

WINTER 2019 NEWSLETTER

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Director:
Dr. Cynthia K. Thompson

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Music, Language and Aphasia by Brianne Chiappetta (doctoral student)

Language and music are part of every human culture. It is unclear how much overlap there is between these two abilities. Previously, language and music were thought of as largely separate functions, depending on distinct brain areas, with language processed predominantly in the left hemisphere and music processed predominantly in the right hemisphere. However, several links have been found between language and musical abilities, which suggests there may be more overlap than previously thought. For example, research has demonstrated a connection between reading abilities and musical abilities^[2,3]. Phonological awareness, which is the ability to recognize and manipulate speech sounds, underlies reading abilities. Phonological awareness is thought to be related to pitch awareness, which offers one explanation of how musical training could impact reading abilities. Additionally, research has shown that musicians, compared to non-musicians, are better able to hear speech in noise^[7].

How Does Musical Training Affect Language Ability?

Dr. Aniruddh Patel (Tufts University) developed the OPERA hypothesis to offer an explanation for how musical training could benefit language^[4,5]. According to this hypothesis, musical training places a high demand on sensory and cognitive processes that overlap with language processing. Thus pairing music and language has the potential to promote neural plasticity, which refers to experience-based structural and functional changes in the brain. The OPERA hypothesis suggests that musical training can affect language because:



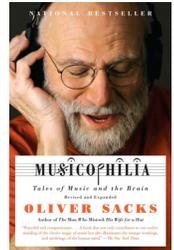
- Overlap of brain regions for music and language
- Precision processing is enhanced in musical training
- Emotional brain networks are activated by music
- Repetition is a defining characterization of musical training
- Attention is fine-tuned with musical training

References:

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- Dege F., Schwarzer G. (2011). The effect of a music program on phonological awareness in preschoolers. *Front. Psychol.* 2:124.10.3389/fpsyg.2011.00124
- Loui P., Kroog K., Zuk J., Winner E., Schlaug G. (2011). Relating pitch awareness to phonemic awareness in children: implications for tone-deafness and dyslexia. *Front. Psychol.* 2:111.10.3389/fpsyg.2011.00111
- Patel, A. D. (2011). Why would musical training benefit the neural encoding of speech? The OPERA hypothesis. *Frontiers in Psychology*, 2, 142.

“Music can lift us out of depression or move us to tears - it is a remedy, a tonic, orange juice for the ear. But for many of my neurological patients, **music is even more - it can provide access, even when no medication can, to movement, to speech, to life.** For them, music is not a luxury, but a necessity.”

— Dr. Oliver Sacks, *Musicophilia* (2007)^[6]



Use of Music as a Therapy Tool

Music has been used as a clinical tool to help people who have depression, dementia, asthma, chronic pain, and other impairments. It also has been used to improve walking in people with Parkinson’s disease and to help people with aphasia talk more fluently.^[1] For improving language production in people with severe Broca’s aphasia, an intervention known as Melodic Intonation Therapy (MIT) has been shown to be effective^[8]. MIT was developed in 1973 after clinicians noted that, in spite of severe language impairments, singing was relatively intact. MIT takes advantage of this preserved ability by using singing to help improve speech production.

The use of music for improving the ability to understand language has received little attention. In the Aphasia and Neurolinguistics Research Laboratory, we are presently investigating this in an experiment examining the relationship between music and language comprehension in people with and without aphasia. We plan to follow this with studies exploring how music can be used to improve sentence comprehension abilities in aphasia. We are presently looking for people with and without aphasia to participate in these studies. If you are or know someone who may be interested please contact us!

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- Patel, A. D. (2014). Can nonlinguistic musical training change the way the brain processes speech? The expanded OPERA hypothesis. *Hearing research*, 308, 98-108.
- Sacks, O. (2007). *Musicophilia: Tales of music and the brain*. New York: Alfred A. Knopf.
- Strait D. L., Kraus N. (2011). Can you hear me now? Musical training shapes functional brain networks for selective auditory attention and hearing speech in noise. *Front. Psychol.* 2:113.10.3389/fpsyg.2011.00113
- Schlaug, G., Marchina, S., & Norton, A. (2008). From singing to speaking: why singing may lead to recovery of expressive language function in patients with Broca’s aphasia. *Music perception: An interdisciplinary journal*, 25(4), 315-323.

SUPPORT GROUP INFO & PEOPLE TO KNOW

Aphasia Support Group Meetings

GENERAL INFORMATION:

Aphasia Support Group Meetings are held the first Thursday 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:

March 7th

April 4th

May 2nd

June 6th

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 Kathy and Emma 847-467-7591. Possible topics include tips and advice, hobbies (e.g. cooking, crafts, etc.), health, research, and your personal experience with aphasia.

Featured Lab Members:

Amanda Salman



Amanda is a new research technician in the Aphasia and Neurolinguistics Research lab. She earned her Bachelor's degree from Loyola University Chicago in Psychology, with a minor in Biology. After graduating, she worked as a psychometrist at a Neuropsychology Clinic where she was able to learn about and test adult and pediatric patients for various cognitive disorders. This sparked her interest learning more about stroke induced and neurodegenerative related disorders. She began working in the lab in August 2018, and helps transcribe and code narrative samples, run EEG and eye-tracking studies, administer cognitive batteries, and assist in co-leading the Aphasia Support Group meetings. Amanda is interested in neuropsychology and neuroimaging and hopes to pursue a career in Clinical Psychology. In her spare time, she enjoys painting, boxing, and watching Netflix with her cat Milo!



Candace Todd



Candace is a first year undergraduate at Northwestern University majoring in Communication Sciences and Disorders. She plans to pursue a Masters in Speech Language Pathology and work specifically with patients affected by Aphasia. In the lab, she helps prepare treatment materials, transcribe test responses, and administer treatment. In her free time, Candace enjoys finding new books to read, crocheting, and sound designing for theatre productions.



IN THE NEWS



Public Speaking group provides support and speaking practice for patients with aphasia

A public speaking group called the Toastmasters has recently come to light as a supportive treatment environment for aphasic patients who have completed speech therapy, but who still are not confident in their abilities. The group specializes in improving speaking skills, and is primarily for those with public speaking anxiety. However, many people with aphasia are finding the sessions are helpful for improving their speaking confidence and skills as well. The meetings involve delivering short speeches to other members, and then providing each other in-depth feedback on how the speech was received. Through this method, participants have a supportive environment to improve in even the most intricate aspects of speech, such as body language, and intonation. The Toastmasters' format of supportive group environments as a way to practice stressful social situations has inspired an aphasia support group at Boston University, and may eventually be used in treatment of aphasia. (<https://www.aphasia.org/stories/toastmasters-and-aphasia/>)

Robotic rehabilitation for motor skills may also help with speech and language processing after strokes

At NYU, research led by Adam Buchwald and Dr. Carolyn Falconer-Horne is showing the possibility that in individuals undergoing robotic arm rehabilitation for motor skill deficits following a stroke, there may be a double benefit. The study has shown that this robotic therapy on the patient's right side may in fact encourage plasticity and reorganization in the left side of the brain, helping rehabilitate speech and language performance simultaneously. (<https://www.news-medical.net/news/20181030/Robotic-arm-rehabilitation-may-help-recover-speech-language-function-in-chronic-stroke-patients.aspx>)

Sound Awake: "Noisy" Neurons May Repeatedly Disrupt Your Sleep

The average human wakes up at least 100 times each night for less than 15 seconds, with no recollection of it in the morning. Researcher Ronny Bartsch at the Bar-Ilan University in Israel has proposed a new hypothesis toward finding the biological cause for these spontaneous awakenings. His findings suggest a specific set of neurons in the brain that produce random bursts of electrical activity to wake us up. While these awakenings have no real effect on quality of sleep, these findings help us to further understand the brain and may have implications in the future for preventing SIDS in infants. (<https://www.scientificamerican.com/article/sound-awake-noisy-neurons-may-repeatedly-disrupt-your-sleep1/>).

Case Study Gives Researchers Insight into Multilingual Aphasia

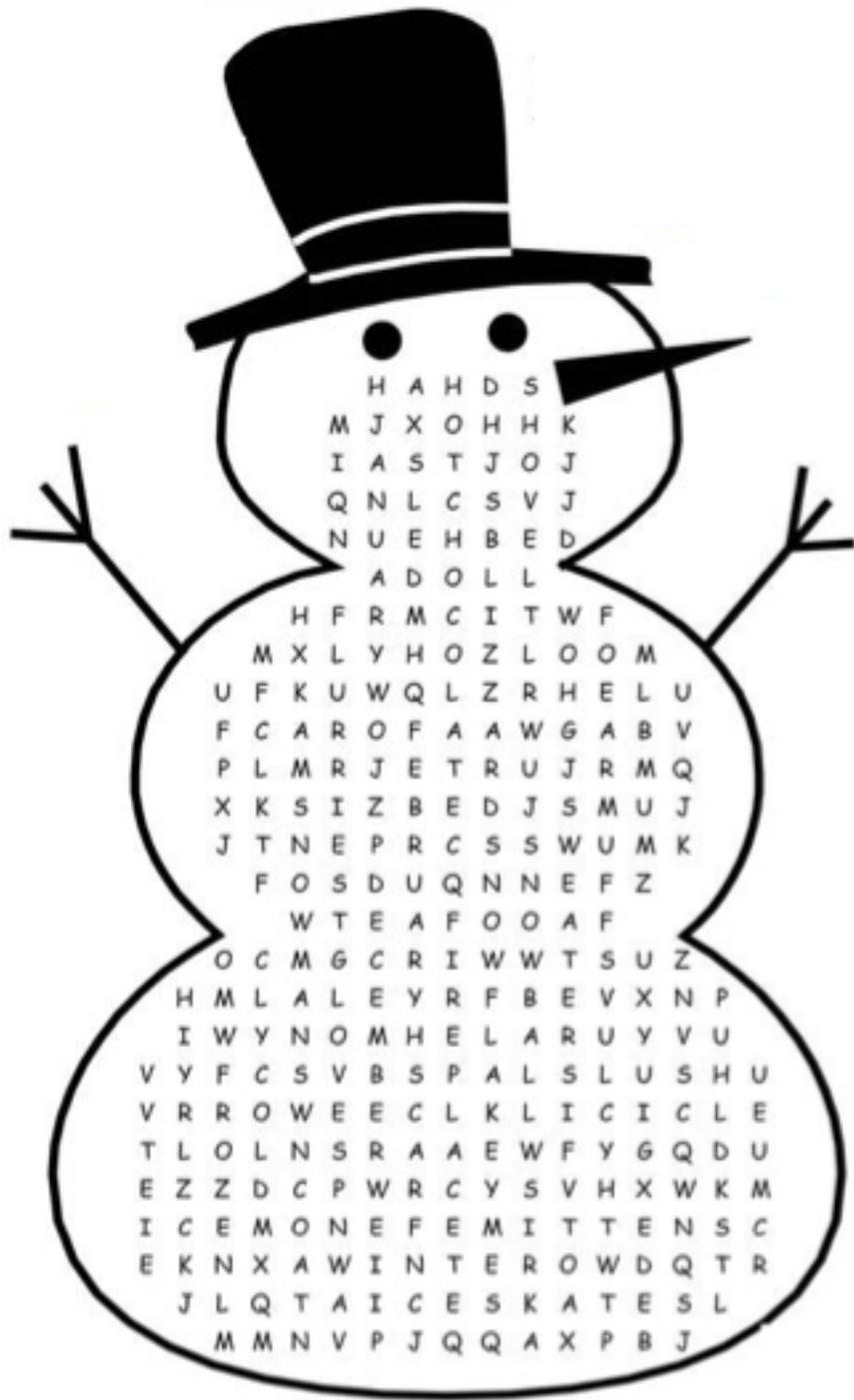
In a curious case study of multilingual aphasia in Switzerland, one trilingual man lost his capabilities of speech, and consequently gained them back in a manner that prompts further study of multilingualism in the brain. The patient was a native speaker of Swiss German, and had learned Standard German early in his school years. Later he had learned French, and used it as a young adult in France for six years. However, upon suffering a stroke around age 44, the man quickly regained solely the ability to speak French, despite having not been native to the language, and despite having used it rarely since his youth. However, the man had expressed a strong emotional tie to the French language. More than six months later, the man regained the other two languages, and his French regressed to near inexistence. This study challenges long-standing beliefs that bilinguals express emotion with their native language, and supports researchers such as Dr. Mieczyslaw Minkowski, who proposed psychosocial factors in language recovery of aphasic patients. (<https://www.psychologytoday.com/us/blog/life-bilingual/201208/the-man-who-could-no-longer-speak-his-wife>).

ACTIVITIES CORNER

Word search:

Can you find these words in the snowman below?

- | | | | | | |
|----------|-----------|---------------|---------|----------|-----------|
| Blizzard | Earmuffs | Frozen | Icicle | Shovel | Snowflake |
| Coat | February | Gloves | January | Sled | Snowman |
| Cold | Fireplace | Hot chocolate | Mittens | Slush | Sweater |
| December | Flurries | Ice skates | Scarf | Snowball | Winter |



Word & letter games:

Figure out the word that “goes with” all of the words listed:

- ___ Morning
- ___ Night
- ___ will
- ___ year

A

Each word in the following pairs of long words includes a smaller word (one for each). Find these smaller words to make a familiar phrase. For example the long word pair thighbone/swallowtail contains the phrase "High & Low."

1. skyrocketing / trolleyman
2. thermometer / apoplexy
3. delaware / bordering
4. surprised / trashiness
5. throughout / stumblebum

B

The following word pairs can be made into a synonym (or near synonym) pair by moving a single letter from one word to the other. For example, the word pair Boast – Hip can become Boat – Ship by moving the ‘s’ in Boast to the word Hip.

1. burn - bead
2. rid - tripe
3. grove - rout
4. charm - rush
5. cream - sweep

C

- Answers to word games:
- Game A - 1. Rock & roll
 - 2. Mom & pop
 - 3. Law & order
 - 4. Rise & shine
 - 5. Rough & tumble
 - Game B - 1. bun - bread
 - 2. ride - trip
 - 3. groove - run
 - 4. harm - crush
 - 5. scream - weep
 - Game C -

Word search from: <https://www.supplyme.com/products/free-printable-winter-word-search-a7437>
 Word game A from: <https://www.braingle.com/brainteasers/45663/missing-word5.html>
 Word game B from: <https://www.braingle.com/brainteasers/17980/hidden-time-again.html>
 Word game C from: <https://www.braingle.com/brainteasers/teaser.php?op=2&id=46845&comm=0>