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MESSAGE FROM THE DIRECTOR

With 2022 upon us, we welcome the new opportunities that may present over the coming months, the safe engagement with our research community, and continuing the momentum of MRRI’s remarkable scientific advancements of 2021.

Through the significant challenges brought about by the waves of COVID-19 pandemic variants, our staff have found ways to maintain personal and professional balance, and I commend their perseverance and resilience. While MRRI may be robust and adaptable, we are not immune to the prolonged effects of the pandemic. Despite the ongoing stresses and uncertainties, we have done well to rely on each other, including finding opportunities for laughter, friendship, and support.

I encourage you to stay informed about MRRI’s latest research findings and opportunities to participate in our cutting-edge basic and clinical research.

Best wishes for a prosperous, safe, and fulfilling year.

Sincerely,

D. Edwards
 Dylan Edwards, PhD



LETTER FROM MOSSREHAB APHASIA CENTER CO-FOUNDER

Reflections on the 25th anniversary of the MossRehab Aphasia Center

For 25 years, the MossRehab Aphasia Center has been a source of hope, growth, and empowerment for people living with aphasia and their families. Founded in collaboration with MRRI researchers, clinicians, and people with aphasia, the Center was designed to address the long-term communication and psychosocial needs of those with aphasia.

In 1996, scientists at MRRI and around the world demonstrated that, with targeted treatment, people with aphasia could make progress many years after the onset of aphasia. Yet formal, reimbursable, treatment was often limited to weeks or months, and there was no integrated model of long-term rehabilitation. At the same time, there was increasing recognition that psychosocial, environmental, and societal factors were as important to address as the language impairment itself.

Inspired by these findings, as well as input from clinicians and people living with aphasia, we rethought and expanded our model of aphasia rehabilitation. What emerged was a model that offered a new outpatient program for people with chronic aphasia, the Advanced Clinical Therapy Program, and a new Activity Center where those with aphasia could participate in programs to reduce social isolation, improve communication while engaging in meaningful activities, and increase society’s awareness through education. That vision became a reality in 1996.

Over the past 25 years, the Aphasia Center has helped many people with aphasia build new relationships, feel empowered during their recovery, and find a safe space to relearn, practice, and improve their communication skills. But the sentiment of one of our Aphasia Center community members says it best: “There is nothing like this around—I am so glad to be here.”

I am deeply grateful to all who helped make this dream a reality. It has been the highlight of my professional life. But our work is far from finished, and there are still many we need to reach out to who are not yet part of a thriving community like ours. So please spread the word!

Sincerely,
Ruth Fink
 Ruth Fink, MA, CCC-SLP



JEFFERSON
 +EINSTEIN
 Einstein Healthcare Network
 has joined Jefferson Health

In October of last year, Einstein Healthcare Network and Jefferson Health announced the completion of the merger of the two prestigious academic medical centers. This merger will advance health care throughout the Greater Philadelphia area, and it will bring together the exceptional scientists, clinicians, and programs of MossRehab and Magee Rehab.

“During the coming year, we anticipate MRRI scientists and staff will engage in activities to further integrate with Jefferson Health. In doing so, we will remain dedicated to our mission, as well as to promoting the professional growth of individuals and the evolution of the Institute as a whole,” remarked MRRI Director Dylan Edwards, PhD.

Einstein and Jefferson will work together to further strengthen health care and wellness for patients where they live and work, improving patient care and helping to reduce health disparities.

Einstein Healthcare Network and Jefferson Health Finalize Merger

MOVEMENT SCIENCE AND MOBILITY REHABILITATION

New Research Examines Use of One or Both Arms To Perform Tasks After Stroke



Important daily activities such as cooking, bathing, and performing housework involve bimanual action, or the coordinated use of both arms. Following a stroke, 80% of individuals show reduced ability and use of one arm. While previous research has examined use of the affected or the unaffected arm during unimanual action (movement with one arm), virtually nothing is known about how stroke survivors choose between using one or both arms for daily tasks. In a new research project, scientists Cory Potts, PhD, Laurel Buxbaum, PsyD, Shailesh Kantak, PT, PhD, and Aaron Wong, PhD, will investigate, for the first time, task-related and clinical variables that influence the use of one or both arms in individuals with chronic stroke.

In related work, Drs. Potts and Kantak are examining the planning and coordination of bimanual actions in stroke patients. Efficient movement planning involves adjusting for the physical properties of objects. MRRI researchers tested how well stroke patients and adults without stroke (controls) could adjust for changes in an object's weight. In the experiment, participants lifted a box that was initially unweighted. After a few lifts, unbeknownst to the participant, weight was added to the box. They found that neurotypical controls incorporated the information about increased weight into the forthcoming movement plan, scaling the force applied to the box before liftoff. Stroke patients, on the other hand, showed a more reactive pattern, adjusting the force applied to the box throughout the movement. Pinpointing the differences between movement planning in healthy individuals and stroke survivors may inform training strategies to improve movement capacity.

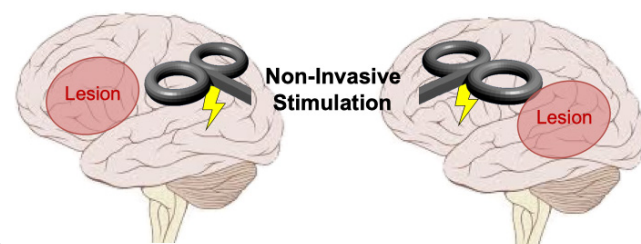
COGNITIVE NEUROSCIENCE AND COGNITIVE REHABILITATION

Using Gestures and Brain Stimulation to Enhance Language in People with Stroke

Everyone experiences that "tip of the tongue" feeling from time to time. Difficulty finding the word you're looking for is frustrating, but for people living with aphasia – language impairment following stroke or brain injury – these word-finding difficulties, called anomia are frequent and highly disruptive to daily life. Gesture, another medium for conveying meaning, may also be impaired following stroke. This is unfortunate because gestures can not only serve to help get a point across, but also can activate semantic networks in the brain to help the speaker produce the word they want to say.

MRRI and University of Pennsylvania researchers Haley Dresang, PhD, Laurel Buxbaum, PsyD, and Roy Hamilton, MD, MS, are combining gesture observation with non-invasive brain stimulation to investigate whether enhanced activation of action knowledge (semantics) can facilitate verb production in patients with aphasia. This is the first study to implement a specific type of excitatory stimulation – intermittent theta-burst stimulation – on verb-production impairments, and also the first to combine brain stimulation with gesture-observation cues in aphasia.

The researchers will apply a magnetic current that amplifies the activity of neurons in brain regions important for semantic processing, and assess whether patients are able to successfully name more verbs based on observed gestures while receiving brain stimulation. This exciting research holds the potential to not only advance scientific understanding of how the brain functions, but also to create a novel neurorehabilitation approach for treating stroke patients with language and/or motor impairments.



Research is an important part of treatment, often leading the way to new advances and innovations in medical rehabilitation.

You can help make a difference by supporting our research at MRRI.

Visit the donation page of our website to learn more: <http://mrri.org/donate-now/>

MRRI WELCOMES DR. MARJA-LIISA MAILEND

MRRI Launches New Speech and Language Recovery Laboratory Directed by Dr. Mailend

We are pleased to announce that Marja-Liisa Mailend, PhD, has recently joined our team of Institute Scientists at MRRI. Dr. Mailend's academic training began with a clinical focus at the University of Tartu in Estonia where she received her master's degree in speech-language pathology. During her early scientific training, she realized the critical need for further development of a solid evidence base for clinical care. This, combined with her passion for research and scientific thinking, drove her to pursue a doctoral degree. Dr. Mailend was awarded her Ph.D. in Speech, Language, and Hearing Sciences from the University of Arizona where she had an opportunity to work with several exceptional researchers. In 2017, Dr. Mailend came to MRRI to train as a postdoctoral fellow under the mentorship of Erica Middleton, PhD, and Laurel Buxbaum, PsyD.



Research in Dr. Mailend's new laboratory focuses on improving our understanding of impairments of phonological encoding and motor planning for speech. She applies theoretical models of typical speech production to elucidate the underlying impairments in apraxia of speech (a motor speech disorder that makes it difficult to speak) and aphasia (an acquired language impairment that impairs one's ability to express and understand language). The ultimate goal of Dr. Mailend's research program is to develop theory-driven assessments and treatments to help people with speech and language impairments lead independent and fulfilling lives.

Dr. Mailend's work complements ongoing research at the Institute in the area of cognitive neuroscience and cognitive rehabilitation, and she looks forward to continuing to build collaborations with other world-class researchers both within and outside of MRRI.

OUR RESEARCH REGISTRY

MRRI's Research Registry Helps Scientists Make Important Discoveries

Founded in 2000, the MRRI Research Registry is a computer database that allows MossRehab patients and members of the community to learn about research opportunities that may ultimately benefit them or others. The Registry is directed by Sharon M. Antonucci, PhD, CCC-SLP, and it is a unique and valuable resource for MRRI scientists and collaborators.



There are over 2,000 members in the MRRI Research Registry, and it continues to grow. Registry members include adults with stroke, traumatic brain injury (TBI), and Parkinson's Disease, as well as individuals who do not have a neurological condition. As MRRI continues to expand and establish new laboratories, the MRRI Research Registry may begin recruiting populations with other neurological diagnoses. Participation in each research opportunity is completely voluntary, and to date, members have contributed to 157 research studies.

MRRI scientists are committed to improving the lives of people with neurological disabilities through research. The time, effort, and dedication of research participants has been critical in the success of MRRI scientists in advancing our knowledge in the fields of neuroscience and neurorehabilitation. We are grateful to all of our research volunteers and their families.

For more information about the MRRI Research Registry and how to get involved, please visit the Registry webpage at <https://mrri.org/patient-research-registry/>.



MRRI
MOSS REHABILITATION
RESEARCH INSTITUTE

MossRehab
EINSTEIN HEALTHCARE NETWORK

Subscribe to our YouTube channel (youtube.com/user/MossRehabResearch) to see recent videos featuring our researchers, presentations from the Shrier Family Topics In Rehabilitation Science Seminar Series, MRRI Visiting Scholar Lectures, and more!

Developing a Novel Clinical Program for People with Primary Progressive Aphasia

Primary progressive aphasia (PPA) is a cluster of neurodegenerative disorders characterized by insidious loss of speech and language, which over time severely impairs the ability to articulate, remember words, understand others, and in some cases even comprehend the use for common objects, like a spoon or a key. All presentations of PPA are variants of fronto-temporal dementia, the most common form of dementia for people under the age of 60 (theaftd.org). While knowledge of PPA has begun to increase in the healthcare community, it can still take more than three years for families to receive an accurate diagnosis, delaying access to treatment. Due to the young onset of PPA, difficulty accessing resources is further exacerbated by the fact that many caregivers are still working full time to support families that may include young children.



To assist in bridging this critical gap in services within the greater Philadelphia community and beyond, the MossRehab Aphasia Center will be piloting a program called the Strategy Training and Education Program for People Living with Primary Progressive Aphasia (STEP-LPPA). This pilot program, funded by the Albert Einstein Society, will provide communication, psychosocial, and educational support to individuals with PPA and their primary care/communication partners. Participants will receive individualized training and information regarding support services in a service-delivery model designed to maximize building friendships and a community for long-term support.

Last year, we published more than 50 new posts on the MRR I blog, and we look forward to sharing more stories and updates with you in 2022!

Visit our blog at mrr i.org/blog/ to learn about our latest news and updates.

TRAUMATIC BRAIN INJURY TREATMENT AND OUTCOMES

MRR I Scientists Examine Learning and Memory in People with TBI and Depression

Depression is common following moderate to severe Traumatic Brain Injury (TBI). However, many research studies on cognition and brain function after TBI do not examine depression symptoms, or they exclude individuals with depression. MRR I Scientists are collaborating with scientists at Kessler Foundation (lead site), Montclair State University, and the University of Pennsylvania to conduct research that aims to fill this gap. The study examines how individuals learn and remember information when they are living with TBI, clinical depression, or both conditions. Umesh Venkatesan, PhD, is Site Principal Investigator, and Amanda Rabinowitz, PhD, is also contributing to this effort. The study is funded by the National Institute of Neurologic Disorders and Stroke of the National Institutes of Health.



Research participants in this study undergo neuroimaging, clinical assessment, and neurocognitive testing. The research team hopes the findings will suggest novel ways to improve memory performance for people simultaneously experiencing the effects of TBI and depression. Ultimately, the goal is to find support for new memory treatments that could positively impact patients' daily functioning and quality of life. The study will run through Spring of 2026, and findings will provide important insights into the mechanisms underlying memory impairment in TBI. A better understanding of these mechanisms will inform development of future treatments, particularly in individuals living with both TBI and depression.

2021 ACCOMPLISHMENT HIGHLIGHTS

31
Conference
Presentations

9
Grants
Funded

51
Research
Papers

Dr. Sharon M. Antonucci published the lead article in an issue of *Seminars in Speech and Language* devoted to research regarding animal-assisted interventions, for which she was also the guest editor. In collaboration with Karen R. Cohen, MossRehab Aphasia Center speech-language pathologist, she secured an innovative program grant from the Albert Einstein Society to fund a pilot program for families living with primary progressive aphasia that will focus on strategy training, education, and community-building.

Dr. Laurel Buxbaum and Dr. H. Branch Coslett received a 5-year, \$2.8 million grant from the National Institutes of Health (NIH). The multi-site research will test a novel virtual reality treatment for phantom limb pain and assess brain changes that result from treatment. Dr. Buxbaum was also appointed to the Board of Directors of the American Society of Neurorehabilitation (ASNR).

Dr. Dylan Edwards and collaborators published original research demonstrating clinical improvement of post-stroke symptoms with intensive upper limb training use digital gaming (Journal: *Neurology*), and separately with walking training using robotics (Journal: *Scientific Reports*). Dr. Edwards also hosted a workshop on mapping the brain with non-invasive stimulation, sponsored by the National Institutes of Health, through the Medical University of South Carolina.

Dr. Shailesh Katak along with collaborator Dr. Laurel Buxbaum received a grant from the Albert Einstein Society to investigate the cognitive and neurophysiologic bases of arm choice after stroke. Dr. Katak also published three new manuscripts — two in the journal *Physical Therapy* and one in *Human Movement Science*.

Dr. Marja-Liisa Mailend, in collaboration with Dr. Erica Middleton and Dr. Laurel Buxbaum, received a grant from the National Institute on Deafness and Other Communication Disorders of the NIH to investigate the efficacy of speech entrainment practice for people with aphasia. Dr. Mailend also published two manuscripts in the journal *Cognitive Neuropsychology*.

Dr. Middleton continued to direct research funded by the NIH seeking to establish the relevance of powerful learning principles derived from basic psychological research for optimizing the treatment of comprehension and production impairments in aphasia. Work from Dr. Middleton's lab was presented at the annual meetings of the Academy of Aphasia, the International Workshop on Language Production, and the Psychonomic Society. Dr. Middleton served on the Program Committee of the Academy of Aphasia.

Dr. Amanda Rabinowitz authored or co-authored 16 scientific publications in 2021 in journals including *Journal of Neurotrauma*, *Archives of Physical Medicine and Rehabilitation*, *Journal of Head Trauma Rehabilitation*, *Rehabilitation Psychology*, *Neuropsychology*, and *Journal of the International Neuropsychological Society*. She is part of a multi-center team that was recently awarded an NIH grant for the project, led by Ohio State, entitled "Comparing Treatment Approaches to Promote Inpatient Rehabilitation Effectiveness for Traumatic Brain Injury (CARE4TBI)".

Dr. Amanda Therrien and her collaborators published 7 peer-reviewed publications in the following journals: *Cerebellum*, *Physical Therapy*, *Current Opinion in Physiology*, *Journal of Neurophysiology*, *Brain Stimulation*, *Gait and Posture*, and *Neurorehabilitation and Neural Repair*. Dr. Therrien was also awarded a research grant from the Albert Einstein Society to study the neurophysiological mechanisms of preserved reinforcement learning capacity in individuals with cerebellar degeneration.

Dr. Umesh Venkatesan contributed to several publications in outlets including *Journal of Head Trauma Rehabilitation*, *Journal of Neurotrauma*, and *Neurorehabilitation*. He led a Special Communication in *Archives of Physical Medicine and Rehabilitation* on psychoeducation for veterans and service members with mild TBI. The paper presents a theory-driven approach to delivering and evaluating personalized patient education based on the Rehabilitation Treatment Specification System, which MRRI helped to pioneer.

Dr. Aaron Wong received funding from the National Institute of Neurological Disorders and Stroke of the NIH to study the cognitive-movement disorder of apraxia following left-hemisphere stroke. He also received renewed support for the Klein Family Parkinson's Rehabilitation Center, a clinical-research collaboration to improve the lives of people with Parkinson's Disease.

Dr. Laurel Buxbaum was awarded the prestigious Freda Newcombe Prize from the British Neuropsychological Society for her contributions to the field of neuropsychology research.

Dr. Dylan Edwards and Dr. Shailesh Katak at MRRI, together with collaborators at Harvard Medical School, were awarded a grant from the Chernowitz Medical Research Foundation, titled Precision Transcranial Magnetic Stimulation in Stroke, to improve current methods for diagnostic and therapeutic brain stimulation.
