

*Sunil S, Jiang J, Shah S, Kura S, Kilic K, Erdener SE, Ayata C, __Devor A__, __Boas DA__. Neurovascular coupling is preserved in chronic stroke recovery after targeted photothrombosis. Neuroimage Clin. 2023 Mar 15;38:103377. doi: 10.1016/j.nicl.2023.103377. Epub ahead of print. PMID: 36948140; PMCID: PMC10034641.

Li B, Yabluchanskiy A, Tarantini S, Allu SR, Şencan-Eğilmez I, Leng J, Alfadhel MAH, Porter JE, Fu B, Ran C, Erdener SE, __Boas DA__, Vinogradov SA, Sonntag WE, Csiszar A, Ungvari Z, Sakadžić S. Measurements of cerebral microvascular blood flow, oxygenation, and morphology in a mouse model of whole-brain irradiation-induced cognitive impairment by two-photon microscopy and optical coherence tomography: evidence for microvascular injury in the cerebral white matter. Geroscience. 2023 Feb 16. doi: 10.1007/s11357-023-00735-3. Epub ahead of print. PMID: 36792820.

Zilpelwar S, Sie EJ, Postnov D, Chen AI, Zimmermann B, Marsili F, __Boas DA__, Cheng X. Model of dynamic speckle evolution for evaluating laser speckle contrast measurements of tissue dynamics. Biomed Opt Express. 2022 Nov 17;13(12):6533-6549. doi: 10.1364/BOE.472263. PMID: 36589566; PMCID: PMC9774840.

Tucker S, Dubb J, Kura S, von Lühmann A, Franke R, Horschig JM, Powell S, Oostenveld R, Lührs M, Delaire É, Aghajan ZM, Yun H, Yücel MA, Fang Q, Huppert TJ, Frederick BB, Pollonini L, __Boas D__, Luke R. Introduction to the shared near infrared spectroscopy format. Neurophotonics. 2023 Jan;10(1):013507. doi: 10.1117/1.NPh.10.1.013507. Epub 2022 Dec 9. PMID: 36507152; PMCID: PMC9732807.

Giblin JT, Park SW, Jiang J, Kılıç K, Kura S, Tang J, __Boas DA__, Chen IA. Measuring capillary flow dynamics using interlaced two-photon volumetric scanning. J Cereb Blood Flow Metab. 2023 Apr;43(4):595-609. doi: 10.1177/0271678X221145091. Epub 2022 Dec 10. PMID: 36495178.

*Mächler P, Fomin-Thunemann N, Thunemann M, Sætra MJ, Desjardins M, Kılıç K, Amra LN, Martin EA, Chen IA, Şencan-Eğilmez I, Li B, Saisan P, Jiang JX, Cheng Q, Weldy KL, __Boas DA__, Buxton RB, Einevoll GT, Dale AM, Sakadžić S, __Devor A__. Baseline oxygen consumption decreases with cortical depth. PLoS Biol. 2022 Oct 27;20(10):e3001440. doi: 10.1371/journal.pbio.3001440. PMID: 36301995; PMCID: PMC9642908.

Ortega-Martinez A, Rogers D, Anderson J, Farzam P, Gao Y, Zimmermann B, Yücel MA, __Boas DA__. How much do time-domain functional near-infrared spectroscopy (fNIRS) moments improve estimation of brain activity over traditional fNIRS? Neurophotonics. 2023 Jan;10(1):013504. doi: 10.1117/1.NPh.10.1.013504. Epub 2022 Oct 22. PMID: 36284602; PMCID: PMC9587749.

*Ayaz H, Baker WB, Blaney G, __Boas DA__, Bortfeld H, Brady K, Brake J, Brigadoi S, Buckley EM, Carp SA, Cooper RJ, Cowdrick KR, Culver JP, Dan I, Dehghani H, __Devor A__, Durduran T, Eggebrecht AT, Emberson LL, Fang Q, Fantini S, Franceschini MA, Fischer JB, Gervain J, Hirsch J, Hong KS, Horstmeyer R, Kainerstorfer JM, Ko TS, Licht DJ, Liebert A, Luke R, Lynch JM, Mesquida J, Mesquita RC, Naseer N, Novi SL, Orihuela-Espina F, O'Sullivan TD, Peterka DS, Pifferi A, Pollonini L, Sassaroli A, Sato JR, Scholkmann F, Spinelli L, Srinivasan VJ, St Lawrence K, Tachtsidis I, Tong Y, Torricelli A, Urner T, Wabnitz H, Wolf M, Wolf U, Xu S, Yang C, Yodh AG, Yücel MA, Zhou W. Optical imaging and spectroscopy for the study of the human brain: status report. Neurophotonics. 2022 Aug;9(Suppl 2):S24001. doi: 10.1117/1.NPh.9.S2.S24001. Epub 2022 Aug 30. PMID: 36052058; PMCID: PMC9424749.

Aykan SA, Xie H, Zheng Y, Chung DY, Kura S, Han Lai J, Erdogan TD, Morais A, Tamim I, Yagmur D, Ishikawa H, Arai K, Abbas Yaseen M, __Boas DA__, Sakadzic S, Ayata C. Rho-Kinase Inhibition Improves the Outcome of Focal Subcortical White Matter Lesions. Stroke. 2022 Jul;53(7):2369-2376. doi: 10.1161/STROKEAHA.121.037358. Epub 2022 Jun 3. PMID: 35656825; PMCID: PMC9245195.

Varadarajan D, Magnain C, Fogarty M, __Boas DA__, Fischl B, Wang H. A novel algorithm for multiplicative speckle noise reduction in ex vivo human brain OCT images. Neuroimage. 2022 Aug 15;257:119304. doi: 10.1016/j.neuroimage.2022.119304. Epub 2022 May 11. PMID: 35568350; PMCID: PMC10018743.

Staehr C, Giblin JT, Gutiérrez-Jiménez E, Guldbrandsen HØ, Tang J, Sandow SL, __Boas DA__, Matchkov VV. Neurovascular Uncoupling Is Linked to Microcirculatory Dysfunction in Regions Outside the Ischemic Core Following Ischemic Stroke. J Am Heart Assoc. 2023 Jun 6;12(11):e029527. doi: 10.1161/JAHA.123.029527. Epub 2023 May 26. PMID: 37232244.

Gao Y, Rogers D, von Lühmann A, Ortega-Martinez A, __Boas DA__, Yücel MA. Short-separation regression incorporated diffuse optical tomography image reconstruction modeling for high-density functional near-infrared spectroscopy. Neurophotonics. 2023 Apr;10(2):025007. doi: 10.1117/1.NPh.10.2.025007. Epub 2023 May 23. PMID: 37228904; PMCID: PMC10203730.

Walek KW, Stefan S, Lee JH, Puttigampala P, Kim AH, Park SW, Marchand PJ, Lesage F, Liu T, Huang YA, __Boas DA__, Moore C, Lee J. Near-lifespan longitudinal tracking of brain microvascular morphology, topology, and flow in male mice. Nat Commun. 2023 May 24;14(1):2982. doi: 10.1038/s41467-023-38609-z. PMID: 37221202; PMCID: PMC10205707.

Garrett A, Kim B, Sie EJ, Gurel NZ, Marsili F, __Boas DA__, Roblyer D. Simultaneous photoplethysmography and blood flow measurements towards the estimation of blood pressure using speckle contrast optical spectroscopy. Biomed Opt Express. 2023 Mar 23;14(4):1594-1607. doi: 10.1364/BOE.482740. PMID: 37078049; PMCID: PMC10110303.

Giblin JT, Park SW, Jiang J, Kılıç K, Kura S, Tang J, __Boas DA__, Chen IA. Measuring capillary flow dynamics using interlaced two-photon volumetric scanning. J Cereb Blood Flow Metab. 2023 Apr;43(4):595-609. doi: 10.1177/0271678X221145091. Epub 2022 Dec 10. PMID: 36495178; PMCID: PMC10063827.

Parisien M, van Reij RRI, Khoury S, Koseli E, Karaky M, van den Hoogen NJ, Peng G, Allegri M, de Gregori M, Chelly JE, Rakel BA, Aasvang EK, Kehlet H, Buhre WFFA, __Bryant CD__, Damaj MI, King IL, Mogil JS, Joosten EAJ, Diatchenko L. Genome-wide association study suggests a critical contribution of the adaptive immune system to chronic post-surgical pain. medRxiv [Preprint]. 2023 Mar 10:2023.01.24.23284520. doi: 10.1101/2023.01.24.23284520. PMID: 36945481; PMCID: PMC10029026.

Ulker E, Caillaud M, Koseli E, Contreras K, Alkhlaif Y, Lindley E, Barik M, Ghani S, __Bryant CD__, Imad Damaj M. Comparison of Pain-Like behaviors in two surgical incision animal models in C57BL/6J mice. Neurobiol Pain. 2022 Sep 7;12:100103. doi: 10.1016/j.ynpai.2022.100103. PMID: 36531613; PMCID: PMC9755018.

Beierle JA, Yao EJ, Goldstein SI, Lynch WB, Scotellaro JL, Shah AA, Sena KD, Wong AL, Linnertz CL, Averin O, Moody DE, Reilly CA, Peltz G, Emili A, Ferris MT, __Bryant CD__. Zhx2 Is a Candidate Gene Underlying Oxymorphone Metabolite Brain Concentration Associated with State-Dependent Oxycodone Reward. J Pharmacol Exp Ther. 2022 Aug;382(2):167-180. doi: 10.1124/jpet.122.001217. Epub 2022 Jun 10. PMID: 35688478; PMCID: PMC9341249.

Lee K, Carr N, Perliss A, __Chandrasekaran C__. WaveMAP for identifying putative cell types from in vivo electrophysiology. STAR Protoc. 2023 May 22;4(2):102320. doi: 10.1016/j.xpro.2023.102320. Epub ahead of print. PMID: 37220000; PMCID: PMC10220268.

*Platisa J, Ye X, Ahrens AM, Liu C, Chen IA, __Davison IG__, Tian L, Pieribone

VA, **Chen JL**. High-speed low-light in vivo two-photon voltage imaging of large neuronal populations. Nat Methods. 2023 Mar 27. doi: 10.1038/s41592-023-01820-3. Epub ahead of print. PMID: 36973547.

Kinger SB, Juneau T, Kaplan RI, Pluim CF, Fox-Fuller JT, Wang T, Mukadam N, Neargarder S, Salazar RD, **Cronin-Golomb A**. Changes in Apathy, Depression, and Anxiety in Parkinson's Disease from before to during the COVID-19 Era. Brain Sci. 2023 Jan 24;13(2):199. doi: 10.3390/brainsci13020199. PMID: 36831742; PMCID: PMC9954738.

Piers RJ, Farchione TJ, Wong B, Rosellini AJ, **Cronin-Golomb A**. Telehealth Transdiagnostic Cognitive Behavioral Therapy for Depression in Parkinson's Disease: A Pilot Randomized Controlled Trial. Mov Disord Clin Pract. 2022 Oct 29;10(1):79-85. doi: 10.1002/mdc3.13587. PMID: 36704072; PMCID: PMC9847300.

Fox-Fuller JT, Ngo J, Pluim CF, Kaplan RI, Kim DH, Anzai JAU, Yucebas D, Briggs SM, Aduen PA, **Cronin-Golomb A**, Quiroz YT. Initial investigation of test-retest reliability of home-to-home teleneuropsychological assessment in healthy, English-speaking adults. Clin Neuropsychol. 2022 Nov;36(8):2153-2167. doi: 10.1080/13854046.2021.1954244. Epub 2021 Jul 26. PMID: 34311660; PMCID: PMC8789947.

Yucebas D, Fox-Fuller JT, Badillo Cabrera A, Baena A, Pluim McDowell C, Aduen P, Vila-Castelar C, Bocanegra Y, Tirado V, Sanchez JS, **Cronin-Golomb A**, Lopera F, Quiroz YT. Associations of category fluency clustering performance with *in vivo* brain pathology in autosomal dominant Alzheimer's disease. J Int Neuropsychol Soc. 2023 Apr 26:1-7. doi: 10.1017/S1355617723000243. Epub ahead of print. PMID: 37185154.

Yoles-Frenkel M, Shea SD, **Davison IG**, Ben-Shaul Y. The Bruce effect: Representational stability and memory formation in the accessory olfactory bulb of the female mouse. Cell Rep. 2022 Aug 23;40(8):111262. doi: 10.1016/j.celrep.2022.111262. PMID: 36001975; PMCID: PMC9446479.

Greene J, Xue Y, Alido J, Matlock A, Hu G, Kiliç K, **Davison I**, Tian L. Pupil engineering for extended depth-of-field imaging in a fluorescence miniscope. Neurophotonics. 2023 Oct;10(4):044302. doi: 10.1117/1.NPh.10.4.044302. Epub 2023 May 8. PMID: 37215637; PMCID: PMC10197144.

Alido J, Greene J, Xue Y, Hu G, Li Y, Monk KJ, DeBenedicts BT, **Davison IG**, Tian L. Robust single-shot 3D fluorescence imaging in scattering media with a simulator-trained neural network. ArXiv [Preprint]. 2023 Mar 22:arXiv:2303.12573v1. PMID: 36994164; PMCID: PMC10055497.

Rahnev D, Balsdon T, Charles L, de Gardelle V, **Denison R**, Desender K, Faivre N, Filevich E, Fleming SM, Jehee J, Lau H, Lee ALF, Locke SM, Mamassian P, Odegaard B, Peters M, Reyes G, Rouault M, Sackur J, Samaha J, Sergent C, Sherman MT, Siedlecka M, Soto D, Vlassova A, Zylberberg A. Consensus Goals in the Field of Visual Metacognition. Perspect Psychol Sci. 2022 Nov;17(6):1746-1765. doi: 10.1177/17456916221075615. Epub 2022 Jul 15. PMID: 35839099; PMCID: PMC9633335.

Samaha J, **Denison R**. The positive evidence bias in perceptual confidence is unlikely post-decisional. Neurosci Conscious. 2022 Jul 26;2022(1):niac010. doi: 10.1093/nc/niac010. PMID: 35903409; PMCID: PMC9316228.

Duyar A, **Denison RN**, Carrasco M. Exogenous temporal attention varies with temporal uncertainty. J Vis. 2023 Mar 1;23(3):9. doi: 10.1167/jov.23.3.9. PMID: 36928299; PMCID: PMC10029770.

Lee JL, **Denison R**, Ma WJ. Challenging the fixed-criterion model of perceptual decision-making. Neurosci Conscious. 2023 Apr 20;2023(1):niad010. doi: 10.1093/nc/niad010. PMID: 37089450; PMCID: PMC10118309.

Kay K, Bonnen K, **Denison RN**, Arcaro MJ, Barack DL. Tasks and their role in visual neuroscience. Neuron. 2023 Mar 31:S0896-6273(23)00218-0. doi: 10.1016/j.neuron.2023.03.022. Epub ahead of print. PMID: 37040765.

Gupta D, **DePasquale B**, Kopec CD, Brody CD. Trial-history biases in evidence accumulation can give rise to apparent lapses. bioRxiv [Preprint]. 2023 Feb 1:2023.01.18.524599. doi: 10.1101/2023.01.18.524599. PMID: 36778392; PMCID: PMC9915493.

DePasquale B, Sussillo D, Abbott LF, Churchland MM. The centrality of population-level factors to network computation is demonstrated by a versatile approach for training spiking networks. Neuron. 2023 Mar 1;111(5):631-649.e10. doi: 10.1016/j.neuron.2022.12.007. Epub 2023 Jan 10. PMID: 36630961.

Devor A. Constraining the many-worlds interpretation of computational neuroscience with neurophotonics: a conversation with Gaute Einevoll. Neurophotonics. 2023 Jan;10(1):010103. doi: 10.1117/1.NPh.10.1.010103. Epub 2023 Mar 7. PMID: 36896093; PMCID: PMC9989877.

Wilson MN, Thunemann M, Liu X, Lu Y, Puppo F, Adams JW, Kim JH, Ramezani M, Pizzo DP, Djurovic S, Andreassen OA, Mansour AA, Gage FH, Muotri AR, **Devor A**, Kuzum D. Multimodal monitoring of human cortical organoids implanted in mice reveal functional connection with visual cortex. Nat Commun. 2022 Dec 26;13(1):7945. doi: 10.1038/s41467-022-35536-3. PMID: 36572698; PMCID: PMC9792589.

Kılıç K, **Devor A**. The stop and go of glymphatic flow. Nat Neurosci. 2023 Jun;26(6):924-925. doi: 10.1038/s41593-023-01344-1. PMID: 37264157.

Shin P, Pian Q, Ishikawa H, Hamanaka G, Mandeville ET, Shuzhen G, Buyin F, Alfadhel M, Allu SR, Şencan-Eğilmez I, Li B, Ran C, Vinogradov SA, Ayata C, Lo EH, Arai K, **Devor A**, Sakadžić S. Aerobic exercise reverses aging-induced depth-dependent decline in cerebral microcirculation. bioRxiv [Preprint]. 2023 Feb 13:2023.02.12.528244. doi: 10.1101/2023.02.12.528244. PMID: 36824939; PMCID: PMC9949059.

Sunil S, Jiang J, Shah S, Kura S, Kilic K, Erdener SE, Ayata C, **Devor A**, **Boas DA**. Neurovascular coupling is preserved in chronic stroke recovery after targeted photothrombosis. Neuroimage Clin. 2023 Mar 15;38:103377. doi: 10.1016/j.nicl.2023.103377. Epub ahead of print. PMID: 36948140; PMCID: PMC10034641.

Abdelfattah AS, Zheng J, Singh A, Huang YC, Reep D, Tsegaye G, Tsang A, Arthur BJ, Rehorova M, Olson CVL, Shuai Y, Zhang L, Fu TM, Milkie DE, Moya MV, Weber TD, Lemire AL, Baker CA, Falco N, Zheng Q, Grimm JB, Yip MC, Walpita D, Chase M, Campagnola L, Murphy GJ, Wong AM, Forest CR, Mertz J, **Economo MN**, Turner GC, Koyama M, Lin BJ, Betzig E, Novak O, Lavis LD, Svoboda K, Korff W, Chen TW, Schreiter ER, Hasseman JP, Kolb I. Sensitivity optimization of a rhodopsin-based fluorescent voltage indicator. Neuron. 2023 May 17;111(10):1547-1563.e9. doi: 10.1016/j.neuron.2023.03.009. Epub 2023 Apr 3. PMID: 37015225.

*Schlafly ED, Marshall FA, Merricks EM, **Eden UT**, Cash SS, Schevon CA, **Kramer MA**. Multiple sources of fast traveling waves during human seizures: resolving a controversy. J Neurosci. 2022 Jul 29;42(36):6966–82. doi: 10.1523/JNEUROSCI.0338-22.2022. Epub ahead of print. PMID: 35906069; PMCID: PMC9464018.

Rafferty H, Rocha E, Gonzalez-Mego P, Ramos CL, El-Hagrassy MM, Gunduz ME, Uygur-Kucukseymen E, Zehry H, Chaudhari SS, Teixeira PE, Rosa GR, Zaninotto AL, Connor C, **Eden U**, Ramos-Estebanez C, Fregni F, Dipietro L, Wagner T. Cost-Effectiveness Analysis to Inform Randomized Controlled Trial Design in Chronic Pain Research: Methods for Guiding Decisions on the Addition of a Run-In Period. Princ Pract Clin Res. 2022 Jul 3;8(2):31-42. doi: 10.21801/ppcrj.2022.82.5. Epub 2022 Aug 22. PMID: 36561218; PMCID: PMC9769699.

Chen S, Redline S, **Eden UT**, Prerau MJ. Dynamic models of obstructive sleep apnea provide robust prediction of respiratory event timing and a statistical framework for phenotype exploration. Sleep. 2022 Dec 12;45(12):zsac189. doi: 10.1093/sleep/zsac189. PMID: 35932480; PMCID: PMC9742895.

*Chinappen DM, Xiao G, Jing J, Spencer ER, **Eden UT**, **Kramer MA**, Westover MB, Chu CJ. Spike height improves prediction of future seizure risk. Clin Neurophysiol. 2023 Jun;150:49-55. doi: 10.1016/j.clinph.2023.02.180. Epub 2023 Mar 21. PMID: 37002980; PMCID: PMC10192090.

*Kwon H, Walsh KG, Berja ED, Manoach DS, **Eden UT**, **Kramer MA**, Chu CJ. Sleep spindles in the healthy brain from birth through 18 years. Sleep. 2023 Apr 12;46(4):zsad017. doi: 10.1093/sleep/zsad017. PMID: 36719044; PMCID: PMC10091086.

Basu I, Yousefi A, Crocker B, Zelmann R, Paulk AC, Peled N, Ellard KK, Weisholtz DS, Cosgrove GR, Deckersbach T, **Eden UT**, Eskandar EN, Dougherty DD, Cash SS, Widge AS. Closed-loop enhancement and neural decoding of cognitive control in humans. Nat Biomed Eng. 2023 Apr;7(4):576-588. doi: 10.1038/s41551-021-00804-y. Epub 2021 Nov 1. PMID: 34725508; PMCID: PMC9056584.

Price BH, Jensen CM, Khoudary AA, **Gavornik JP**. Expectation violations produce error signals in mouse V1. Cereb Cortex. 2023 May 13:bhad163. doi: 10.1093/cercor/bhad163. Epub ahead of print. PMID: 37183176.

Rozells J, **Gavornik JP**. Optogenetic manipulation of inhibitory interneurons can be used to validate a model of spatiotemporal sequence learning. Front Comput Neurosci. 2023 Jun 9;17:1198128. doi: 10.3389/fncom.2023.1198128. PMID: 37362060; PMCID: PMC10288026.

Schecter RW, Jensen CM, **Gavornik JP**. Sex and estrous cycle affect experience-dependent plasticity in mouse primary visual cortex. PLoS One. 2023 Apr 17;18(4):e0282349. doi: 10.1371/journal.pone.0282349. PMID: 37068089; PMCID: PMC10109517.

Rimmele JM, Sun Y, Michalareas G, **Ghitza O**, Poeppel D. Dynamics of Functional Networks for Syllable and Word-Level Processing. Neurobiol Lang (Camb). 2023 Mar 8;4(1):120-144. doi: 10.1162/nol_a_00089. PMID: 37229144; PMCID: PMC10205074.

Kim D, Lewis CL, Silverman AK, **Gill SV**. Changes in dynamic balance control in adults with obesity across walking speeds. J Biomech. 2022 Nov;144:111308. doi: 10.1016/j.jbiomech.2022.111308. Epub 2022 Sep 18. PMID: 36150320.

Shin D, Keegan L, **Gill SV**. Changes in Gait Self-Efficacy, Fear of Falls, and Gait Four and Eight Months after Bariatric Surgery. Behav Sci (Basel). 2022 Jul 22;12(8):246. doi: 10.3390/bs12080246. PMID: 35892345; PMCID: PMC9332025.

Shin D, **Gill SV**, Kim TW, Magane KM, Mason T, Heeren T, Winter M, Helfrich C, Saitz R. Study Protocol for a Pilot Randomized Trial of a Virtual Occupational Therapy Fall Prevention Intervention for People With HIV and Alcohol Use. Subst Abuse. 2022 Dec 23;16:11782218221145548. doi: 10.1177/11782218221145548. PMID: 36578450; PMCID: PMC9791282.

*Maffei MF, Chenausky KV, **Gill SV**, **Tager-Flusberg H**, Green JR. Oromotor skills in autism spectrum disorder: A scoping review. Autism Res. 2023 May;16(5):879-917. doi: 10.1002/aur.2923. Epub 2023 Apr 3. PMID: 37010327.

Graber KA, Halverstadt AL, **Gill SV**, Kulkarni VS, Lewis CL. The effect of trunk and shank position on the hip-to-knee moment ratio in a

bilateral squat. Phys Ther Sport. 2023 Mar 20;61:102-107. doi: 10.1016/j.ptsp.2023.03.005. Epub ahead of print. PMID: 37001335.

Fischer D, Edlow BL, Giacino JT, **Greer DM**. Neuroprognostication: a conceptual framework. Nat Rev Neurol. 2022 Jul;18(7):419-427. doi: 10.1038/s41582-022-00644-7. Epub 2022 Mar 29. PMID: 35352033; PMCID: PMC9326772.

Dupre AE, Cronin MFM, Schmugge S, Tate S, Wack A, Prescott BR, Li C, Auerbach S, Suchdev K, Al-Faraj A, He W, Cervantes-Arslanian AM, Abdennadher M, Saxena A, Lehan W, Russo M, Pugsley B, **Greer D**, Shin M, Ong CJ. A Machine Learning Eye Movement Detection Algorithm using Electrooculography. Sleep. 2022 Oct 18:zsac254. doi: 10.1093/sleep/zsac254. Epub ahead of print. PMID: 36255119.

Herrera VLM, Takahashi CE, Nguyen MQ, Mosaddeghi JZ, Denis R, **Greer DM**, Ruiz-Opazo N. "Rogue" [DEspR+CD11b+] neutrophil subset correlates with severity in spontaneous intracerebral hemorrhage. Front Neurol. 2022 Jul 25;13:935579. doi: 10.3389/fneur.2022.935579. PMID: 35959408; PMCID: PMC9358208.

Miller MI, Orfanoudaki A, Cronin M, Saglam H, So Yeon Kim I, Balogun O, Tzalidi M, Vasilopoulos K, Fanaropoulou G, Fanaropoulou NM, Kalin J, Hutch M, Prescott BR, Brush B, Benjamin EJ, Shin M, Mian A, **Greer DM**, Smirnakis SM, Ong CJ. Natural Language Processing of Radiology Reports to Detect Complications of Ischemic Stroke. Neurocrit Care. 2022 Aug;37(Suppl 2):291-302. doi: 10.1007/s12028-022-01513-3. Epub 2022 May 9. PMID: 35534660; PMCID: PMC9986939.

Kim ISY, Balogun OO, Prescott BR, Saglam H, Olson DM, Speir K, Stutzman SE, Schneider N, Aguilera V, Lussier BL, Smirnakis SM, Dupuis J, Mian A, **Greer DM**, Ong CJ. Quantitative pupillometry and radiographic markers of intracranial midline shift: A pilot study. Front Neurol. 2022 Dec 6;13:1046548. doi: 10.3389/fneur.2022.1046548. PMID: 36561299; PMCID: PMC9763295.

Lele AV, Wahlster S, Bost I, Adorno D, Wells C, O'Connor K, **Greer D**, Souter MJ. A Review of Practices Around Determination of Death by Neurologic Criteria by an Organ Procurement Organization in the WAMI Region. Neurol Clin Pract. 2022 Oct;12(5):336-343. doi: 10.1212/CPJ.0000000000200077. PMID: 36380895; PMCID: PMC9647811.

Beekman R, Crawford A, Mazurek MH, Prabhat AM, Chavva IR, Parasuram N, Kim N, Kim JA, Petersen N, de Havenon A, Khosla A, Honiden S, Miller PE, Wira C, Daley J, Payabvash S, **Greer DM**, Gilmore EJ, Taylor Kimberly W, Sheth KN. Bedside monitoring of hypoxic ischemic brain injury using low-field, portable brain magnetic resonance imaging after cardiac arrest. Resuscitation. 2022 Jul;176:150-158. doi: 10.1016/j.resuscitation.2022.05.002. Epub 2022 May 11. PMID: 35562094; PMCID: PMC9746653.

Gonçalves B, Rynkowski C, Turon R, Charris N, Miranda F, de Caro V, Prazeres M, Santos T, **Greer DM**, Sharshar T, Guillaume T, Bozza FA, Righy C, Kurtz P. Clinical Characteristics and Outcomes of Patients with Aneurysmal Subarachnoid Hemorrhage: A Prospective Multicenter Study in a Middle-Income Country. Neurocrit Care. 2022 Nov 2. doi: 10.1007/s12028-022-01629-6. Epub ahead of print. PMID: 36324005.

Herrera VLM, Gromisch CM, Decano JL, Pasion KA, Tan GLA, Hua N, Takahashi CE, **Greer DM**, Ruiz-Opazo N. Anti-DEspR antibody treatment improves survival and reduces neurologic deficits in a hypertensive, spontaneous intracerebral hemorrhage (hsICH) rat model. Sci Rep. 2023 Feb 15;13(1):2703. doi: 10.1038/s41598-023-28149-3. PMID: 36792616; PMCID: PMC9932093.

Kim N, Kitlen E, Garcia G, Khosla A, Miller PE, Johnson J, Wira C, **Greer DM**, Gilmore EJ, Beekman R. Validation of the rCAST score and comparison to the PCAC and FOUR scores for prognostication after out-of-hospital cardiac arrest. Resuscitation. 2023 May 11;188:109832. doi: 10.1016/j.resuscitation.2023.109832. Epub ahead of print. PMID: 37178901.

Spears WE, Lewis A, Bakkar A, Kreiger-Benson E, Kumpfbeck A, Liebman J, Sung G, Torrance S, Shemie SD, **Greer DM**. What does "brainstem death" mean? A review of international protocols. Can J Anaesth. 2023 Apr;70(4):651-658. English. doi: 10.1007/s12630-023-02428-z. Epub 2023 May 2. PMID: 37131037.

Gardiner D, **Greer DM**, Bernat JL, Meade MO, Opdam H, Schwarz SKW. Answering global challenges to the determination of death: consensus-building leadership from Canada. Can J Anaesth. 2023 Apr;70(4):468-477. English. doi: 10.1007/s12630-023-02423-4. Epub 2023 May 2. PMID: 37131024.

Greer DM. An updated practice guideline for death determination: one giant leap for the field led by Canada. Can J Anaesth. 2023 Apr;70(4):478-482. English. doi: 10.1007/s12630-023-02405-6. Epub 2023 May 2. PMID: 37131022.

Gonçalves B, Rynkowski C, Turon R, Charris N, Miranda F, de Caro V, Prazeres M, Santos T, **Greer DM**, Sharshar T, Guillaume T, Bozza FA, Righy C, Kurtz P. Clinical Characteristics and Outcomes of Patients with Aneurysmal Subarachnoid Hemorrhage: A Prospective Multicenter Study in a Middle-Income Country. Neurocrit Care. 2023 Apr;38(2):378-387. doi: 10.1007/s12028-022-01629-6. Epub 2022 Nov 2. PMID: 36324005.

Dupre AE, Cronin MFM, Schmugge S, Tate S, Wack A, Prescott BR, Li C, Auerbach S, Suchdev K, Al-Faraj A, He W, Cervantes-Arslanian AM, Abdennadher M, Saxena A, Lehan W, Russo M, Pugsley B, **Greer D**, Shin M, Ong CJ. A machine learning eye movement detection algorithm using electrooculography. Sleep. 2023 Apr 12;46(4):zsac254. doi: 10.1093/sleep/zsac254. PMID: 36255119.

Castellucci GA, **Guenther FH**, Long MA. A Theoretical Framework for Human and Nonhuman Vocal Interaction. Annu Rev Neurosci. 2022 Jul 8;45:295-316. doi: 10.1146/annurev-neuro-111020-094807. Epub 2022 Mar 22. PMID: 35316612; PMCID: PMC9909589.

Simonyan K, Ehrlich SK, Andersen R, Brumberg J, **Guenther F**, Hallett M, **Howard MA** , Millán JDR, Reilly RB, Schultz T, Valeriani D. Brain-Computer Interfaces for Treatment of Focal Dystonia. Mov Disord. 2022 Sep;37(9):1798-1802. doi: 10.1002/mds.29178. Epub 2022 Aug 10. PMID: 35947366; PMCID: PMC9474652.

Kearney E, Nieto-Castañón A, Falsini R, Daliri A, Heller Murray ES, Smith DJ, **Guenther FH**. Quantitatively characterizing reflexive responses to pitch perturbations. Front Hum Neurosci. 2022 Nov 2;16:929687. doi: 10.3389/fnhum.2022.929687. PMID: 36405080; PMCID: PMC9666385.

Frankford SA, Cai S, Nieto-Castañón A, **Guenther FH**. Auditory feedback control in adults who stutter during metronome-paced speech II. Formant Perturbation. J Fluency Disord. 2022 Dec;74:105928. doi: 10.1016/j.jfludis.2022.105928. Epub 2022 Aug 27. PMID: 36063640; PMCID: PMC9930613.

de Zubicaray GI, Arciuli J, Kearney E, **Guenther F**, McMahon KL. On the roles of form systematicity and sensorimotor effects in language processing. J Exp Psychol Learn Mem Cogn. 2023 Mar;49(3):431-444. doi: 10.1037/xlm0001201. Epub 2022 Dec 22. PMID: 36548090.

Frankford SA, Cai S, Nieto-Castañón A, **Guenther FH**. Auditory feedback control in adults who stutter during metronome-paced speech I. Timing Perturbation. J Fluency Disord. 2023 Mar;75:105943. doi: 10.1016/j.jfludis.2022.105943. Epub 2022 Nov 17. PMID: 36423506; PMCID: PMC9974758.

Lowet E, Kondabolu K, Zhou S, Mount RA, Wang Y, Ravasio CR, **Han X**. Deep brain stimulation creates informational lesion through membrane depolarization in mouse hippocampus. Nat Commun. 2022 Dec 13;13(1):7709. doi: 10.1038/s41467-022-35314-1. PMID: 36513664; PMCID: PMC9748039.

Zeng J, Acin-Perez R, Assali EA, Martin A, Brownstein AJ, Petcherski A, Fernández-Del-Rio L, Xiao R, Lo CH, Shum M, Liesa M, **Han X**, Shirihai OS, Grinstaff MW. Restoration of lysosomal acidification rescues autophagy and metabolic dysfunction in non-alcoholic fatty liver disease. Nat Commun. 2023 May 4;14(1):2573. doi: 10.1038/s41467-023-38165-6. PMID: 37142604; PMCID: PMC10160018.

Mercer RCC, **Harris DA**. Mechanisms of prion-induced toxicity. Cell Tissue Res. 2023 Apr;392(1):81-96. doi: 10.1007/s00441-022-03683-0. Epub 2022 Sep 7. PMID: 36070155.

Lian Y, Williams S, Alexander AS, **Hasselmo ME,** Burkitt AN. Learning the Vector Coding of Egocentric Boundary Cells from Visual Data. J Neurosci. 2023 Jul 12;43(28):5180-5190. doi: 10.1523/JNEUROSCI.1071-22.2023. Epub 2023 Jun 7. PMID: 37286350; PMCID: PMC10342228.

Ning W, Bladon JH, **Hasselmo ME**. Complementary representations of time in the prefrontal cortex and hippocampus. Hippocampus. 2022 Aug;32(8):577-596. doi: 10.1002/hipo.23451. Epub 2022 Jul 13. PMID: 35822589; PMCID: PMC9444055.

*Cao R, Bladon JH, Charczynski SJ, **Hasselmo ME**, **Howard MW**. Internally generated time in the rodent hippocampus is logarithmically compressed. Elife. 2022 Oct 17;11:e75353. doi: 10.7554/eLife.75353. PMID: 36250631; PMCID: PMC9651951.

Kopsick JD, Hartzell K, Lazaro H, Nambiar P, **Hasselmo ME**, Dannenberg H. Temporal dynamics of cholinergic activity in the septo-hippocampal system. Front Neural Circuits. 2022 Aug 25;16:957441. doi: 10.3389/fncir.2022.957441. PMID: 36092276; PMCID: PMC9452968.

Lubin RE, Fitzgerald HE, Rosenfield D, Carpenter JK, Papini S, Dutcher CD, Dowd SM, **Hofmann SG**, Pollack MH, Smits JAJ, Otto MW. Using pre-treatment de novo threat conditioning outcomes to predict treatment response to DCS augmentation of exposure-based CBT. J Psychiatr Res. 2023 Aug;164:357-363. doi: 10.1016/j.jpsychires.2023.06.008. Epub 2023 Jun 19. PMID: 37399757.

Ong CW, Hayes SC, **Hofmann SG**. A process-based approach to cognitive behavioral therapy: A theory-based case illustration. Front Psychol. 2022 Oct 25;13:1002849. doi: 10.3389/fpsyg.2022.1002849. PMID: 36389539; PMCID: PMC9642026.

Hayes SC, Ciarrochi J, **Hofmann SG**, Chin F, Sahdra B. Evolving an idionomic approach to processes of change: Towards a unified personalized science of human improvement. Behav Res Ther. 2022 Sep;156:104155. doi: 10.1016/j.brat.2022.104155. Epub 2022 Jul 3. PMID: 35863243.

Bhattacharya S, Goicoechea C, Heshmati S, Carpenter JK, **Hofmann SG**. Efficacy of Cognitive Behavioral Therapy for Anxiety-Related Disorders: A Meta-Analysis of Recent Literature. Curr Psychiatry Rep. 2023 Jan;25(1):19-30. doi: 10.1007/s11920-022-01402-8. Epub 2022 Dec 19. PMID: 36534317; PMCID: PMC9834105.

Curtiss JE, Pinaire M, Fulford D, McNally RJ, **Hofmann SG**. Temporal and contemporaneous network structures of affect and physical activity in emotional disorders. J Affect Disord. 2022 Oct 15;315:139-147. doi: 10.1016/j.jad.2022.07.061. Epub 2022 Jul 27. PMID: 35907480.

Bhattacharya S, Kennedy M, Miguel C, Tröger A, **Hofmann SG**, Cuijpers P. Effect of psychotherapy for adult depression on self-esteem: A systematic review and meta-analysis. J Affect Disord. 2023 Mar 15;325:572-581. doi: 10.1016/j.jad.2023.01.047. Epub 2023 Jan 13. PMID: 36642316.

Messina I, Spataro P, Grecucci A, Moskow DM, Marogna C,

Hofmann SG. Interpersonal emotion regulation questionnaire: psychometric properties of the Italian version and associations with psychopathology. Res Psychother. 2022 Aug 24;25(2):616. doi: 10.4081/ripppo.2022.616. PMID: 36039912; PMCID: PMC9472333.

Yamaguchi K, Ito M, Takebayashi Y, Horikoshi M, **Hofmann SG**. Affective styles and their association with anxiety and depression in a Japanese clinical sample. Clin Psychol Psychother. 2022 Jul;29(4):1481-1487. doi: 10.1002/cpp.2707. Epub 2022 Jan 28. PMID: 35048459.

Barthel AL, Aderka IM, Byrne AJ, Peckham AD, **Hofmann SG**. Distinct and interacting impacts of trait anxiety and a state anxiety manipulation on attentional switching. Anxiety Stress Coping. 2022 Jul;35(4):409-424. doi: 10.1080/10615806.2021.1983801. Epub 2021 Oct 10. PMID: 34632875.

Cushing CA, Dawes AJ, **Hofmann SG**, Lau H, LeDoux JE, Taschereau-Dumouchel V. A generative adversarial model of intrusive imagery in the human brain. PNAS Nexus. 2023 Jan 23;2(1):pgac265. doi: 10.1093/pnasnexus/pgac265. PMID: 36733294; PMCID: PMC9887942.

Szuhany KL, Adhikari S, Chen A, Lubin RE, Jennings E, Rassaby M, Eakley R, Brown ML, Suzuki R, Barthel AL, Rosenfield D, Hoeppner SS, Khalsa SB, Bui E, **Hofmann SG**, Simon NM. Impact of preference for yoga or cognitive behavioral therapy in patients with generalized anxiety disorder on treatment outcomes and engagement. J Psychiatr Res. 2022 Sep;153:109-115. doi: 10.1016/j.jpsychires.2022.07.008. Epub 2022 Jul 5. PMID: 35810600; PMCID: PMC9969964.

Carpenter JK, Moskow DM, **Hofmann SG**. Enhanced Mental Reinstatement of Exposure to Improve Extinction Generalization: A Study on Claustrophobia and MRI Fear. Behav Ther. 2023 Jan;54(1):156-169. doi: 10.1016/j.beth.2022.08.002. Epub 2022 Aug 13. PMID: 36608973.

Xie Q, Guan Y, **Hofmann SG**, Jiang T, Liu X. The potential mediating role of anxiety sensitivity in the impact of mindfulness training on anxiety and depression severity and impairment: A randomized controlled trial. Scand J Psychol. 2023 Feb;64(1):21-29. doi: 10.1111/sjop.12860. Epub 2022 Jul 19. PMID: 35851956; PMCID: PMC9839484.

Howard MW, Esfahani ZG, Le B, Sederberg PB. Foundations of a temporal RL. ArXiv [Preprint]. 2023 Feb 20:arXiv:2302.10163v1. PMID: 36866224; PMCID: PMC9980275.

Tiganj Z, Singh I, Esfahani ZG, **Howard MW**. Scanning a compressed ordered representation of the future. J Exp Psychol Gen. 2022 Dec;151(12):3082-3096. doi: 10.1037/xge0001243. Epub 2022 Aug 1. PMID: 35913876; PMCID: PMC9670103.

Garcia-Retortillo S, **Ivanov PC**. Inter-muscular networks of synchronous muscle fiber activation. Front Netw Physiol. 2022 Nov 14;2:1059793. doi: 10.3389/fnetp.2022.1059793. PMID: 36926057; PMCID: PMC10012969.

Schöll E, Sawicki J, Berner R, **Ivanov PC**. Editorial: Adaptive networks in functional modeling of physiological systems. Front Netw Physiol. 2022 Aug 25;2:996784. doi: 10.3389/fnetp.2022.996784. PMID: 36926059; PMCID: PMC10012965.

Balagué N, Hristovski R, Almarcha M, Garcia-Retortillo S, **Ivanov PC**. Network Physiology of Exercise: Beyond Molecular and Omics Perspectives. Sports Med Open. 2022 Sep 23;8(1):119. doi: 10.1186/s40798-022-00512-0. PMID: 36138329; PMCID: PMC9500136.

Rizzo R, Garcia-Retortillo S, **Ivanov PC**. Dynamic networks of physiologic interactions of brain waves and rhythms in muscle activity. Hum Mov Sci. 2022 Aug;84:102971. doi: 10.1016/j.humov.2022.102971. Epub 2022 Jun 17. PMID: 35724499.

Vaidya R, Yi JX, O'Shea TM , Jensen ET, **Joseph RM**, Shenberger J, Gogcu S, Wagner K, Msall ME, Thompson AL, Frazier JA, Fry R, Singh R; ELGAN-ECHO Study Investigators. Long-Term Outcome of Necrotizing Enterocolitis and Spontaneous Intestinal Perforation. Pediatrics. 2022 Nov 1;150(5):e2022056445. doi: 10.1542/peds.2022-056445. PMID: 36200375; PMCID: PMC9647591.

Freedman AN, Eaves LA, Rager JE, Gavino-Lopez N, Smeester L, Bangma J, Santos HP, **Joseph RM**, Kuban KC, O'Shea TM, Fry RC. The placenta epigenome-brain axis: placental epigenomic and transcriptomic responses that preprogram cognitive impairment. Epigenomics. 2022 Aug;14(15):897-911. doi: 10.2217/epi-2022-0061. Epub 2022 Sep 8. PMID: 36073148; PMCID: PMC9475498.

Frazier JA, Cochran D, Kim S, Jalnapurkar I, **Joseph RM**, Hooper SR, Santos HP Jr, Ru H, Venuti L, Singh R, Washburn LK, Gogcu S, Msall ME, Kuban KCK, Rollins JV, Hanson SG, Jara H, Pastyrnak SL, Roell KR, Fry RC, O'Shea TM; ELGAN Study Investigators. Psychiatric Outcomes, Functioning, and Participation in Extremely Low Gestational Age Newborns at Age 15 Years. J Am Acad Child Adolesc Psychiatry. 2022 Jul;61(7):892-904.e2. doi: 10.1016/j.jaac.2021.12.008. Epub 2021 Dec 29. PMID: 34973366; PMCID: PMC9240104.

Joseph RM, Hooper SR, Heeren T, Santos HP Jr, Frazier JA, Venuti L, Foley A, Rollins CK, Kuban KCK, Fry RC, O'Shea TM; ELGAN Study Investigators. Maternal Social Risk, Gestational Age at Delivery, and Cognitive Outcomes among Adolescents Born Extremely Preterm. Paediatr Perinat Epidemiol. 2022 Sep;36(5):654-664. doi: 10.1111/ppe.12893. Epub 2022 May 18. PMID: 36530363; PMCID: PMC9754639.

Jensen ET, Yi J, Jackson W, Singh R, **Joseph RM**, Kuban KCK, Msall ME, Washburn L, Fry R, South AM, O'Shea TM. Analysis of Neurodevelopment in Children Born Extremely Preterm Treated With Acid Suppressants Before Age 2 Years. JAMA Netw Open. 2022 Nov 1;5(11):e2241943. doi: 10.1001/jamanetworkopen.2022.41943. PMID: 36378311; PMCID: PMC9667324.

Hadjikhani N, Galazka M, Kenet T, **Joseph R**, Åsberg Johnels J. Discrepancy between high non-verbal intelligence and low accuracy at reading emotional expressions in the eyes reflects the magnitude of social-emotional difficulties in autism. Eur Arch Psychiatry Clin Neurosci. 2022 Aug 18. doi: 10.1007/s00406-022-01471-z. Epub ahead of print. PMID: 35980452.

Ahlfors SP, Graham S, Alho J, **Joseph RM**, McGuiggan NM, Nayal Z, Hämäläinen MS, Khan S, Kenet T. Magnetoencephalography and electroencephalography can both detect differences in cortical responses to vibrotactile stimuli in individuals on the autism spectrum. Front Psychiatry. 2022 Aug 5;13:902332. doi: 10.3389/fpsyt.2022.902332. PMID: 35990048; PMCID: PMC9388788.

Cochran DM, Jensen ET, Frazier JA, Jalnapurkar I, Kim S, Roell KR, **Joseph RM**, Hooper SR, Santos HP Jr, Kuban KCK, Fry RC, O'Shea TM. Association of prenatal modifiable risk factors with attention-deficit hyperactivity disorder outcomes at age 10 and 15 in an extremely low gestational age cohort. Front Hum Neurosci. 2022 Oct 20;16:911098. doi: 10.3389/fnhum.2022.911098. PMID: 36337853; PMCID: PMC9630552.

Joseph RM, Lai ER, Bishop S, Yi J, Bauman ML, Frazier JA, Santos HP Jr, Douglas LM, Kuban KKC, Fry RC, O'Shea TM. Comparing autism phenotypes in children born extremely preterm and born at term. Autism Res. 2023 Mar;16(3):653-666. doi: 10.1002/aur.2885. Epub 2023 Jan 3. PMID: 36595641.

Emmanuel C, Yi JX, **Joseph RM**, Kuban KKC, Knafl KA, Docherty SL, Hodges EA, Fry RC, O'Shea TM, Santos HP Jr. Child and family factors associated with positive outcomes among youth born extremely preterm. Pediatr Res. 2023 Jan 13. doi: 10.1038/s41390-022-02424-x. Epub ahead of print. PMID: 36639518.

O'Shea TM, Register HM, Yi JX, Jensen ET, **Joseph RM**, Kuban KCK, Frazier JA, Washburn L, Belfort M, South AM, Santos HP Jr, Shenberger J, Perrin EM, Thompson AL, Singh R, Rollins J, Gogcu S, Sanderson K, Wood C, Fry RC; ELGAN-ECHO Pulmonary/Obesity Group. Growth During Infancy After Extremely Preterm Birth: Associations with Later Neurodevelopmental and Health Outcomes. J Pediatr. 2023 Jan;252:40-47.e5. doi: 10.1016/j.jpeds.2022.08.015. Epub 2022 Aug 18. PMID: 35987367.

Eaves LA, Enggasser AE, Camerota M, Gogcu S, Gower WA, Hartwell H, Jackson WM, Jensen E, **Joseph RM**, Marsit CJ, Roell K, Santos HP Jr, Shenberger JS, Smeester L, Yanni D, Kuban KCK, O'Shea TM, Fry RC. CpG methylation patterns in placenta and neonatal blood are differentially associated with neonatal inflammation. Pediatr Res. 2023 Mar;93(4):1072-1084. doi: 10.1038/s41390-022-02150-4. Epub 2022 Jun 28. PMID: 35764815.

Frazier JA, Li X, Kong X, Hooper SR, **Joseph RM**, Cochran DM, Kim S, Fry RC, Brennan PA, Msall ME, Fichorova RN, Hertz-Picciotto I, Daniels JL, Lai JS, Boles RE, Zvara BJ, Jalnapurkar I, Schweitzer JB, Singh R, Posner J, Bennett DH, Kuban KCK, O'Shea TM; program collaborators for Environmental influences on Child Health Outcomes. Perinatal Factors and Emotional, Cognitive, and Behavioral Dysregulation in Childhood and Adolescence. J Am Acad Child Adolesc Psychiatry. 2023 May 15:S0890-8567(23)00248-4. doi: 10.1016/j.jaac.2023.05.010. Epub ahead of print. PMID: 37207889.

Freedman AN, Clark J, Eaves LA, Roell K, Oran A, Koval L, Rager J, Santos HP Jr, Kuban K, **Joseph RM**, Frazier J, Marsit CJ, Burt AA, O'Shea TM, Fry RC. A multi-omic approach identifies an autism spectrum disorder (ASD) regulatory complex of functional epimutations in placentas from children born preterm. Autism Res. 2023 May;16(5):918-934. doi: 10.1002/aur.2915. Epub 2023 Mar 20. PMID: 36938998; PMCID: PMC10192070.

Ahlfors SP, Graham S, Bharadwaj H, Mamashli F, Khan S, **Joseph RM**, Losh A, Pawlyszyn S, McGuiggan NM, Vangel M, Hämäläinen MS, Kenet T. No Differences in Auditory Steady-State Responses in Children with Autism Spectrum Disorder and Typically Developing Children. J Autism Dev Disord. 2023 Mar 17. doi: 10.1007/s10803-023-05907-w. Epub ahead of print. PMID: 36932270.

*Sena KD, Beierle JA, Richardson KT, **Kantak KM**, **Bryant CD**. Assessment of Binge-Like Eating of Unsweetened vs. Sweetened Chow Pellets in BALB/c Substrains. Front Behav Neurosci. 2022 Jul 15;16:944890. doi: 10.3389/fnbeh.2022.944890. PMID: 35910681; PMCID: PMC9337213.

Mathieson E, Irving C, Koberna S, Nicholson M, Otto MW, **Kantak KM**. Role of preexisting inhibitory control deficits vs. drug use history in mediating insensitivity to aversive consequences in a rat model of polysubstance use. Psychopharmacology (Berl). 2022 Aug;239(8):2377-2394. doi: 10.1007/s00213-022-06134-4. Epub 2022 Apr 7. PMID: 35391547; PMCID: PMC8989405.

Cheng C, **Kibbe MM**. Is Nonsymbolic Arithmetic Truly "Arithmetic"? Examining the Computational Capacity of the Approximate Number System in Young Children. Cogn Sci. 2023 Jun;47(6):e13299. doi: 10.1111/cogs.13299. PMID: 37303302.

Mandelbaum E, Dunham Y, Feiman R, Firestone C, Green EJ, Harris D , **Kibbe MM**, Kurdi B, Mylopoulos M, Shepherd J, Wellwood A, Porot N, Quilty-Dunn J. Problems and Mysteries of the Many Languages of Thought. Cogn Sci. 2022 Dec;46(12):e13225. doi: 10.1111/cogs.13225. PMID: 36537721.

Kenderla P, **Kibbe MM**. Explore versus store: Children strategically trade off reliance on exploration versus working memory during a complex task. J Exp Child Psychol. 2023 Jan;225:105535. doi: 10.1016/j.jecp.2022.105535. Epub 2022 Aug 27. PMID: 36041236.

Kibbe MM, Applin JB. Tracking what went where across toddlerhood: Feature-location bound object representations in 2- to 3-year-olds'

working memory. Child Dev. 2022 Nov;93(6):1713-1726. doi: 10.1111/cdev.13813. Epub 2022 Jun 18. PMID: 35716069.

Blankenship TL, **Kibbe MM**. "Plan chunking" expands 3-year-olds' ability to complete multiple-step plans. Child Dev. 2023 Apr 24. doi: 10.1111/cdev.13929. Epub ahead of print. PMID: 37092570.

Varkanitsa M, Peñaloza C, Charidimou A, **Kiran S**. Cerebral Small Vessel Disease Burden: An Independent Biomarker for Anomia Treatment Responsiveness in Chronic Stroke Patients With Aphasia. Arch Phys Med Rehabil. 2023 Jun 7:S0003-9993(23)00341-6. doi: 10.1016/j.apmr.2023.05.008. Epub ahead of print. PMID: 37290492.

Annoni JM, Ansaldo AI, **Kiran S**, Marangolo P. Editorial: New insights into vascular language disorders. Front Hum Neurosci. 2023 Jan 6;16:1087848. doi: 10.3389/fnhum.2022.1087848. PMID: 36684835; PMCID: PMC9853959.

Varkanitsa M, Godecke E, **Kiran S**. How Much Attention Do We Pay to Attention Deficits in Poststroke Aphasia? Stroke. 2023 Jan;54(1):55-66. doi: 10.1161/STROKEAHA.122.037936. Epub 2022 Dec 21. PMID: 36542078; PMCID: PMC9927868.

Braun EJ, Billot A, Meier EL, Pan Y, Parrish TB, Kurani AS, **Kiran S**. White matter microstructural integrity pre- and post-treatment in individuals with chronic post-stroke aphasia. Brain Lang. 2022 Sep;232:105163. doi: 10.1016/j.bandl.2022.105163. Epub 2022 Jul 31. PMID: 35921727; PMCID: PMC9641951.

Billot A, Thiebaut de Schotten M, Parrish TB, Thompson CK, Rapp B, Caplan D, **Kiran S**. Structural disconnections associated with language impairments in chronic post-stroke aphasia using disconnectome maps. Cortex. 2022 Oct;155:90-106. doi: 10.1016/j.cortex.2022.06.016. Epub 2022 Jul 19. PMID: 35985126; PMCID: PMC9623824.

Cordella C, Munsell M, Godlove J, Anantha V, Advani M, **Kiran S**. Dosage Frequency Effects on Treatment Outcomes Following Self-managed Digital Therapy: Retrospective Cohort Study. J Med Internet Res. 2022 Jul 20;24(7):e36135. doi: 10.2196/36135. PMID: 35857353; PMCID: PMC9350823.

Braun EJ, **Kiran S**. Stimulus- and Person-Level Variables Influence Word Production and Response to Anomia Treatment for Individuals With Chronic Poststroke Aphasia. J Speech Lang Hear Res. 2022 Oct 17;65(10):3854-3872. doi: 10.1044/2022_JSLHR-21-00527. Epub 2022 Oct 6. PMID: 36201169; PMCID: PMC9927625.

Scimeca M, Abdollahi F, Peñaloza C, **Kiran S**. Clinical perspectives and strategies for confronting disparities in social determinants of health for Hispanic bilinguals with aphasia. J Commun Disord. 2022 Jul-Aug;98:106231. doi: 10.1016/j.jcomdis.2022.106231. Epub 2022 Jun 3. PMID: 35688011; PMCID: PMC9228944.

Barbieri E, Thompson CK, Higgins J, Caplan D, **Kiran S**, Rapp B, Parrish T. Treatment-induced neural reorganization in aphasia is language-domain specific: Evidence from a large-scale fMRI study. Cortex. 2023 Feb;159:75-100. doi: 10.1016/j.cortex.2022.11.008. Epub 2022 Dec 17. PMID: 36610109; PMCID: PMC9931666.

Wallace SJ, Worrall L, Rose TA, Alyahya RSW, Babbitt E, Beeke S, de Beer C, Bose A, Bowen A, Brady MC, Breitenstein C, Bruehl S, Bryant L, Cheng BBY, Cherney LR, Conroy P, Copland DA, Croteau C, Cruice M, Dipper L, Hilari K, Howe T, Kelly H, **Kiran S**, Laska AC, Marshall J, Murray LL, Patterson J, Pearl G, Quinting J, Rochon E, Rose ML, Rubi-Fessen I, Sage K, Simmons-Mackie N, Visch-Brink E, Volkmer A, Webster J, Whitworth A, Dorze GL. Measuring communication as a core outcome in aphasia trials: Results of the ROMA-2 international core outcome set development meeting. Int J Lang Commun Disord. 2022 Dec 30. doi: 10.1111/1460-6984.12840. Epub ahead of print. PMID: 36583427.

Soplata AE, Adam E, Brown EN, Purdon PL, McCarthy MM, **Kopell N**. Rapid thalamocortical network switching mediated by cortical synchronization underlies propofol-induced EEG signatures: a biophysical model. J Neurophysiol. 2023 Jul 1;130(1):86-103. doi: 10.1152/jn.00068.2022. Epub 2023 Jun 14. PMID: 37314079; PMCID: PMC10312318.

Hass J, Ardid S, Sherfey J, **Kopell N**. Constraints on persistent activity in a biologically detailed network model of the prefrontal cortex with heterogeneities. Prog Neurobiol. 2022 Aug;215:102287. doi: 10.1016/j.pneurobio.2022.102287. Epub 2022 May 6. PMID: 35533813.

Quast KB, Reh RK, Caiati MD, **Kopell N**, McCarthy MM, Hensch TK. Rapid synaptic and gamma rhythm signature of mouse critical period plasticity. Proc Natl Acad Sci U S A. 2023 Jan 10;120(2):e2123182120. doi: 10.1073/pnas.2123182120. Epub 2023 Jan 4. PMID: 36598942; PMCID: PMC9926253.

Aussel A, Fiebelkorn IC, Kastner S, **Kopell NJ**, Pittman-Polletta BR PhD. Interacting rhythms enhance sensitivity of target detection in a fronto-parietal computational model of visual attention. Elife. 2023 Jan 31;12:e67684. doi: 10.7554/eLife.67684. Epub ahead of print. PMID: 36718998.

Cattani A, Arnold DB, McCarthy M, **Kopell N**. Basolateral amygdala oscillations enable fear learning in a biophysical model. bioRxiv [Preprint]. 2023 Apr 28:2023.04.28.538604. doi: 10.1101/2023.04.28.538604. PMID: 37163011; PMCID: PMC10168360.

Chinappen DM, Ostrowski LM, Spencer ER, Kwon H, **Kramer MA**, Hämäläinen MS, Chu CJ. Decreased thalamocortical connectivity in resolved Rolandic epilepsy. Clin Neurophysiol. 2023 Jun 24;153:21-27. doi: 10.1016/j.clinph.2023.05.013. Epub ahead of print. PMID: 37419052.

Zhu X, Shappell H, **Kramer MA**, Chu CJ, Kolaczyk ED. Distinguishing between different percolation regimes in noisy dynamic networks with an application to epileptic seizures. PLoS Comput Biol. 2023 Jun 16;19(6):e1011188. doi: 10.1371/journal.pcbi.1011188. PMID: 37327238; PMCID: PMC10310035.

Smith D, **Kramer M**, Bumb N, Silten B. Creating Shared Value to Advance Health Equity. Am J Health Promot. 2022 Jul;36(6):1047-1050. doi: 10.1177/08901171221092576b. PMID: 35699328.

Kramer MA, Chu CJ. The 1/f-like behavior of neural field spectra are a natural consequence of noise driven brain dynamics. bioRxiv [Preprint]. 2023 May 19:2023.03.10.532077. doi: 10.1101/2023.03.10.532077. PMID: 37214869; PMCID: PMC10197559.

Ostrowski LM, Chinappen DM, Stoyell SM, Song DY, Ross EE, **Kramer MA**, Emerton BC, Chu CJ. Children with Rolandic epilepsy have micro- and macrostructural abnormalities in white matter constituting networks necessary for language function. Epilepsy Behav. 2023 May 18;144:109254. doi: 10.1016/j.yebeh.2023.109254. Epub ahead of print. PMID: 37209552.

McLaren JR, Luo Y, Kwon H, Shi W, **Kramer MA**, Chu CJ. Preliminary evidence of a relationship between sleep spindles and treatment response in epileptic encephalopathy. bioRxiv [Preprint]. 2023 Apr 24:2023.04.22.537937. doi: 10.1101/2023.04.22.537937. PMID: 37163098; PMCID: PMC10168273.
Kramer MA. Reducing FHIR "Profiliferation": A Data-Driven Approach. AMIA Annu Symp Proc. 2023 Apr 29;2022:634-643. PMID: 37128432; PMCID: PMC10148270.

Kramer MA, Moesel C. Interoperability with multiple Fast Healthcare Interoperability Resources (FHIR®) profiles and versions. JAMIA Open. 2023 Feb 7;6(1):ooad001. doi: 10.1093/jamiaopen/ooad001. PMID: 36762126; PMCID: PMC9904180.

Zhu X, **Lin JW,** Sander MY. Bidirectional modulation of evoked synaptic transmission by pulsed infrared light. Sci Rep. 2022 Aug 20;12(1):14196. doi: 10.1038/s41598-022-18139-2. PMID: 35987765; PMCID: PMC9392733.

Yu F, Müller WS, Ehnholm G, Okada Y, **Lin JW**. Effects of Osmolarity on Ultrasound-Induced Membrane Depolarization in Isolated Crayfish Motor Axon. Ultrasound Med Biol. 2022 Oct;48(10):2040-2051. doi: 10.1016/j.ultrasmedbio.2022.05.028. Epub 2022 Jul 23. PMID: 35882572.

Foster JJ, **Ling S**. Feature-based attention multiplicatively scales the fMRI-BOLD contrast-response function. J Neurosci. 2022 Jul 22;42(36):6894–906. doi: 10.1523/JNEUROSCI.0513-22.2022. Epub ahead of print. PMID: 35868860; PMCID: PMC9464014.

Harrison AH, **Ling S**, Foster JJ. The cost of divided attention for detection of simple visual features primarily reflects limits in post-perceptual processing. Atten Percept Psychophys. 2023 Feb;85(2):377-386. doi: 10.3758/s13414-022-02547-7. Epub 2022 Aug 8. PMID: 35941469; PMCID: PMC9360720.

*__Medalla M__, Mo B, Nasar R, Zhou Y, Park J, **Luebke JI**. Comparative features of calretinin, calbindin, and parvalbumin expressing interneurons in mouse and monkey primary visual and frontal cortices. J Comp Neurol. 2023 Jun 26. doi: 10.1002/cne.25514. Epub ahead of print. PMID: 37357562.

*__Moore TL__, __Medalla M__, Ibañez S, Wimmer K, Mojica CA, **Killiany RJ**, **Moss MB**, **Luebke JI**, **Rosene DL**. Neuronal properties of pyramidal cells in lateral prefrontal cortex of the aging rhesus monkey brain are associated with performance deficits on spatial working memory but not executive function. Geroscience. 2023 Apr 28. doi: 10.1007/s11357-023-00798-2. Epub ahead of print. PMID: 37106282.

Huo Y, Lu W, Tian Y, Hou Q, **Man HY**. *Prkn* knockout mice show autistic-like behaviors and aberrant synapse formation. iScience. 2022 Jun 10;25(7):104573. doi: 10.1016/j.isci.2022.104573. PMID: 35789851; PMCID: PMC9249611.

Hu WT, Liuyang ZY, Tian Y, Liang JW, Zhang XL, Zhang HL, Wang G, Huo Y, Shentu YP, Wang JZ, Wang XC, Lu YM, Westermarck J, **Man HY**, Liu R. CIP2A deficiency promotes depression-like behaviors in mice through inhibition of dendritic arborization. EMBO Rep. 2022 Dec 6;23(12):e54911. doi: 10.15252/embr.202254911. Epub 2022 Oct 28. PMID: 36305233; PMCID: PMC9724669.

McNaughton R, Huo Y, Li G, Ioschpe ADV, Yan L, **Man HY**, Zhang X. Regulatory Effects of Gradient Microtopographies on Synapse Formation and Neurite Growth in Hippocampal Neurons. J Micromech Microeng. 2022 Jul;32(7):075005. doi: 10.1088/1361-6439/ac73d7. Epub 2022 Jun 10. PMID: 35814808; PMCID: PMC9262107.

Qiao H, Tian Y, Huo Y, **Man HY**. Role of the DUB enzyme USP7 in dendritic arborization, neuronal migration, and autistic-like behaviors in mice. iScience. 2022 Jun 14;25(7):104595. doi: 10.1016/j.isci.2022.104595. PMID: 35800757; PMCID: PMC9253496.

Zhang J, Liu D, Fu P, Liu ZQ, Lai C, Yang CQ, Chen K, Bao WD, Hu F, Du HY, Yang W, Wang J, **Man HY**, Lu Y, Zhu LQ. Social isolation reinforces aging-related behavioral inflexibility by promoting neuronal necroptosis in basolateral amygdala. Mol Psychiatry. 2022 Oct;27(10):4050-4063. doi: 10.1038/s41380-022-01694-5. Epub 2022 Jul 15. PMID: 35840795; PMCID: PMC9284973.

Zhou LT, Liu D, Kang HC, Lu L, Huang HZ, Ai WQ, Zhou Y, Deng MF, Li H, Liu ZQ, Zhang WF, Hu YZ, Han ZT, Zhang HH, Jia JJ, Sarkar AK, Sharaydeh S, Wang J, **Man HY**, Schilling M, Bertram L, Lu Y, Guo Z, Zhu LQ. Tau pathology epigenetically remodels the neuron-glial cross-talk in Alzheimer's disease. Sci Adv. 2023 Apr 21;9(16):eabq7105. doi: 10.1126/sciadv.abq7105. Epub 2023 Apr 21. PMID: 37083538; PMCID: PMC10121173.

*Do Q, Li Y, Kane GA, **McGuire JT**, **Scott BB**. Assessing evidence accumulation and rule learning in humans with an online game. J Neurophysiol. 2023 Jan 1;129(1):131-143. doi: 10.1152/jn.00124.2022. Epub 2022 Dec 7. PMID: 36475830.

Bakst L, **McGuire JT**. Experience-driven recalibration of learning from surprising events. Cognition. 2023 Mar;232:105343. doi: 10.1016/j.cognition.2022.105343. Epub 2022 Dec 5. PMID: 36481590; PMCID: PMC9851993.

Lempert KM, Schaefer L, Breslow D, Peterson TD, Kable JW, **McGuire JT**. Statistical information about reward timing is insufficient for promoting optimal persistence decisions. Cognition. 2023 May 4;237:105468. doi: 10.1016/j.cognition.2023.105468. Epub ahead of print. PMID: 37148639.

Daneshvar DH, Nair ES, Baucom ZH, Rasch A, Abdolmohammadi B, Uretsky M, Saltiel N, Shah A, Jarnagin J, Baugh CM, Martin BM, Palmisano JN, Cherry JD, Alvarez VE, Huber BR, Weuve J, Nowinski CJ, Cantu RC, Zafonte RD, Dwyer B, Crary JF, Goldstein LE, Kowall NW, Katz DI, **Stern RA**, Tripodis Y, Stein TD, McClean MD, Alosco ML, **McKee AC**, Mez J. Leveraging football accelerometer data to quantify associations between repetitive head impacts and chronic traumatic encephalopathy in males. Nat Commun. 2023 Jun 20;14(1):3470. doi: 10.1038/s41467-023-39183-0. PMID: 37340004; PMCID: PMC10281995.

Alosco ML, Ly M, Mosaheb S, Saltiel N, Uretsky M, Tripodis Y, Martin B, Palmisano J, Delano-Wood L, Bondi MW, Meng G, Xia W, Daley S, Goldstein LE, Katz DI, Dwyer B, Daneshvar DH, Nowinski C, Cantu RC, Kowall NW, Stern RA, Alvarez VE, Mez J, Huber BR, **McKee AC**, Stein TD. Decreased myelin proteins in brain donors exposed to football-related repetitive head impacts. Brain Commun. 2023 Mar 6;5(2):fcad019. doi: 10.1093/braincomms/fcad019. PMID: 36895961; PMCID: PMC9990992.

Labadorf A, Agus F, Aytan N, Cherry J, Mez J, **McKee A**, Stein TD. Inflammation and neuronal gene expression changes differ in early versus late chronic traumatic encephalopathy brain. BMC Med Genomics. 2023 Mar 9;16(1):49. doi: 10.1186/s12920-023-01471-5. PMID: 36895005; PMCID: PMC9996917.

McKee AC, Stein TD, Huber BR, Crary JF, Bieniek K, Dickson D, Alvarez VE, Cherry JD, Farrell K, Butler M, Uretsky M, Abdolmohammadi B, Alosco ML, Tripodis Y, Mez J, Daneshvar DH. Chronic traumatic encephalopathy (CTE): criteria for neuropathological diagnosis and relationship to repetitive head impacts. Acta Neuropathol. 2023 Apr;145(4):371-394. doi: 10.1007/s00401-023-02540-w. Epub 2023 Feb 10. PMID: 36759368; PMCID: PMC10020327.

Nicks R, Clement NF, Alvarez VE, Tripodis Y, Baucom ZH, Huber BR, Mez J, Alosco ML, Aytan N, Cherry JD, Cormier KA, Kubilius C, Mathias R, Svirsky SE, Pothast MJ, Hildebrandt AM, Chung J, Han X , Crary JF, **McKee AC**, Frosch MP, Stein TD. Repetitive head impacts and chronic traumatic encephalopathy are associated with TDP-43 inclusions and hippocampal sclerosis. Acta Neuropathol. 2023 Apr;145(4):395-408. doi: 10.1007/s00401-023-02539-3. Epub 2023 Jan 21. PMID: 36681782.

Kirsch D, Shah A, Dixon E, Kelley H, Cherry JD, Xia W, Daley S, Aytan N, Cormier K, Kubilus C, Mathias R, Alvarez VE, Huber BR, **McKee AC**, Stein TD. Vascular injury is associated with repetitive head impacts and tau pathology in chronic traumatic encephalopathy. J Neuropathol Exp Neurol. 2023 Jan 20;82(2):127-139. doi: 10.1093/jnen/nlac122. PMID: 36617181; PMCID: PMC9852946.

Cherry JD, Baucom ZH, Eppich KG, Kirsch D, Dixon ER, Tripodis Y, Bieniek KF, Farrell K, Whitney K, Uretsky M, Crary JF, Dickson D, **McKee AC**. Neuroimmune proteins can differentiate between tauopathies. J Neuroinflammation. 2022 Nov 19;19(1):278. doi: 10.1186/s12974-022-02640-6. PMID: 36403052; PMCID: PMC9675129.

*Alosco ML, Su Y, Stein TD, Protas H, Cherry JD, Adler CH, Balcer LJ, Bernick C, Pulukuri SV, Abdolmohammadi B, Coleman MJ, Palmisano JN, Tripodis Y, Mez J, Rabinovici GD, Marek KL, Beach TG, Johnson KA, Huber BR, Koerte I, Lin AP, Bouix S, Cummings JL, Shenton ME, Reiman EM, **McKee AC**, **Stern RA**; DIAGNOSE C. T. E. Research Project. Associations between near end-of-life flortaucipir PET and postmortem CTE-related tau neuropathology in six former American football players. Eur J Nucl Med Mol Imaging. 2023 Jan;50(2):435-452. doi: 10.1007/s00259-022-05963-x. Epub 2022 Sep 24. PMID: 36152064; PMCID: PMC9816291.

McKenzie AT, Marx GA, Koenigsberg D, Sawyer M, Iida MA, Walker JM, Richardson TE, Campanella G, Attems J, **McKee AC**, Stein TD, Fuchs TJ, White CL 3rd; PART working group; Farrell K, Crary JF. Interpretable deep learning of myelin histopathology in age-related cognitive impairment. Acta Neuropathol Commun. 2022 Sep 21;10(1):131. doi: 10.1186/s40478-022-01425-5. PMID: 36127723; PMCID: PMC9490907.

Farrell K, Iida MA, Cherry JD, Casella A, Stein TD, Bieniek KF, Walker JM, Richardson TE, White CL, Alvarez VE, Huber BR, Dickson DW, Insausti R, Dams-O'Connor K; Part Working Group; **McKee AC**, Crary JF. Differential Vulnerability of Hippocampal Subfields in Primary Age-Related Tauopathy and Chronic Traumatic Encephalopathy. J Neuropathol Exp Neurol. 2022 Sep 19;81(10):781-789. doi: 10.1093/jnen/nlac066. PMID: 36004533; PMCID: PMC9487677.

*Alosco ML, Tripodis Y, Baucom ZH, Adler CH, Balcer LJ, Bernick C, Mariani ML, Au R, Banks SJ, Barr WB, Wethe JV, Cantu RC, Coleman MJ, Dodick DW, McClean MD, **McKee AC**, Mez J, Palmisano JN, Martin B, Hartlage K, Lin AP, Koerte IK, Cummings JL, Reiman EM, **Stern RA**, Shenton ME, Bouix S; DIAGNOSE CTE Research Project. White matter hyperintensities in former American football players. Alzheimers Dement. 2023 Apr;19(4):1260-1273. doi: 10.1002/alz.12779. Epub 2022 Aug 22. PMID: 35996231.

Roemer SF, Grinberg LT, Crary JF, Seeley WW, **McKee AC**, Kovacs GG, Beach TG, Duyckaerts C, Ferrer IA, Gelpi E, Lee EB, Revesz T, White CL 3rd, Yoshida M, Pereira FL, Whitney K, Ghayal NB, Dickson DW. Rainwater Charitable Foundation criteria for the neuropathologic diagnosis of progressive supranuclear palsy. Acta Neuropathol. 2022 Oct;144(4):603-614. doi: 10.1007/s00401-022-02479-4. Epub 2022 Aug 10. PMID: 35947184; PMCID: PMC9468104.

Butler MLMD, Dixon E, Stein TD, Alvarez VE, Huber B, Buckland ME, **McKee AC**, Cherry JD. Tau Pathology in Chronic Traumatic Encephalopathy is Primarily Neuronal. J Neuropathol Exp Neurol. 2022 Sep 19;81(10):773-780. doi: 10.1093/jnen/nlac065. Erratum in: J Neuropathol Exp Neurol. 2023 Mar 20;82(4):373. PMID: 35903039; PMCID: PMC9487650.

Lee J, Kim S, Kim YH, Park U, Lee J, **McKee AC**, Kim KH, Ryu H, Lee J. Non-Targeted Metabolomics Approach Revealed Significant Changes in Metabolic Pathways in Patients with Chronic Traumatic Encephalopathy. Biomedicines. 2022 Jul 15;10(7):1718. doi: 10.3390/biomedicines10071718. PMID: 35885023; PMCID: PMC9313062.

*Atherton K, Han X , Chung J, Cherry JD, Baucom Z, Saltiel N, Nair E, Abdolmohammadi B, Uretsky M, Khan MM, Shea C, Durape S, Martin BM, Palmisano JN, Farrell K, Nowinski CJ, Alvarez VE, Dwyer B, Daneshvar DH, Katz DI, Goldstein LE, Cantu RC, Kowall NW, Alosco ML, Huber BR, Tripodis Y, Crary JF, Farrer L, **Stern RA**, Stein TD, **McKee AC**, Mez J. Association of APOE Genotypes and Chronic Traumatic Encephalopathy. JAMA Neurol. 2022 Aug 1;79(8):787-796. doi: 10.1001/jamaneurol.2022.1634. Erratum in: JAMA Neurol. 2023 Feb 1;80(2):215. PMID: 35759276; PMCID: PMC9237800.

Colvin LE, Foster ZW, Stein TD, Thakore-James M, Salajegheh MK, Carr K, Spencer KR, Abdul Rauf N, Adams L, Averill JG, Walker SE, Robey I, Alvarez VE, Huber BR, **McKee AC**, Kowall NW, Brady CB. Utility of the ALSFRS-R for predicting ALS and comorbid disease neuropathology: The Veterans Affairs Biorepository Brain Bank. Muscle Nerve. 2022 Aug;66(2):167-174. doi: 10.1002/mus.27635. Epub 2022 Jun 4. PMID: 35585776; PMCID: PMC9308705.

*Yang J, Chang S, Chen IA, Kura S, Rosen GA, Saltiel NA, Huber BR, Varadarajan D, Balbastre Y, Magnain C, Chen SC, Fischl B, **McKee AC**, **Boas DA**, Wang H. Volumetric Characterization of Microvasculature in Ex Vivo Human Brain Samples By Serial Sectioning Optical Coherence Tomography. IEEE Trans Biomed Eng. 2022 Dec;69(12):3645-3656. doi: 10.1109/TBME.2022.3175072. Epub 2022 Nov 23. PMID: 35560084; PMCID: PMC9888394.

*Morrison MS, Aparicio HJ, Blennow K, Zetterberg H, Ashton NJ, Karikari TK, Tripodis Y, Martin B, Palmisano JN, Sugarman MA, Frank B, Steinberg EG, Turk KW, Budson AE, Au R, Goldstein LE, Jun GR, Kowall NW, **Killiany R**, Qiu WQ, **Stern RA**, Mez J, **McKee AC**, Stein TD, Alosco ML. Ante-mortem plasma phosphorylated tau (181) predicts Alzheimer's disease neuropathology and regional tau at autopsy. Brain. 2022 Oct 21;145(10):3546-3557. doi: 10.1093/brain/awac175. PMID: 35554506.

LeClair J, Weuve J, Fox MP, Mez J, Alosco ML, Nowinski C, **McKee A**, Tripodis Y. Relationship Between Level of American Football Playing and Diagnosis of Chronic Traumatic Encephalopathy in a Selection Bias Analysis. Am J Epidemiol. 2022 Jul 23;191(8):1429-1443. doi: 10.1093/aje/kwac075. PMID: 35434739; PMCID: PMC9989358.

Moncaster JA, Moir RD, Burton MA, Chadwick O, Minaeva O, Alvarez VE, Ericsson M, Clark JI, **McKee AC**, Tanzi RE, Goldstein LE. Alzheimer's disease amyloid-β pathology in the lens of the eye. Exp Eye Res. 2022 Aug;221:108974. doi: 10.1016/j.exer.2022.108974. Epub 2022 Feb 21. PMID: 35202705; PMCID: PMC9873124.

*Frank B, Ally M, Brekke B, Zetterberg H, Blennow K, Sugarman MA, Ashton NJ, Karikari TK, Tripodis Y, Martin B, Palmisano JN, Steinberg EG, Simkina I, Turk KW, Budson AE, O'Connor MK, Au R, Goldstein LE, Jun GR, Kowall NW, Stein TD, **McKee AC**, **Killiany R**, Qiu WQ, **Stern RA**, Mez J, Alosco ML. Plasma p-tau181 shows stronger network association to Alzheimer's disease dementia than neurofilament light and total tau. Alzheimers Dement. 2022 Aug;18(8):1523-1536. doi: 10.1002/alz.12508. Epub 2021 Dec 2. PMID: 34854549; PMCID: PMC9160800.

Stathas S, Alvarez VE, Xia W, Nicks R, Meng G, Daley S, Pothast M, Shah A, Kelley H, Esnault C, McCormack R, Dixon E, Fishbein L, Cherry JD, Huber BR, Tripodis Y, Alosco ML, Mez J, **McKee AC**, Stein TD. Tau phosphorylation sites serine202 and serine396 are differently altered in chronic traumatic encephalopathy and Alzheimer's disease. Alzheimers Dement. 2022 Aug;18(8):1511-1522. doi: 10.1002/alz.12502. Epub 2021 Dec 2. PMID: 34854540; PMCID: PMC9160206.

*Campbell NB, Patel Y, **Moore TL**, **Medalla M**, **Zeldich E**. Extracellular Vesicle Treatment Alleviates Neurodevelopmental and Neurodegenerative Pathology in Cortical Spheroid Model of Down Syndrome. Int J Mol Sci. 2023 Feb 9;24(4):3477. doi: 10.3390/ijms24043477. PMID: 36834891; PMCID: PMC9960302.

***Moore TL**, **Medalla M**, Iba Ez S, Wimmer K, Mojica CA, **Killiany RJ**, **Moss MB**, **Luebke JI**, **Rosene DL**. Neuronal properties of pyramidal cells in lateral prefrontal cortex of the aging rhesus monkey brain are associated with performance deficits on spatial working memory but not executive function. bioRxiv [Preprint]. 2023 Feb 8:2023.02.07.527321. doi: 10.1101/2023.02.07.527321. Update in: Geroscience. 2023 Apr 28;. PMID: 36798388; PMCID: PMC9934587.

*Calderazzo S, Covert M, Alba D, Bowley BE, Pessina MA, **Rosene DL**, Buller B, **Medalla M**, **Moore TL**. Neural recovery after cortical injury:

Effects of MSC derived extracellular vesicles on motor circuit remodeling in rhesus monkeys. IBRO Neurosci Rep. 2022 Aug 18;13:243-254. doi: 10.1016/j.ibneur.2022.08.001. PMID: 36590089; PMCID: PMC9795302.

Hogeveen J, **Medalla M**, Ainsworth M, Galeazzi JM, Hanlon CA, Mansouri FA, Costa VD. What Does the Frontopolar Cortex Contribute to Goal-Directed Cognition and Action? J Neurosci. 2022 Nov 9;42(45):8508-8513. doi: 10.1523/JNEUROSCI.1143-22.2022. PMID: 36351824; PMCID: PMC9665930.

*Rickner HD, Jiang L, Hong R, O'Neill NK, Mojica CA, Snyder BJ, Zhang L, Shaw D, **Medalla M**, **Wolozin B**, Cheng CS. Single cell transcriptomic profiling of a neuron-astrocyte assembloid tauopathy model. Nat Commun. 2022 Oct 21;13(1):6275. doi: 10.1038/s41467-022-34005-1. PMID: 36271092; PMCID: PMC9587045.

Anibal J, Day AG, Bahadiroglu E, O'Neil L, Phan L, Peltekian A, Erez A, Kaplan M, Altan-Bonnet G, **Mehta P**. HAL-X: Scalable hierarchical clustering for rapid and tunable single-cell analysis. PLoS Comput Biol. 2022 Oct 3;18(10):e1010349. doi: 10.1371/journal.pcbi.1010349. PMID: 36191000; PMCID: PMC9560626.

Rocks JW, **Mehta P**. Bias-variance decomposition of overparameterized regression with random linear features. Phys Rev E. 2022 Aug;106(2-2):025304. doi: 10.1103/PhysRevE.106.025304. PMID: 36109970; PMCID: PMC9906786.

Zhao B, Koyama M, **Mertz J**. High-resolution multi-z confocal microscopy with a diffractive optical element. Biomed Opt Express. 2023 May 31;14(6):3057-3071. doi: 10.1364/BOE.491538. PMID: 37342696; PMCID: PMC10278611.

Zheng S, **Mertz J**. Correcting sampling bias in speckle contrast imaging. Opt Lett. 2022 Dec 15;47(24):6333-6336. doi: 10.1364/OL.474604. PMID: 36538431; PMCID: PMC9801309.

Zheng S, **Mertz J**. Direct characterization of tissue dynamics with laser speckle contrast imaging. Biomed Opt Express. 2022 Jul 6;13(8):4118-4133. doi: 10.1364/BOE.462913. PMID: 36032565; PMCID: PMC9408238.

Meyer HC, Fields A, Vannucci A, Gerhard DM, Bloom PA, Heleniak C, Opendak M, Sullivan R, Tottenham N, Callaghan BL, Lee FS. The Added Value of Crosstalk Between Developmental Circuit Neuroscience and Clinical Practice to Inform the Treatment of Adolescent Anxiety. Biol Psychiatry Glob Open Sci. 2022 Feb 17;3(2):169-178. doi: 10.1016/j.bpsgos.2022.02.002. PMID: 37124361; PMCID: PMC10140450.

*Dimovasili C, Fair AE, Garza IR, Batterman KV, Mortazavi F, **Moore TL**, **Rosene DL**. Aging compromises oligodendrocyte precursor cell maturation and efficient remyelination in the monkey brain. Geroscience. 2023 Feb;45(1):249-264. doi: 10.1007/s11357-022-00621-4. Epub 2022 Aug 5. PMID: 35930094; PMCID: PMC9886778.

*Welke LA, **Moore TL**, **Rosene DL**, **Killiany RJ**, **Moss MB**. Prefrontal and medial temporal interactions in memory functions in the rhesus monkey. Behav Neurosci. 2023 Jun;137(3):211-222. doi: 10.1037/bne0000556. Epub 2023 Apr 6. PMID: 37023305; PMCID: PMC10192048.

Wollenstein-Betech S, Salazar M, Houshmand A, Pavone M, **Paschalidis IC**, Cassandras CG. Routing and Rebalancing Intermodal Autonomous Mobility-on-Demand Systems in Mixed Traffic. IEEE trans Intell Transp Syst. 2022 Aug;23(8):12263-12275. doi: 10.1109/tits.2021.3112106. Epub 2021 Sep 20. PMID: 37124136; PMCID: PMC10147341.

Sotudian S, Chen R, **Paschalidis IC**. Distributionally robust learning-to-rank under the Wasserstein metric. PLoS One. 2023 Mar 30;18(3):e0283574. doi: 10.1371/journal.pone.0283574. PMID: 36996130; PMCID: PMC10062629.

Hu Y, Huerta J, Cordella N, Mishuris RG, **Paschalidis IC**. Personalized hypertension treatment recommendations by a data-driven model. BMC Med Inform Decis Mak. 2023 Mar 1;23(1):44. doi: 10.1186/s12911-023-02137-z. PMID: 36859187; PMCID: PMC9979505.

Sotudian S, Afran A, LeBedis CA, Rives AF, **Paschalidis IC**, Fishman MDC. Social determinants of health and the prediction of missed breast imaging appointments. BMC Health Serv Res. 2022 Nov 30;22(1):1454. doi: 10.1186/s12913-022-08784-8. PMID: 36451240; PMCID: PMC9714014.

Amini S, Hao B, Zhang L, Song M, Gupta A, Karjadi C, Kolachalama VB, Au R, **Paschalidis IC**. Automated detection of mild cognitive impairment and dementia from voice recordings: A natural language processing approach. Alzheimers Dement. 2022 Jul 7:10.1002/alz.12721. doi: 10.1002/alz.12721. Epub ahead of print. PMID: 35796399; PMCID: PMC10148688.

Sotudian S, **Paschalidis IC**. Machine Learning for Pharmacogenomics and Personalized Medicine: A Ranking Model for Drug Sensitivity Prediction. IEEE/ACM Trans Comput Biol Bioinform. 2022 Jul-Aug;19(4):2324-2333. doi: 10.1109/TCBB.2021.3084562. Epub 2022 Aug 8. PMID: 34043512; PMCID: PMC9642333.

D'Mello AM, Frosch IR, Meisler SL, Grotzinger H, **Perrachione TK**, Gabrieli JDE. Diminished Repetition Suppression Reveals Selective and Systems-Level Face Processing Differences in ASD. J Neurosci. 2023 Mar 15;43(11):1952-1962. doi: 10.1523/JNEUROSCI.0608-22.2023. Epub 2023 Feb 9. PMID: 36759192; PMCID: PMC10027049.

Kapadia AM, Tin JAA, **Perrachione TK**. Multiple sources of acoustic variation affect speech processing efficiency. J Acoust Soc Am. 2023 Jan;153(1):209. doi: 10.1121/10.0016611. PMID: 36732274; PMCID: PMC9836727.

*Alho J, Khan S, Mamashli F, **Perrachione TK**, Losh A, McGuiggan NM, Graham S, Nayal Z, **Joseph RM**, Hämäläinen MS, Bharadwaj H, Kenet T. Atypical cortical processing of bottom-up speech binding cues in children with autism spectrum disorders. Neuroimage Clin. 2023;37:103336. doi: 10.1016/j.nicl.2023.103336. Epub 2023 Jan 22. PMID: 36724734; PMCID: PMC9898310.

*O'Brien AM, **Perrachione TK**, Wisman Weil L, Sanchez Araujo Y, Halverson K, Harris A, Ostrovskaya I, Kjelgaard M, Kenneth Wexler, **Tager-Flusberg H**, Gabrieli JDE, Qi Z. Altered engagement of the speech motor network is associated with reduced phonological working memory in autism. Neuroimage Clin. 2023;37:103299. doi: 10.1016/j.nicl.2022.103299. Epub 2022 Dec 23. PMID: 36584426; PMCID: PMC9830373.

Romeo RR, **Perrachione TK**, Olson HA, Halverson KK, Gabrieli JDE, Christodoulou JA. Socioeconomic dissociations in the neural and cognitive bases of reading disorders. Dev Cogn Neurosci. 2022 Dec;58:101175. doi: 10.1016/j.dcn.2022.101175. Epub 2022 Nov 15. PMID: 36401889; PMCID: PMC9674867.

Lee JJ, **Perrachione TK**. Implicit and explicit learning in talker identification. Atten Percept Psychophys. 2022 Aug;84(6):2002-2015. doi: 10.3758/s13414-022-02500-8. Epub 2022 May 9. PMID: 35534783; PMCID: PMC10081569.

Ozernov-Palchik O, Beach SD, Brown M, Centanni TM, Gaab N, Kuperberg G, **Perrachione TK**, Gabrieli JDE. Speech-specific perceptual adaptation deficits in children and adults with dyslexia. J Exp Psychol Gen. 2022 Jul;151(7):1556-1572. doi: 10.1037/xge0001145. Epub 2021 Nov 29. PMID: 34843363; PMCID: PMC9148384.

Ma Z, Kristensen P, **Ramachandran S**. Scaling information pathways in optical fibers by topological confinement. Science. 2023 Apr 21;380(6642):278-282. doi: 10.1126/science.add1874. Epub 2023 Apr 20. PMID: 37079683.

Borzello M, **Ramirez S**, Treves A, Lee I, Scharfman H, Stark C, Knierim JJ, Rangel LM. Assessments of dentate gyrus function: discoveries and debates. Nat Rev Neurosci. 2023 Jun 14. doi: 10.1038/s41583-023-00710-z. Epub ahead of print. PMID: 37316588.

Suthard RL, Senne RA, Buzharsky MD, Pyo AY, Dorst KE, Diep AH, Cole RH, **Ramirez S**. Basolateral Amygdala Astrocytes Are Engaged by the Acquisition and Expression of a Contextual Fear Memory. J Neurosci. 2023 Jul 5;43(27):4997-5013. doi: 10.1523/JNEUROSCI.1775-22.2023. Epub 2023 Jun 2. PMID: 37268419; PMCID: PMC10324998.

*Wilmerding LK, Kondratyev I, **Ramirez S**, **Hasselmo ME**. Route-dependent spatial engram tagging in mouse dentate gyrus. Neurobiol Learn Mem. 2023 Apr;200:107738. doi: 10.1016/j.nlm.2023.107738. Epub 2023 Feb 21. PMID: 36822466; PMCID: PMC10106405.

Suthard RL, Jellinger AL, Surets M, Shpokayte M, Pyo AY, Buzharsky MD, Senne RA, Dorst K, Leblanc H, **Ramirez S**. Chronic Gq activation of ventral hippocampal neurons and astrocytes differentially affects memory and behavior. Neurobiol Aging. 2023 May;125:9-31. doi: 10.1016/j.neurobiolaging.2023.01.007. Epub 2023 Jan 31. PMID: 36801699.

Kinsky NR, Orlin DJ, Ruesch EA, Diba K, **Ramirez S**. Erasable Hippocampal Neural Signatures Predict Memory Discrimination. bioRxiv [Preprint]. 2023 Mar 4:2023.02.02.526824. doi: 10.1101/2023.02.02.526824. PMID: 36778486; PMCID: PMC9915633.

Chen L, Francisco TR, Baggetta AM, Zaki Y, **Ramirez S**, Clem RL, Shuman T, Cai DJ. Ensemble-specific deficit in neuronal intrinsic excitability in aged mice. Neurobiol Aging. 2023 Mar;123:92-97. doi: 10.1016/j.neurobiolaging.2022.12.007. Epub 2022 Dec 22. PMID: 36652783; PMCID: PMC9892234.

Linghu C, An B, Shpokayte M, Celiker OT, Shmoel N, Zhang R, Zhang C, Park D, Park WM, **Ramirez S**, Boyden ES. Recording of cellular physiological histories along optically readable self-assembling protein chains. Nat Biotechnol. 2023 Jan 2. doi: 10.1038/s41587-022-01586-7. Epub ahead of print. PMID: 36593405.

Bolsius YG, Heckman PRA, Paraciani C, Wilhelm S, Raven F, Meijer EL, Kas MJH, **Ramirez S**, Meerlo P, Havekes R. Recovering object-location memories after sleep deprivation-induced amnesia. Curr Biol. 2023 Jan 23;33(2):298-308.e5. doi: 10.1016/j.cub.2022.12.006. Epub 2022 Dec 27. PMID: 36577400.

*Shpokayte M, McKissick O, Guan X, Yuan B, Rahsepar B, Fernandez FR, Ruesch E, Grella SL, **White JA**, Liu XS, **Ramirez S**. Hippocampal cells segregate positive and negative engrams. Commun Biol. 2022 Sep 26;5(1):1009. doi: 10.1038/s42003-022-03906-8. PMID: 36163262; PMCID: PMC9512908.

Grella SL, Fortin AH, Ruesch E, Bladon JH, Reynolds LF, Gross A, Shpokayte M, Cincotta C, Zaki Y, **Ramirez S**. Reactivating hippocampal-mediated memories during reconsolidation to disrupt fear. Nat Commun. 2022 Sep 12;13(1):4733. doi: 10.1038/s41467-022-32246-8. PMID: 36096993; PMCID: PMC9468169.

Cincotta C, Ruesch E, Senne R, **Ramirez S**. Hippocampal fear engrams modulate ethanol-induced maladaptive contextual generalization in mice. Hippocampus. 2022 Oct;32(10):707-715. doi: 10.1002/hipo.23463. Epub 2022 Aug 11. PMID: 35950345.

Zaki Y, Mau W, Cincotta C, Monasterio A, Odom E, Doucette E, Grella SL, Merfeld E, Shpokayte M, **Ramirez S**. Hippocampus and amygdala fear memory engrams re-emerge after contextual fear relapse. Neuropsychopharmacology. 2022 Oct;47(11):1992-2001. doi: 10.1038/s41386-022-01407-0. Epub 2022 Aug 8. PMID: 35941286; PMCID: PMC9485238.

Cheng PX, Grover S, Wen W, Sankaranarayanan S, Davies S,

Fragetta J, Soto D, **Reinhart RMG**. Dissociable rhythmic mechanisms enhance memory for conscious and nonconscious perceptual contents. Proc Natl Acad Sci U S A. 2022 Nov;119(44):e2211147119. doi: 10.1073/pnas.2211147119. Epub 2022 Oct 27. PMID: 36302042; PMCID: PMC9636912.

Grover S, Wen W, Viswanathan V, Gill CT, **Reinhart RMG**. Long-lasting, dissociable improvements in working memory and long-term memory in older adults with repetitive neuromodulation. Nat Neurosci. 2022 Sep;25(9):1237-1246. doi: 10.1038/s41593-022-01132-3. Epub 2022 Aug 22. PMID: 35995877; PMCID: PMC10068908.

Reinhart RMG. Synchronizing neural rhythms. Science. 2022 Aug 5;377(6606):588-589. doi: 10.1126/science.add4834. Epub 2022 Aug 4. PMID: 35926017; PMCID: PMC10069948.

Grover S, Fayzullina R, Bullard BM, Levina V, **Reinhart RMG**. A meta-analysis suggests that tACS improves cognition in healthy, aging, and psychiatric populations. Sci Transl Med. 2023 May 24;15(697):eabo2044. doi: 10.1126/scitranslmed.abo2044. Epub 2023 May 24. PMID: 37224229.

Raymond N, **Reinhart RMG**, Trotti R, Parker D, Grover S, Turkozer B, Sabatinelli D, Hegde R, Bannai D, Gandu S, Clementz B, Keshavan M, Lizano P. Efficacy and Tolerability of Lesion Network Guided Transcranial Electrical Stimulation in Outpatients with Psychosis Spectrum Illness: A Nonrandomized Controlled Trial. medRxiv [Preprint]. 2023 Apr 3:2023.03.31.23287980. doi: 10.1101/2023.03.31.23287980. PMID: 37066217; PMCID: PMC10104217.

Kumar AA, Yeo N, Whittaker M, Attra P, Barrick TR, Bridges LR, Dickson DW, Esiri MM, Farris CW, Graham D, Lin WL, Meijles DN, Pereira AC, Perry G, **Rosene DL**, Shtaya AB, Van Agtmael T, Zamboni G, Hainsworth AH. Vascular Collagen Type-IV in Hypertension and Cerebral Small Vessel Disease. Stroke. 2022 Dec;53(12):3696-3705. doi: 10.1161/STROKEAHA.122.037761. Epub 2022 Oct 7. PMID: 36205142; PMCID: PMC9698121.

Rushmore RJ, McGaughy JA, Mokler DJ, **Rosene DL**. The enduring effect of prenatal protein malnutrition on brain anatomy, physiology and behavior. Nutr Neurosci. 2022 Jul;25(7):1392-1399. doi: 10.1080/1028415X.2020.1859730. Epub 2020 Dec 14. PMID: 33314995.

Montalban E, Giralt A, Taing L, Nakamura Y, Pelosi A, Brown M, de Pins B, Valjent E, Martin M, Nairn AC, Greengard P, Flajolet M, Herv D, Gambardella N, **Roussarie JP**, Girault JA. Operant training for highly palatable food alters translating mRNA in nucleus accumbens D2 neurons and reveals a modulatory role of *Neurochondrin*. bioRxiv [Preprint]. 2023 Mar 9:2023.03.07.531496. doi: 10.1101/2023.03.07.531496. PMID: 36945487; PMCID: PMC10028890.

Marion-Poll L, **Roussarie JP**, Taing L, Dard-Dascot C, Servant N, Jaszczyszyn Y, Jordi E, Mulugeta E, Hervé D, Bourc'his D, Greengard P, Thermes C, Girault JA. DNA methylation and hydroxymethylation characterize the identity of D1 and D2 striatal projection neurons. Commun Biol. 2022 Dec 1;5(1):1321. doi: 10.1038/s42003-022-04269-w. PMID: 36456703; PMCID: PMC9715678.

Tipton AE, Cruz Del Angel Y, Hixson K, Carlsen J, Strode D, Busquet N, Mesches MH, Gonzalez MI, Napoli E, **Russek SJ**, Brooks-Kayal AR. Selective Neuronal Knockout of STAT3 Function Inhibits Epilepsy Progression, Improves Cognition, and Restores Dysregulated Gene Networks in a Temporal Lobe Epilepsy Model. Ann Neurol. 2023 Mar 19. doi: 10.1002/ana.26644. Epub ahead of print. PMID: 36935347.

Seiglie MP, Lepeak L, Velázquez-Sanchez C, Ferragud A, Le T, Cottone P, **Sabino V**. The Pituitary Adenylate Cyclase-Activating Polypeptide (PACAP) System of the Central Amygdala Mediates the Detrimental Effects of Chronic Social Defeat Stress in Rats. eNeuro. 2022 Sep 21;9(5):ENEURO.0260-22.2022. doi: 10.1523/ENEURO.0260-22.2022. PMID: 36566434; PMCID: PMC9506682.

Minnig MA, Blasio A, Ferragud A, Sami YN, Erhard EE, Clark RH, DiLeo A, Giuliano C, Everitt BJ, Cottone P, **Sabino V**. Pituitary adenylate cyclase-activating polypeptide type 1 receptor within the nucleus accumbens core mediates excessive alcohol drinking in alcohol-preferring rats. Neuropharmacology. 2022 Jul 1;212:109063. doi: 10.1016/j.neuropharm.2022.109063. Epub 2022 Apr 20. PMID: 35460713.

Kern KL, McMains SA, Storer TW, Moffat SD, **Schon K**. Cardiorespiratory fitness is associated with fMRI signal in right cerebellum lobule VIIa Crus I and II during spatial navigation in older adult women. Front Aging Neurosci. 2022 Nov 23;14:979741. doi: 10.3389/fnagi.2022.979741. PMID: 36506472; PMCID: PMC9727394.

Marwaha JS, Beaulieu-Jones BR, Berrigan M, Yuan W, Odom SR, Cook CH, **Scott BB**, Gupta A, Parsons CS, Seshadri AJ, Brat GA. Quantifying the Prognostic Value of Preoperative Surgeon Intuition: Comparing Surgeon Intuition and Clinical Risk Prediction as Derived from the American College of Surgeons NSQIP Risk Calculator. J Am Coll Surg. 2023 Jun 1;236(6):1093-1103. doi: 10.1097/XCS.0000000000000658. Epub 2023 Feb 23. PMID: 36815715.

Affan RO, **Scott BB**. Everything, everywhere, all at once: Functional specialization and distributed coding in the cerebral cortex. Neuron. 2022 Aug 3;110(15):2361-2362. doi: 10.1016/j.neuron.2022.07.006. PMID: 35926451.

Best V, Boyd AD, **Sen K**. An Effect of Gaze Direction in Cocktail Party Listening. Trends Hear. 2023 Jan-Dec;27:23312165231152356. doi: 10.1177/23312165231152356. PMID: 36691678; PMCID: PMC9896088.

*Chou KF, Boyd AD, Best V, **Colburn HS**, **Sen K**. A biologically oriented algorithm for spatial sound segregation. Front Neurosci. 2022 Oct 14;16:1004071. doi: 10.3389/fnins.2022.1004071. PMID: 36312015; PMCID: PMC9614053.

Isenburg K, Morin TM, Rosen ML, **Somers DC**, **Stern CE**. Functional network reconfiguration supporting memory-guided attention. Cereb Cortex. 2023 Mar 28:bhad073. doi: 10.1093/cercor/bhad073. Epub ahead of print. PMID: 36977634.

Tauber JM, Brincat SL, **Stephen EP**, Donaghue JA, Kozachkov L, Brown EN, Miller EK. Propofol Mediated Unconsciousness Disrupts Progression of Sensory Signals through the Cortical Hierarchy. bioRxiv [Preprint]. 2023 Jun 29:2023.06.25.546463. doi: 10.1101/2023.06.25.546463. PMID: 37425684; PMCID: PMC10327085.

Weiner VS, Zhou DW, Kahali P, **Stephen EP**, Peterfreund RA, Aglio LS, Szabo MD, Eskandar EN, Salazar-Gomez AF, Sampson AL, Cash SS, Brown EN, Purdon PL. Propofol disrupts alpha dynamics in functionally distinct thalamocortical networks during loss of consciousness. Proc Natl Acad Sci U S A. 2023 Mar 14;120(11):e2207831120. doi: 10.1073/pnas.2207831120. Epub 2023 Mar 10. PMID: 36897972; PMCID: PMC10089159.

Soulat H, **Stephen EP**, Beck AM, Purdon PL. State space methods for phase amplitude coupling analysis. Sci Rep. 2022 Sep 24;12(1):15940. doi: 10.1038/s41598-022-18475-3. PMID: 36153353; PMCID: PMC9509338.

*Alexander AS, Robinson JC, **Stern CE**, **Hasselmo ME**. Gated transformations from egocentric to allocentric reference frames involving retrosplenial cortex, entorhinal cortex, and hippocampus. Hippocampus. 2023 May;33(5):465-487. doi: 10.1002/hipo.23513. Epub 2023 Mar 1. PMID: 36861201.

***Stern CE**, **Hasselmo ME**. Mechanisms for maintaining information in working memory. Cogn Neurosci. 2022 Jul;13(3-4):218-219. doi: 10.1080/17588928.2022.2131750. Epub 2022 Oct 10. PMID: 36214597; PMCID: PMC10121215.

Chrastil ER, Rice C, Goncalves M, Moore KN, Wynn SC, **Stern CE**, Nyhus E. Theta oscillations support active exploration in human spatial navigation. Neuroimage. 2022 Nov 15;262:119581. doi: 10.1016/j.neuroimage.2022.119581. Epub 2022 Aug 19. PMID: 35995375.

Morin TM, Moore KN, Isenburg K, Ma W, **Stern CE**. Functional reconfiguration of task-active frontoparietal control network facilitates abstract reasoning. Cereb Cortex. 2023 May 9;33(10):5761-5773. doi: 10.1093/cercor/bhac457. PMID: 36420534.

*Alosco ML, Ly M, Mosaheb S, Saltiel N, Uretsky M, Tripodis Y, Martin B, Palmisano J, Delano-Wood L, Bondi MW, Meng G, Xia W, Daley S, Goldstein LE, Katz DI, Dwyer B, Daneshvar DH, Nowinski C, Cantu RC, Kowall NW, **Stern RA**, Alvarez VE, Mez J, Huber BR, **McKee AC**, Stein TD. Decreased myelin proteins in brain donors exposed to football-related repetitive head impacts. Brain Commun. 2023 Mar 6;5(2):fcad019. doi: 10.1093/braincomms/fcad019. PMID: 36895961; PMCID: PMC9990992.

Alosco ML, Barr WB, Banks SJ, Wethe JV, Miller JB, Pulukuri SV, Culhane J, Tripodis Y, Adler CH, Balcer LJ, Bernick C, Mariani ML, Cantu RC, Dodick DW, McClean MD, Au R, Mez J, Turner RW 2nd, Palmisano JN, Martin B, Hartlage K, Cummings JL, Reiman EM, Shenton ME, **Stern RA**; DIAGNOSE CTE Research Project. Neuropsychological test performance of former American football players. Alzheimers Res Ther. 2023 Jan 3;15(1):1. doi: 10.1186/s13195-022-01147-9. PMID: 36597138; PMCID: PMC9808953.

Liang B, Alosco ML, Armañanzas R, Martin BM, Tripodis Y, **Stern RA**, Prichep LS. Long-Term Changes in Brain Connectivity Reflected in Quantitative Electrophysiology of Symptomatic Former National Football League Players. J Neurotrauma. 2023 Feb;40(3-4):309-317. doi: 10.1089/neu.2022.0029. Epub 2022 Nov 23. PMID: 36324216; PMCID: PMC9902050.

Tsai FD, Guercio B, Stuver S, **Stern R**, Peluso MJ, Winkler M, Piawah S, Vallurupalli M, Luskin MR, Braun D, Parent A, Glotzbecker B, Kilbridge KL. Resident-Reported Impact of a Novel Oncology Curriculum for Internal Medicine Residents. J Cancer Educ. 2022 Dec;37(6):1879-1885. doi: 10.1007/s13187-021-02055-6. Epub 2021 Sep 4. PMID: 34480712; PMCID: PMC8417651.

van Amerongen S, Kamps S, Kaijser KKM, Pijnenburg YAL, Scheltens P, Teunissen CE, Barkhof F, Ossenkoppele R, Rozemuller AJM, **Stern RA**, Hoozemans JJM, Vijverberg EGB. Severe CTE and TDP-43 pathology in a former professional soccer player with dementia: a clinicopathological case report and review of the literature. Acta Neuropathol Commun. 2023 May 10;11(1):77. doi: 10.1186/s40478-023-01572-3. PMID: 37161501; PMCID: PMC10169296.

Butler LK, Shen L, Chenausky KV, La Valle C, Schwartz S, **Tager-Flusberg H**. Lexical and Morphosyntactic Profiles of Autistic Youth With Minimal or Low Spoken Language Skills. Am J Speech Lang Pathol. 2023 Mar 9;32(2):733-747. doi: 10.1044/2022_AJSLP-22-00098. Epub 2023 Jan 27. PMID: 36706456; PMCID: PMC10171852.

Butler LK, **Tager-Flusberg H**. Fine motor skill and expressive language in minimally verbal and verbal school-aged autistic children. Autism Res. 2023 Mar;16(3):630-641. doi: 10.1002/aur.2883. Epub 2022 Dec 28. PMID: 36578205.

Hantman RM, Johnston EB, **Tager-Flusberg H**. Parental Perspectives: How Sensory Sensitivities Impact the Transition to Adulthood in Adolescents and Young Adults with Autism Spectrum Disorder. J Autism

Dev Disord. 2022 Nov 19:1–19. doi: 10.1007/s10803-022-05815-5. Epub ahead of print. PMID: 36402934; PMCID: PMC9676764.

Chenausky KV, Maffei M, **Tager-Flusberg H**, Green JR. Review of methods for conducting speech research with minimally verbal individuals with autism spectrum disorder. Augment Altern Commun. 2023 Mar;39(1):33-44. doi: 10.1080/07434618.2022.2120071. Epub 2022 Nov 8. PMID: 36345836.

Chenausky KV, Norton AC, **Tager-Flusberg H**, Schlaug G. Auditory-motor mapping training: Testing an intonation-based spoken language treatment for minimally verbal children with autism spectrum disorder. Ann N Y Acad Sci. 2022 Sep;1515(1):266-275. doi: 10.1111/nyas.14817. Epub 2022 Jun 26. PMID: 35754007.

Pecukonis M, Young GS, Brian J, Charman T, Chawarska K, Elsabbagh M, Iverson JM, Jeste S, Landa R, Messinger DS, Schwichtenberg AJ, Webb SJ, Zwaigenbaum L, **Tager-Flusberg H**. Early predictors of language skills at 3 years of age vary based on diagnostic outcome: A baby siblings research consortium study. Autism Res. 2022 Jul;15(7):1324-1335. doi: 10.1002/aur.2760. Epub 2022 Jun 1. PMID: 35652157; PMCID: PMC9253079.

La Valle C, Johnston E, **Tager-Flusberg H**. A systematic review of the use of telehealth to facilitate a diagnosis for children with developmental concerns. Res Dev Disabil. 2022 Aug;127:104269. doi: 10.1016/j.ridd.2022.104269. Epub 2022 May 27. PMID: 35636261.

Barokova MD, **Tager-Flusberg H**. How do parents refer to their children while playing? A cross-linguistic comparison of parental input to Bulgarian- and English-speaking children with ASD. J Child Lang. 2023 Mar;50(2):274-295. doi: 10.1017/S0305000921000842. Epub 2022 Feb 23. PMID: 35193722.

Wagner JB, Keehn B, **Tager-Flusberg H**, Nelson CA. Associations between attentional biases to fearful faces and social-emotional development in infants with and without an older sibling with autism. Infant Behav Dev. 2023 Mar 16;71:101811. doi: 10.1016/j.infbeh.2023.101811. Epub ahead of print. PMID: 36933374.

Galvin M, Coetzee L, Leshabana P, Masebe N, Lebepe S, Moolla A, **Tarullo AR**, Rockers PC, Evans D. Perceptions of HIV and Mental Illness as "Western" or "Traditional" Illnesses: A Cross-Sectional Study from Limpopo Province, South Africa. Res Sq [Preprint]. 2023 Jun 26:rs.3.rs-3068420. doi: 10.21203/rs.3.rs-3068420/v1. PMID: 37461552; PMCID: PMC10350218.

Killion JP, Silverman DT, Evans D, Coetzee L, **Tarullo AR**, Hamer DH, Rockers PC. Vaccination coverage at seven months of age in Limpopo Province, South Africa: a cross-sectional survey. Glob Health Promot. 2023 Mar;30(1):42-52. doi: 10.1177/17579759221107037. Epub 2022 Aug 4. PMID: 35927890.

Rockers PC, Leppänen JM, **Tarullo A**, Coetzee L, Fink G, Hamer DH, Yousafzai AK, Evans D. Evaluation of a community health worker home visit intervention to improve child development in South Africa: A cluster-randomized controlled trial. PLoS Med. 2023 Apr 14;20(4):e1004222. doi: 10.1371/journal.pmed.1004222. PMID: 37058529; PMCID: PMC10146459.

Paolicelli RC, Sierra A, Stevens B, Tremblay ME, Aguzzi A, Ajami B, Amit I, Audinat E, Bechmann I, Bennett M, Bennett F, Bessis A, Biber K, Bilbo S, Blurton-Jones M, Boddeke E, Brites D, Brône B, Brown GC, Butovsky O, Carson MJ, Castellano B, Colonna M, Cowley SA, Cunningham C, Davalos D, De Jager PL, de Strooper B, Denes A, Eggen BJL, Eyo U, Galea E, Garel S, Ginhoux F, Glass CK, Gokce O, Gomez-Nicola D, González B, Gordon S, Graeber MB, Greenhalgh AD, Gressens P, Greter M, Gutmann DH, Haass C, Heneka MT, Heppner FL, Hong S, Hume DA, Jung S, Kettenmann H, Kipnis J, Koyama R, Lemke G, Lynch M, Majewska A, Malcangio M, Malm T, Mancuso R, Masuda T, Matteoli M, McColl BW, Miron VE, Molofsky AV, Monje M, Mracsko E, Nadjar A, Neher JJ, Neniskyte U, Neumann H, Noda M, Peng B, Peri F, Perry VH, Popovich PG, Pridans C, Priller J, Prinz M, Ragozzino D, Ransohoff RM, Salter MW, Schaefer A, Schafer DP, Schwartz M, Simons M, Smith CJ, Streit WJ, **Tay TL**, Tsai LH, Verkhratsky A, von Bernhardi R, Wake H, Wittamer V, Wolf SA, Wu LJ, Wyss-Coray T. Microglia states and nomenclature: A field at its crossroads. Neuron. 2022 Nov 2;110(21):3458-3483. doi: 10.1016/j.neuron.2022.10.020. PMID: 36327895; PMCID: PMC9999291.

Leng K, Rose IVL, Kim H, Xia W, Romero-Fernandez W, Rooney B, Koontz M, Li E, Ao Y, Wang S, Krawczyk M, **Tcw J**, Goate A, Zhang Y, Ullian EM, Sofroniew MV, Fancy SPJ, Schrag MS, Lippmann ES, Kampmann M. CRISPRi screens in human iPSC-derived astrocytes elucidate regulators of distinct inflammatory reactive states. Nat Neurosci. 2022 Nov;25(11):1528-1542. doi: 10.1038/s41593-022-01180-9. Epub 2022 Oct 27. PMID: 36303069; PMCID: PMC9633461.

Tcw J, Arranz AM. hiPSC-based models to decipher the contribution of human astrocytes to Alzheimer's disease and potential therapeutics. Mol Neurodegener. 2023 Mar 25;18(1):19. doi: 10.1186/s13024-023-00612-9. PMID: 36966344; PMCID: PMC10039591.

Kloske CM, Barnum CJ, Batista AF, Bradshaw EM, Brickman AM, Bu G, Dennison J, Gearon MD, Goate AM, Haass C, Heneka MT, Hu WT, Huggins LKL, Jones NS, Koldamova R, Lemere CA, Liddelow SA, Marcora E, Marsh SE, Nielsen HM, Petersen KK, Petersen M, Piña-Escudero SD, Qiu WQ, Quiroz YT, Reiman E, Sexton C, Tansey MG, **Tcw J**, Teunissen CE, Tijms BM, van der Kant R, Wallings R, Weninger SC, Wharton W, Wilcock DM, Wishard TJ, Worley SL, Zetterberg H, Carrillo MC. APOE and immunity: Research highlights. Alzheimers Dement. 2023 Mar 28. doi: 10.1002/alz.13020. Epub ahead of print. PMID: 36975090.

Via G, Baravalle R, Fernandez FR, **White JA**, Canavier CC. Interneuronal network model of theta-nested fast oscillations predicts differential effects of heterogeneity, gap junctions and short term depression for hyperpolarizing versus shunting inhibition. PLoS Comput Biol. 2022 Dec 1;18(12):e1010094. doi: 10.1371/journal.pcbi.1010094. PMID: 36455063; PMCID: PMC9747050.

*Park S, **Zikopoulos B**, **Yazdanbakhsh A**. Visual illusion susceptibility in autism: A neural model. Eur J Neurosci. 2022 Aug;56(3):4246-4265. doi: 10.1111/ejn.15739. Epub 2022 Jun 22. PMID: 35701859; PMCID: PMC9541695.

*Zhu J, **Zikopoulos B**, **Yazdanbakhsh A**. A neural model of modified excitation/inhibition and feedback levels in schizophrenia. bioRxiv [Preprint]. 2023 Apr 28:2023.04.24.538166. doi: 10.1101/2023.04.24.538166. PMID: 37162902; PMCID: PMC10168241.

Herre M, Goldman OV, Lu TC, Caballero-Vidal G, Qi Y, Gilbert ZN, Gong Z, Morita T, Rahiel S, Ghaninia M, Ignell R, Matthews BJ, Li H, Vosshall LB, **Younger MA**. Non-canonical odor coding in the mosquito. Cell. 2022 Aug 18;185(17):3104-3123.e28. doi: 10.1016/j.cell.2022.07.024. PMID: 35985288; PMCID: PMC9480278.

Farley SJ, Grishok A, **Zeldich E**. Shaking up the silence: consequences of HMGN1 antagonizing PRC2 in the Down syndrome brain. Epigenetics Chromatin. 2022 Dec 3;15(1):39. doi: 10.1186/s13072-022-00471-6. PMID: 36463299; PMCID: PMC9719135.

Li Z, Klein JA, Rampam S, Kurzion R, Campbell NB, Patel Y, Haydar TF, **Zeldich E**. Asynchronous excitatory neuron development in an isogenic cortical spheroid model of Down syndrome. Front Neurosci. 2022 Sep 7;16:932384. doi: 10.3389/fnins.2022.932384. PMID: 36161168; PMCID: PMC9504873.

Wang X, Chen J , Homma ST, Wang Y, Smith GR, Ruf-Zamojski F, Sealfon SC, **Zhou L**. Diverse effector and regulatory functions of fibro/adipogenic progenitors during skeletal muscle fibrosis in muscular dystrophy. iScience. 2022 Dec 8;26(1):105775. doi: 10.1016/j.isci.2022.105775. PMID: 36594034; PMCID: PMC9804115.

Wang X, **Zhou L**. The Many Roles of Macrophages in Skeletal Muscle Injury and Repair. Front Cell Dev Biol. 2022 Jul 11;10:952249. doi: 10.3389/fcell.2022.952249. PMID: 35898401; PMCID: PMC9309511.

Luijten LWG, Doets AY, Arends S, Dimachkie MM, Gorson KC, Islam B, Kolb NA, Kusunoki S, Papri N, Waheed W, Walgaard C, Yamagishi Y, Lingsma H, Jacobs BC; **IGOS Consortium**. Modified Erasmus GBS Respiratory Insufficiency Score: a simplified clinical tool to predict the risk of mechanical ventilation in Guillain-Barré syndrome. J Neurol Neurosurg Psychiatry. 2023 Apr;94(4):300-308. doi: 10.1136/jnnp-2022-329937. Epub 2022 Nov 25. PMID: 36428088.

García-Cabezas MÁ, Hacker JL, **Zikopoulos B**. Homology of neocortical areas in rats and primates based on cortical type analysis: an update of the Hypothesis on the Dual Origin of the Neocortex. Brain Struct Funct. 2022 Aug 12:10.1007/s00429-022-02548-0. doi: 10.1007/s00429-022-02548-0. Epub ahead of print. PMID: 35962240; PMCID: PMC9922339.

Zuk J, Vanderauwera J, Turesky T, Yu X, Gaab N. Neurobiological predispositions for musicality: White matter in infancy predicts school-age music aptitude. Dev Sci. 2022 Dec 26:e13365. doi: 10.1111/desc.13365. Epub ahead of print. PMID: 36571291.

Davison KE, **Zuk J**, Mullin LJ, Ozernov-Palchik O, Norton E, Gabrieli JDE, Yu X, Gaab N. Examining Shared Reading and White Matter Organization in Kindergarten in Relation to Subsequent Language and Reading Abilities: A Longitudinal Investigation. J Cogn Neurosci. 2023 Feb 1;35(2):259-275. doi: 10.1162/jocn_a_01944. PMID: 36378907; PMCID: PMC9884137.

Yu X, Ferradal S, Dunstan J, Carruthers C, Sanfilippo J, **Zuk J**, Zöllei L, Gagoski B, Ou Y, Grant PE, Gaab N. Patterns of Neural Functional Connectivity in Infants at Familial Risk of Developmental Dyslexia. JAMA Netw Open. 2022 Oct 3;5(10):e2236102. doi: 10.1001/jamanetworkopen.2022.36102. PMID: 36301547; PMCID: PMC9614583.

Turesky TK, Sanfilippo J, **Zuk** J, Ahtam B, Gagoski B, Lee A, Garrisi K, Dunstan J, Carruthers C, Vanderauwera J, Yu X, Gaab N. Home language and literacy environment and its relationship to socioeconomic status and white matter structure in infancy. Brain Struct Funct. 2022 Nov;227(8):2633-2645. doi: 10.1007/s00429-022-02560-4. Epub 2022 Sep 9. PMID: 36076111; PMCID: PMC9922094.

Spencer C, Davison KE, Boucher AR, **Zuk J**. Speech Perception Variability in Childhood Apraxia of Speech: Implications for Assessment and Intervention. Lang Speech Hear Serv Sch. 2022 Oct 6;53(4):969-984. doi: 10.1044/2022_LSHSS-21-00170. Epub 2022 Sep 2. PMID: 36054844; PMCID: PMC9911093.

Andrade PE, Müllensiefen D, Andrade OVCA, Dunstan J, **Zuk J**, Gaab N. Sequence Processing in Music Predicts Reading Skills in Young Readers: A Longitudinal Study. J Learn Disabil. 2023 Mar 20:222194231157722. doi: 10.1177/00222194231157722. Epub ahead of print. PMID: 36935627. ■

FACILITIES & EQUIPMENT

THE CENTER HOUSES FACULTY in various locations on the Charles River Campus and the School of Medicine Campus. The Rajen Kilachand Center building provides a central location for meetings and Center administration, as well as research facilities for some Center faculty.

Rajen Kilachand Center Building

A number of CSN members are housed on the 7th, 8th and 9th floors of the Rajen Kilachand Center for Integrated Life Sciences and Engineering building at Boston University. Administrative offices for the Center are also housed on the 7th floor of this new building. The building includes space for social gatherings, seminars, and laboratory meetings. The first floor also houses facilities for the Cognitive Neuroimaging Center, as well as testing rooms for behavioral studies. The building provides research space for several CSN faculty performing research using systems neuroscience techniques in animals or functional imaging in human subjects. This is the primary new space available at Boston University for these techniques. Space allocation for the centers housed in the Rajen Kilachand building is controlled by the Provost, and the Vice President and Associate Provost for Research. Allocation of space takes into consideration the research productivity and external research funding of the investigators and research teams.

Core resources provided by university

Housing for animals used in systems neuroscience research:

- Laboratory Animal Care Facility (LACF)

Shared resources for microscopy used in systems neuroscience research:

- Proteomics and Imaging Core Facility

Existing laboratories

Multiple laboratories support systems neuroscience research:

The Atema Lab – Jelle Atema

Intelligent Mechatronics Laboratory – John Baillieul

Neural Systems Laboratory – Helen Barbas

Artificial Intelligence and Emerging Media Group – Margrit Betke

Bifano Laboratory – Thomas Bifano

Bio Optical & Acoustic Spectroscopy Lab – David Boas

Laboratory of Addiction Genetics – Camron Bryant

Neural Dynamics of Cognition Laboratory – Chandramouli Chandrasekaran

Chen Lab – Jerry Chen

Binaural Hearing Laboratory – H. Steven Colburn

Vision & Cognition Laboratory – Alice Cronin-Golomb

Cruz-Martín Lab – Alberto Cruz-Martín

Davison Lab – Ian Davison

Denison Lab – Rachel Denison

DePasquale Lab - Brian DePasquale

Neurovascular Imaging Laboratory – Anna Devor

Economo Laboratory – Michael Economo

Laboratory of Molecular Neurobiology – David H. Farb

Gabel Lab – Christopher V. Gabel

Laboratory for Learned Neural Dynamics and Cortical Prediction - Jeffrey Gavornik

Cortical & Computational Decoding of Speech Lab – Oded Ghitza

Motor Development Lab – Simone Gill

The Guenther Lab – Frank Guenther

Han Lab – Xue Han

Harris Lab – David A. Harris

Laboratory for Computational Neurophysiology – Michael Hasselmo

Ho/Beffert Lab – Angela Ho

Theoretical Cognitive Neuroscience Laboratory – Marc Howard

Howe Lab - Mark Howe

Keck Laboratory for Network Physiology – Plamen Ivanov

Laboratory of Behavioral Neuroscience – Kathleen M. Kantak

Developing Minds Lab – Mellisa Kibbe

Aphasia Research Laboratory – Swathi Kiran

Lin Laboratory – Jen-Wei Lin

The Ling Lab – Sam Ling

The Laboratory of Cellular Neurobiology – Jennifer Luebke

Man Lab – Heng-Ye Man

Cognitive & Decision Laboratory – Joseph McGuire

McKee Lab – Ann McKee

Neural Circuits and Ultrastructure – Maria Medalla

Biomicroscopy Laboratory – Jerome Mertz

Meyer Lab – Heidi Meyer

Laboratory of Cognitive Neurobiology – Tara Moore; Douglas Rosene

Glia Engineering Lab – Tim O'Shea

Network Optimization & Control Laboratory – Yannis Paschalidis

Communication Neuroscience Research Laboratory – Tyler Perrachione

Nanostructured Fibers and Nonlinear Optics Laboratory – Siddharth Ramachandran

Ramirez Group - Steve Ramirez

Cognitive and Clinical Neuroscience Laboratory – Robert M. G. Reinhart

The Roussarie Lab – Jean-Pierre Roussarie

Laboratory of Translational Epilepsy – Shelley J. Russek

Laboratory of Addictive Disorders – Valentina Sabino

Brain Plasticity and Neuroimaging Laboratory – Karin Schon

Laboratory of Comparative Cognition Lab – Benjamin Scott

Natural Sounds and Neural Coding Lab – Kamal Sen

Laboratory of Cellular Biology of the Basal Ganglia – Jean-Jacques Soghomonian

Neuroimaging, Perception, and Attention Laboratory – David Somers

Cognitive Neuroimaging Laboratory – Chantal Stern

The Stern Lab – Robert Stern

Center for Autism Research Excellence – Helen Tager-Flusberg

Brain and Early Experiences Laboratory – Amanda Tarullo

Tay Lab – Tuan Leng Tay

The Laboratory of Human Induced Pluripotent Stem Cell Therapeutics – Julia TCW

Brain & Vision Laboratory – Lucia Vaina

Wallace Lab – Michael Wallace

Neuronal Dynamics Lab – John White

Laboratory of Neurodegeneration – Benjamin Wolozin

Computational Neuroscience & Vision Laboratory – Arash Yazdanbakhsh

Younger Lab – Meg Younger

Laboratory of Intellectual Disorders – Ella Zeldich

Muscle Research Laboratory – Lan Zhou

Human Systems Neuroscience Laboratory – Basilis Zikopoulos

Communication and Neurodevelopment Lab – Jennifer Zuk

Graduate student Gabriela Rodriguez (left) and postdoc Mai-Anh Vu work in the Howe Lab.

The lobby of the Rajen Kilachand building features an art installation (left) titled Blue-Green Brainbow, produced by Brooklyn-based sculptor and printmaker Carson Fox, which was inspired by a neuroimaging technique that distinguishes individual neurons in the brain using fluorescent proteins. On the right is the entrance to the Howard Eichenbaum Colloquium Room where many CSN events take place.

LOOKING AHEAD

The offices of the director and the administrators for the Center for Systems Neuroscience are located at 610 Commonwealth Ave. on the 7th floor.

The seminars for the Center for Systems Neuroscience typically take place in the Eichenbaum Colloquium Room on the 1st floor of the Rajen Kilachand Center for Integrated Life Sciences & Engineering, 610 Commonwealth Avenue, Boston, MA.

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610 Commonwealth Avenue
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Back cover photo: *CSN Faculty and staff. Pictured (from left to right) are David Farb, Jun Shen, Chandramouli Chandrasekaran, Allison Kunze, Uri Eden, Jerry Chen, Swathi Kiran, Ian Davison, Mark Kramer, Alberto Cruz-Martin, Maya Medalla, Xue Han, Chantal Stern, Marc Howard, Ron Killiany, Jean-Jacques Soghomonian, Michael Hasselmo, Kat Kantak, John White, Tara Moore, Nancy Kopell, Shelley Russek, Anna Devor (kneeling), Doug Rosene, Karin Schon, Michael Economo, Jen-Wei Lin, Alice Cronin-Golomb, Steve Ramirez, Robert Joseph, Jenny Luebke, Benjamin Scott, Tyler Perrachione, David Boas, Amanda Tarullo, Jeff Gavornik, and Joseph McGuire*

Boston University Center for Systems Neuroscience

610 COMMONWEALTH AVENUE
BOSTON, MA 02215

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