Sentence processing recovery in post-stroke aphasia
by Kathy Xie, Dr. Elena Barbieri, and Dr. Cynthia K. Thompson

In 2013, the Center for the Neurobiology of Language Recovery (CNLR) was established to understand and treat aphasia recovery after stroke. The CNLR was supported by a five-year $12 million grant from the National Institutes of Health (NIH)[1] and united top brain and language researchers from Northwestern University, Boston University, Harvard University, and Johns Hopkins University. Each site explored how the brain facilitates different aspects of language recovery. At Northwestern, Dr. Cynthia K. Thompson studied sentence processing. Dr. Swathi Kiran and Dr. David Caplan studied naming at Boston and Harvard respectively, and Dr. Brenda Rapp studied spelling and writing at Johns Hopkins.

Recently, Dr. Thompson and her team published the sentence processing treatment results[2]. The project administered Treatment of Underlying Forms (TUF), a linguistically based treatment that improves sentence production and comprehension, to people with aphasia. The project used eye-tracking to measure changes in real-time sentence processing strategies and functional magnetic resonance imaging (fMRI) to capture changes in brain activity as a result of treatment.

After treatment, almost all participants improved in producing and understanding sentences. Improvement in the treated group was not limited to the sentences learned during treatment but was also seen for syntactically-related sentences that were not trained. Additionally, there was a shift toward more normal-like eye-movements following treatment, which indicates an improvement in sentence processing strategy. Finally, neural activity increased significantly in regions in the right hemisphere that are important for sentence processing recovery. These increases in neural activity are closely related to treatment gains and shifts toward normal-like eye-movements. Individuals who did not receive treatment did not show these patterns. Together, this supports TUF for restoration of normal-like sentence processing in aphasia after stroke.

Currently, Drs. Thompson and Barbieri are developing a new study to understand what aspects of TUF lead to improvement in sentence processing. They are looking for participants with aphasia who are interested in receiving language treatment. If you are interested, or know someone who might be interested in participating in this project, please contact us!

References

**CURRENT EVENTS & SUPPORT GROUP INFO**

**Aphasia Support Group Meetings**

**GENERAL INFORMATION:**

**IMPORTANT UPDATE!** Starting February 2020 Aphasia Support Group Meetings will be held the first **Wednesday** of each month (except for January and August) from 12:00pm to 1:00pm in Room 1-530 of the Center for Audiology, Speech Language, and Learning Building- 2315 Campus Drive. Please contact Mary Cosic for more information at 847-467-7591 or m-cosic@northwestern.edu

**PUBLIC TRANSPORTATION:**

The lab is located three blocks east of the Noyes Stop on the Purple Line.

CTA: 1-888-968-7282  
www.transitchicago.com

RTA: 1-312-836-7000  
www.rtachicago.com

**UPCOMING MEETINGS:**

- February 5th
- March 4th
- April 1st
- May 6th
- June 3rd
- July 1st

**Do you have a story to tell?**

We’d like to know!

If you would like submit a piece to be featured in an upcoming ANRL newsletter, please contact Amanda at 847-491-7197. Possible topics include: tips and advice, hobbies (e.g. cooking, crafts, etc.), health, research, and your personal experience with aphasia.

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**IN THE NEWS:**

**International Brain and Syntax Think Tank**

In October, our lab hosted the International Brain and Syntax Think Tank meeting! This meeting gathered a fantastic panel of international experts and very exciting poster presentations, to discuss, share, and learn about current research on the brain and grammar, as well identify goals for future research. The two-day meeting included presentations from invited speakers and open discussion sessions on critical topics. The meeting was a great success and we are excited to see how the future of brain and syntax research progresses! (https://sites.northwestern.edu/international-brainandsyntaxthinktank/)

**New method could transform aphasia treatment after stroke**

Researchers Paul Conroy and Christina Drosopoulou (et al. 2018) at the University of Manchester have been experimenting with special software that gradually influences patients’ ability to produce words more quickly. This new treatment was administered on 20 stroke patients over several training sessions using photos shown on a laptop. The experiment initially gave patients 3 seconds to respond to the photos then gradually reduced the time, aiming to achieve a response at 1 second (which is considered normal for people over 65). After treatment it was found that accuracy of word retrieval improved 25%. Control participants who received standard language treatment improved only 10%. Speed of response also increased from 3 seconds to 1.6 seconds with the new treatment. This finding could aid future treatment methods and opens up the idea of considering speed of naming when in speech therapy. These researchers aim for this treatment to be available for the National Health Service (NHS) within 5 years. (https://www.manchester.ac.uk/discover/news/new-method-could-transform-aphasia-treatment-after-stroke/)

**A Battle for My Life: Emilia Clarke**

Game of Thrones (GoT) actress Emilia Clarke, popularly known as Daenerys Targaryen, Khaleesi of the Great Grass Sea, Lady of Dragonstone, Breaker of Chains, and Mother of Dragons, opens up about her recovery after suffering from two brain aneurysms. After filming the first season of the show in 2011, she suffered a life-threatening subarachnoid hemorrhage (bleeding into the surface tissue surrounding the brain), which was treated with surgeries. The first surgery left her with aphasia: she was not able to recall even her name; instead, nonsense words tumbled out of her mouth. She explains the fear and shock that came along with this realization. After a week of rehabilitation, she recovered from this aphasia however, she struggled to feel like herself for a long time after the stroke. Unfortunately, two years later she suffered from another stroke during a preventative surgery that went wrong. Doctors were able to stop the bleeding quickly enough and she then began her next stage of recovery. Since then she has healed astoundingly and has funded a new charity called Same You (sameyou.org) to support young adults in their rehabilitation after traumatic brain injuries. (https://www.newyorker.com/culture/personal-history/emilia-clarke-a-battle-for-my-life-brain-aneurysm-surgery-game-of-thrones)
**Dr. Haiyan Wang**

Dr. Haiyan Wang is an Associate Professor in the Institute of Language and Brain Science, School of Translation Studies, Qufu Normal University at Rizhao City in China. She received her Ph.D. from Tsinghua University, Beijing, China. During Dr. Wang’s training, she developed a keen focus on investigating the neural correlates of sentence processing in healthy older speakers and aphasic patients using on-line measures with eye-tracking and event-related potentials (ERPs). As a visiting scholar in the Aphasia Lab, she is studying the language abilities of patients suffering from primary progressive aphasia (PPA). This is her first time living in the U.S. She really enjoys Evanston life and loves American people! In her spare time, she enjoys swimming in the wonderful pool at Henry Crown, walking along Lake Michigan, and cooking in her cozy apartment!

**Yang Yang (Yo Yo)** has been a visiting scholar at the Aphasia and Neurolinguistics Lab since September 2019. She is a first year Ph.D. student in Beijing Language and Cultural University majoring in speech-language pathology. She is excited to have this opportunity to work with all the amazing people in the lab, with her multi-disciplinary background in rehabilitation medicine, physical therapy and traditional Chinese medicine, she believes that novel ideas will be inspired. In her free time, she enjoys gym exercises, traveling around the world, discovering new music and delectable food.

**Zijian Pang**

Pang is one of the new visiting scholars in the Aphasia and Neurolinguistics Lab, who will study the language abilities of patients suffering from aphasia. She earned her Bachelor’s degree in Hebei Medical University in China, and she earned her Master’s Degree in Capital Medical University in Beijing, China. She worked as a rehabilitation physician and speech pathologist in Hearing & Language Department, China Rehabilitation Center. She is interested in the rehabilitation of aphasia, so now she is working for her Ph. D. in School of Communication, Beijing Language and Culture University. She is from Beijing, China and this is her first time living in the US. She really enjoys Evanston life! She enjoys running, doing some traditional Chinese exercises, and cooking in her cozy apartment!

**Yang Yang**

Yang Yang is a speech therapist in the Hearing and Language Rehabilitation Center, School of Communication, Beijing Language and Culture University in China. She earned her master’s degree in Rehabilitation Medicine in Nanjing Medical University, Nanjing, China. Then she worked as a speech therapist in the Rehabilitation Center of Affiliated Hospital of Shaoxing University, Shaoxing, China. She is looking forward to continuing her studies in aphasia diagnosis and treatment and hopes to eventually earn a Ph.D. degree. As a visiting scholar in the Aphasia and Neurolinguistics Research Lab she enjoys fishing and traveling in her part time.

**Thomas Sostarics**

Thomas Sostarics is a first-year PhD student in Linguistics at Northwestern University and started volunteering at the Aphasia Lab this past summer. He grew up in New Orleans and received a Bachelor’s degree in Linguistics at the University of Chicago, where he worked as a research assistant in the Sentence Processing Lab. Thomas is particularly interested in what we can learn about language from instances where language is impaired, and how this understanding can help to provide a foundation for helping people with impairments. Thomas also enjoys developing and employing computational methods and tools to streamline project workflow. Aside from research, Thomas enjoys riding his bike along Lake Michigan, cooking, and mentoring undergraduate students.

**Tahereh Mohammadi**

Tahereh (Neda) Mohammadi is a new volunteer researcher in the lab. She graduated from Tehran University of Medical Sciences (TUMS) in 2012. She has been involved in a wide range of clinical hands-on experiences and volunteer activities related to aphasia and developmental language disorders during her undergraduate studies. She has had 8 years of successful clinical experience as a speech and language pathologist in her own clinic mostly seeing patients with stroke, cochlear implants and language delay. She will be in the Aphasia and Neurolinguistics lab for several months to gain a deeper insight into neurolinguistics and research. She is very eager to share her knowledge and skills in clinical research and to study psycholinguistics and brain mapping. Her future goal is to be a clinical scientist in Iran.
**ACTIVITIES CORNER**

**Letter Sudoku**

In Letter Sudoku, each column, row, and bolded box must contain the letters ‘A’ through ‘I’. Use each letter only one time in each column, row, and bolded box.

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D A G E
C B I F H E A I D
F C E G
B A H D H E B
I D G C F
C D F B
H I C D
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**Word & letter games:**

Find the word that goes with all of the words listed:

- ___ light
- ___ block
- ___ flower
- ___ rise

Each word in the following pairs includes a smaller word within them (one for each). Find these smaller words to make a familiar phrase.

Example for the word pair: thighbone / swallowtail, the first word contains the word “high” and the second word contains the word “low”. ‘High and low’ is the phrase.

1. forgiveness / mistaken
2. safeguarded / ultrasound
3. shabby / enlargement
4. deadline / jargoned
5. downside / about
6. antibody / soulmates
7. annulling / unavoidable
8. untouched / golden
9. cleanliness / meaningful
10. birdsong / avoidance

How many words can you make from the words:

SNOW MAN

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Q. What do you get when you drop a pumpkin?

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Letter Sudoku from: https://www.puzzles-to-print.com/printable-sudokus/word-sudoku-s.shtml

Word Scramble from: https://www.puzzles-to-print.com/word-scrambles/