Georgetown University

COGNITIVE RECOVERY LAB

Issue 5 • Summer 2021

2020 - 2021 HIGHLIGHTS

This year has been a challenge all over the world. As a community, we have faced grief, loneliness, and uncertainty. The pandemic has only further magnified the systemic racism, poverty, and gender inequality in our country and our world. We and others at Georgetown University have been actively discussing ways in which we may positively contribute to and educate our community—especially in academia and medical research.

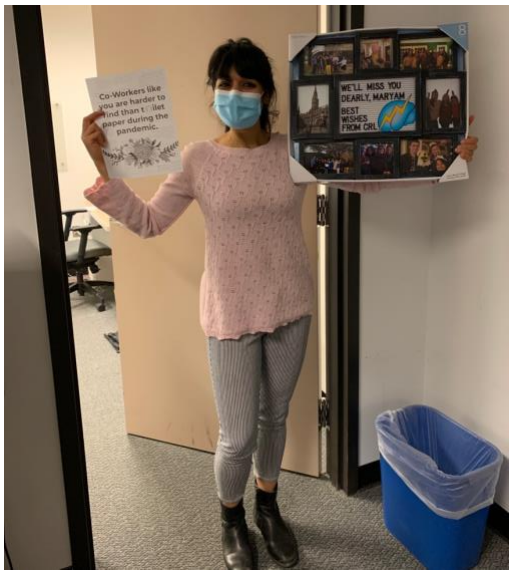
In our smaller CRL bubble, we adjusted to new schedules. We learned to work, communicate, and stay close remotely. Some of us were able to experience more time with loved ones, and others took up new hobbies that we may never have learned otherwise. We've had a lot of lab picnics to stay sane. We resumed testing participants in October with new COVID-19 protocols, and recently, we have returned to work in person more often.

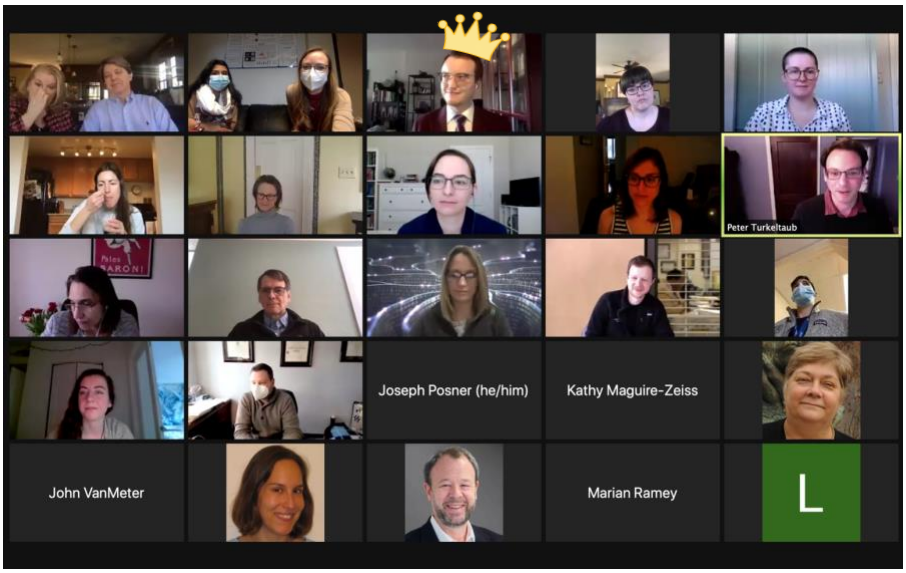
We are so grateful to everyone who has participated in our studies in the past year. You've allowed us to continue making progress toward a brighter future for people with aphasia during this difficult time.

THANK YOU!!!

RECENT NEWS

In January, Vivian Dickens defended his thesis, *Mapping the Neurocognitive Architecture of Reading*. He is now Dr. Dickens and has returned to finish medical school. We are so proud of him. Also in January, Maryam Ghaleh, former postdoctoral researcher, accepted a new position as Scientific Program Manager at the National Institute of Neurological Disorders and Stroke (NINDS) at NIH. Thanks for five amazing years with us, Maryam!





On the left: Maryam's last day in the lab; On the right: Vivian's defense (on Zoom) on January 29, 2021.

Two of our undergraduate research assistants graduated in May. Abigail Ludwigson is going to the University of Colorado School of Medicine, and Caroline Fisher is starting the Master of Public Health program at Boston University. Huge congratulations to both of you!! Thank you for all of your time and service to CRL.

Postdoctoral researcher Andrew DeMarco was awarded the NIH Pathway to Independence K99/R00 grant which will support his research developing a new brain imaging method, called Functional Anomaly Mapping, that may help us understand aphasia recovery better. This award will be supporting Dr. DeMarco in deploying his methods and building his independent career.

Postdoctoral researcher D. Seles Gadson was awarded a K12 grant through the Neurorehabilitation and Restorative Neuroscience Training Network. She will be continuing her work in studying race and socioeconomic disparities in aphasia, and how they affect the brain and quality of life.

Graduate student Joshua McCall received an F30 grant, supporting his research and training towards an MD/PhD degree. Graduate student Joey Posner received second place for his student presentation at Academy of Aphasia. Congratulations to all!!!

Candace van der Stelt transitioned roles from Research Speech-Language Pathologist to PhD student in the Interdisciplinary Program in Neuroscience here at Georgetown. She decided that three years of us wasn't enough! We've been so lucky to have her and are excited to cheer her on in this next journey.

Elizabeth Lacey has been on maternity leave with her beautiful new baby, August Henderson LaVecchia, born on June 4, 2021 (pictured on the left with his big sister, Annabelle).

Dr. Turkeltaub celebrated his ten year anniversary working at Georgetown (and changing the world). He also submitted an application for a huge institutional research training grant earlier this summer! The grant would help us to start a Brain and Language Training Program for PhD students and post doctoral fellows pursuing careers in Brain and Language Neuroscience. We are very excited about the potential of having such a unique training program here at Georgetown. Keep your fingers crossed for us!

We are recruiting!

If you or someone you know may be interested in participating in research, please reach out to us. We can schedule a phone screening to discuss the study and eligibility. See the last page of this newsletter for contact information and more detail on our current study, BUILD. We love hearing from you (and love referrals—please keep those coming!).

WELCOMING NEW LAB MEMBERS

We are incredibly excited to have Alycia Laks, MS, CCC-SLP as our new Research Speech-Language Pathologist! Prior to joining us, Alycia worked with stroke and traumatic brain injury survivors at Inova Mount Vernon Hospital. She is interested in translational research for the diagnosis and treatment of aphasia and alexia and in individual factors that contribute to stroke recovery. We are grateful to have her! We also had four new undergraduate research assistants join us this summer: Cameron Davis, Caitlin McDermott, Anna Prince, and Jessica Schwartz. We now have ten undergrads with us total, and it is definitely making our lives easier (and more fun)!

ALUMNI NEWS

In alumni news, former graduate student Kelly Michaelis is starting a new postdoctoral position with Dr. Adam Green (Georgetown University) and Dr. John Medaglia (Drexel University). Kate Spiegel, who was an undergraduate and then a Lab Manager, graduated from the University of Conneticut School of Medicine and matched in Neurology at Brown University. Former undergrad Ayan Mandal completed his PhD from Cambridge University and is starting medical school at the University of Pennsylvania. Former graduate student William Hayward completed his residency in Neurology at Georgetown University Hospital and is now beginning a new fellowship at the NIH.

Mackenzie Fama, former graduate student and now Assistant Professor in the Department of Speech, Language, and Hearing Sciences at The George Washington University, welcomed beautiful baby Theodore Matthew Fama Finger (pictured on the left) on October 1, 2020. Hooray!!

THANK YOU TO OUR PARTICIPANTS

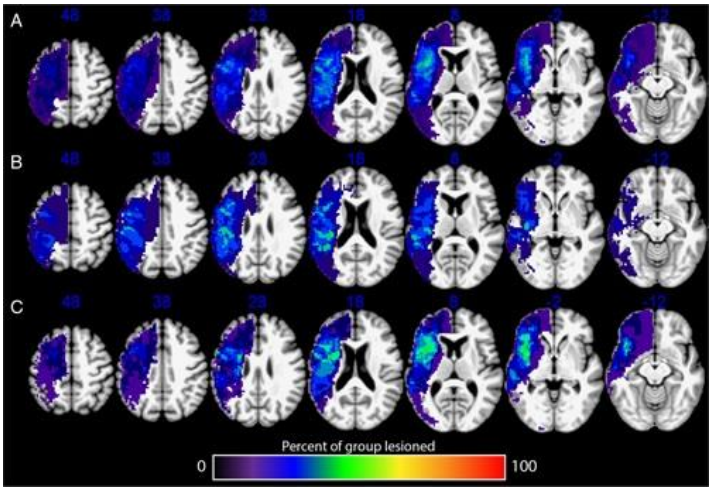
We enrolled 38 participants in the BUILD study this past year, and in total, we have now enrolled 115 BUILD participants! The pandemic led us to form what we now call "Conversation Group" – a weekly meeting group of individuals with aphasia to meet and get to know each other. The group meets over Zoom and in person outdoors from time to time. We cannot begin to express how grateful we are to all of these special people and many more who have given us their time and energy, especially over the last year in a pandemic. We quite literally could not do this research without you— Thank you for sticking with us!

Conversation group meets up at the park to enjoy a beautiful day!

We've highlighted our publications and presentations over the last year below so that you can see how you are helping us contribute to science and the world.

NEW RESEARCH PUBLICATIONS

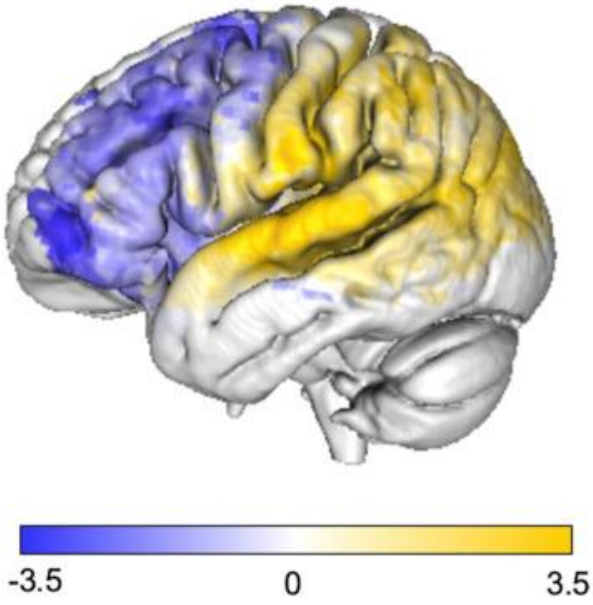
Our CELIA paper was published in *Cognitive and Behavioral Neurology*. CELIA tested the ability of mild electrical stimulation (tDCS) of the right cerebellum to enhance language processing in individuals with aphasia. While we did not find enough effect of treatment to claim it as a useful approach, it was an important project towards the broader goal of finding effective aphasia treatment.



*Overlay showing lesion overlap for all study participants (**A**), only individuals in the active treatment group (**B**), and only individuals in the historical sham control group (**C**).*

D. Seles Gadson published a paper in *Topics in Stroke Rehabilitation* analyzing the relationship between health-related quality of life, perceived social support, and social

network size in African Americans with aphasia. Patient-reported data shows significantly lower health-related quality of life in stroke survivors with aphasia compared to controls. Communication was a very important factor in this outcome.

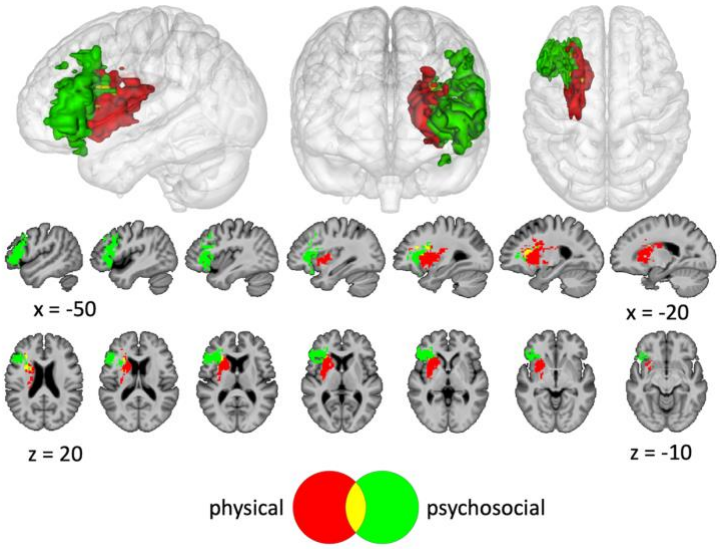


Lesion-mapping results for unaware participant groups (frontal lobe in blue) and aware participant groups (temporal and parietal lobe in yellow).

Candace van der Stelt published a paper in *Neuropsychologia* examining awareness of naming abilities in people with aphasia. Some people with aphasia recognize that they have difficulty finding words, while others do not. Lack of awareness may limit a person's willingness to receive treatment, so it's important to understand why some people are unaware. We found that lack of awareness of naming ability is related to problems with "semantics," which is our knowledge and use of word meanings. Lack of awareness was also more common with strokes in the frontal lobe, while awareness was more common with strokes in the temporal and parietal lobes.

Former graduate student, Kelly Michaelis, published a paper in *Communications Biology* examining how the brain supports speech perception. Specifically, the study looks at how brain systems for speech production may also contribute to speech perception. We recorded electrical activity from participant's brains using electroencephalography (EEG) while they watched videos of words, or listened to audio of words, pieces of words, or familiar non-speech sounds (e.g., car horns, thunder). We found that speech production systems are involved in accurate perception of pieces of words and videos, but not of audio-only words or other sounds. This helps us understand how the brain processes different types of speech and may help us design future therapies for those who have speech perception difficulties.

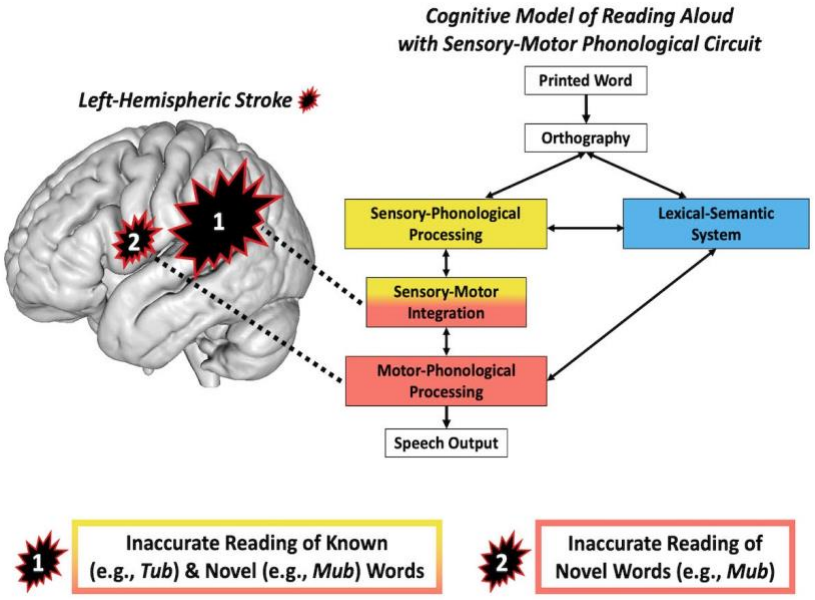
Kelly Martin has a book chapter currently in press in the *Handbook of Clinical Neurology*. The chapter is focused on studying plasticity of the language system in children and adults. Peter Turkeltaub also has a book chapter in press in *Lesion to Symptom Mapping: Principals and Tools* focused on the methods we use to understand how stroke location relates to language and cognitive difficulties . We are looking forward to seeing those out soon.



Lesion-symptom map showing lesions associated with physical and psychosocial quality of life scores.

Liz Dvorak published a paper in *Neurorehabilitation and Neural Repair* studying health-related quality of life and lesion locations in individuals with aphasia. The study looked at scores from cognitive testing, stroke lesion volume, depressed mood, and demographic variables. Results showed that health related quality of life relates to where in the brain the stroke is, depression symptoms, and impairment-based measures (arm strength for physical quality of life and speech production for communication quality of life).

Vivian Dickens' paper on phonological alexia was accepted at *Brain Communications* and is now in-press. This study examined reading scores and measures of how strokes damage connections in the brain. We found two different patterns of reading problems. Strokes involving the left frontal lobe caused problems with motor phonology (e.g., repeating multi-syllable words clearly) and sounding out new words when reading. In contrast, strokes involving the left temporal and parietal lobes caused problems with auditory-motor translation (e.g., repeating long made up words), and both sounding out new words and "sight reading" known words. This helps us understand why people have specific types of reading difficulties after stroke so that we are able to target reading treatments to a person's specific difficulties. This study also helps us understand how reading and speech processing systems relate to each other, which may be important for helping people with other reading difficulties such as developmental dyslexia.



Cognitive Model of Reading Aloud as studied by Dickens et al, focused on the sensory-motor circuit of reading and language.

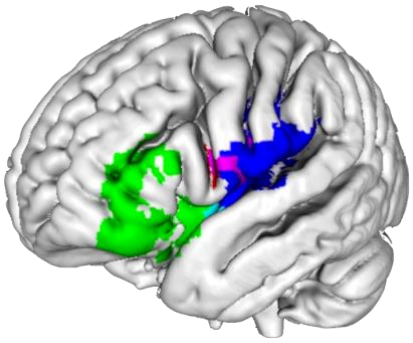
Dr. Turkeltaub also co-authored three additional collaborative papers this year. One, published in *Proceedings of the National Academy of Sciences of the United States of America*, found that while language is left-lateralized throughout life, the right hemisphere has a strong role in language processing in early childhood and decreases with age. The right hemisphere activation, detected through fMRI activation, represents a possible way to explain language recovery following early stroke. The second paper, published in *The Royal Society*, found specific impairments in the ability to predict fear in others (but not other emotions) from written scenarios following bilateral amygdala lesions. The third paper, published in *Aphasiology*, demonstrated that people with apraxia of speech and aphasia often produce inconsistent errors when they are asked to repeat challenging words several times in a row. More specifically, error consistency is similar or lower in aphasia with apraxia of speech. This is important because it suggests new diagnostic rules are needed for apraxia of speech. In addition to these, Kyle Shattuck and Andrew DeMarco have also been co-authored on a few different papers this year. We've been staying busy!

All of this work is only possible with the help of participants, so we thank you for your contributions! Please email us at **crlab@georgetown.edu** if you have any questions or if you would like a copy of any of our publications.

RECENT & UPCOMING TALKS AND CONFERENCE PRESENTATIONS

- Vivian Dickens, Joey Posner, and Candace van der Stelt presented their research at the virtual **Academy of Aphasia Conference** in October 2020.
- Andrew DeMarco was a guest on Stephen Wilson's *Language Neuroscience Podcast* to discuss highlights of the 2021 **Clinical Aphasiology Conference**.
- Tyler Ketchabaw and Vivian Dickens presented their research at the **Society for the Neurobiology of Language** in October 2020.
- Joey Posner virtually presented his research on SVR-LSM and orthography effect in aphasia at **Organization of Human Brain Mapping** in June 2021.
- Peter Turkeltaub gave a number of virtual talks about our research this year, including at **Moss Rehabilitation**, **University of Arizona**, and **Penn State**. He was also a featured guest in an Episodes 83 and 84 of the **Stroke Comeback Podcast**, titled "Slow Road to Better," as well as in a **National Aphasia Association** "Ask the Expert" panel.

CURRENT STUDIES



Thank you to all of the people who have participated in our studies this past year! We are continuing to enroll participants for our NIH-funded study called **BUILD**. We are looking for people who have had a left hemisphere stroke, or a stroke elsewhere in the brain causing aphasia. Additionally, we are looking for individuals with no history of neurological conditions to become control participants.

What is the **BUILD** study about?

Have you ever wondered why you recovered so well after your stroke? Have you wondered why you didn't recover as well as you'd hoped? Have you wondered why your strengths and weaknesses are so different from other stroke survivors you meet? In **BUILD**, we're studying whether these differences are due to the nature of your stroke. We also want to understand how the strength of brain structures and connections that were not affected by your stroke impacts recovery. By understanding these "individual differences" in language and the brain, we hope that in the future, we will be able to predict who will recover well and who may need extra help after their stroke. We also hope that **BUILD** will guide us toward new targets for brain stimulation treatment. Participation requires a few sessions of language, speech, and cognitive testing as well as an MRI scan.

The BUILD Study

- Brain-based Understanding of Individual Language Differences after stroke
- 4-5 sessions of language, speech, and cognitive testing (at Georgetown or NRH)
- One MRI scan (at Georgetown)
- Help us understand more about aphasia and the brain
- After the study, you will receive a report with our observations about your language abilities and pictures of your brain

Please call or e-mail Alycia Laks, MS, CCC-SLP (alycia.laks@georgetown.edu, 202-687-5205) or Sachi Paul (sp1446@georgetown.edu, 202-687-5205) you are interested in participating.