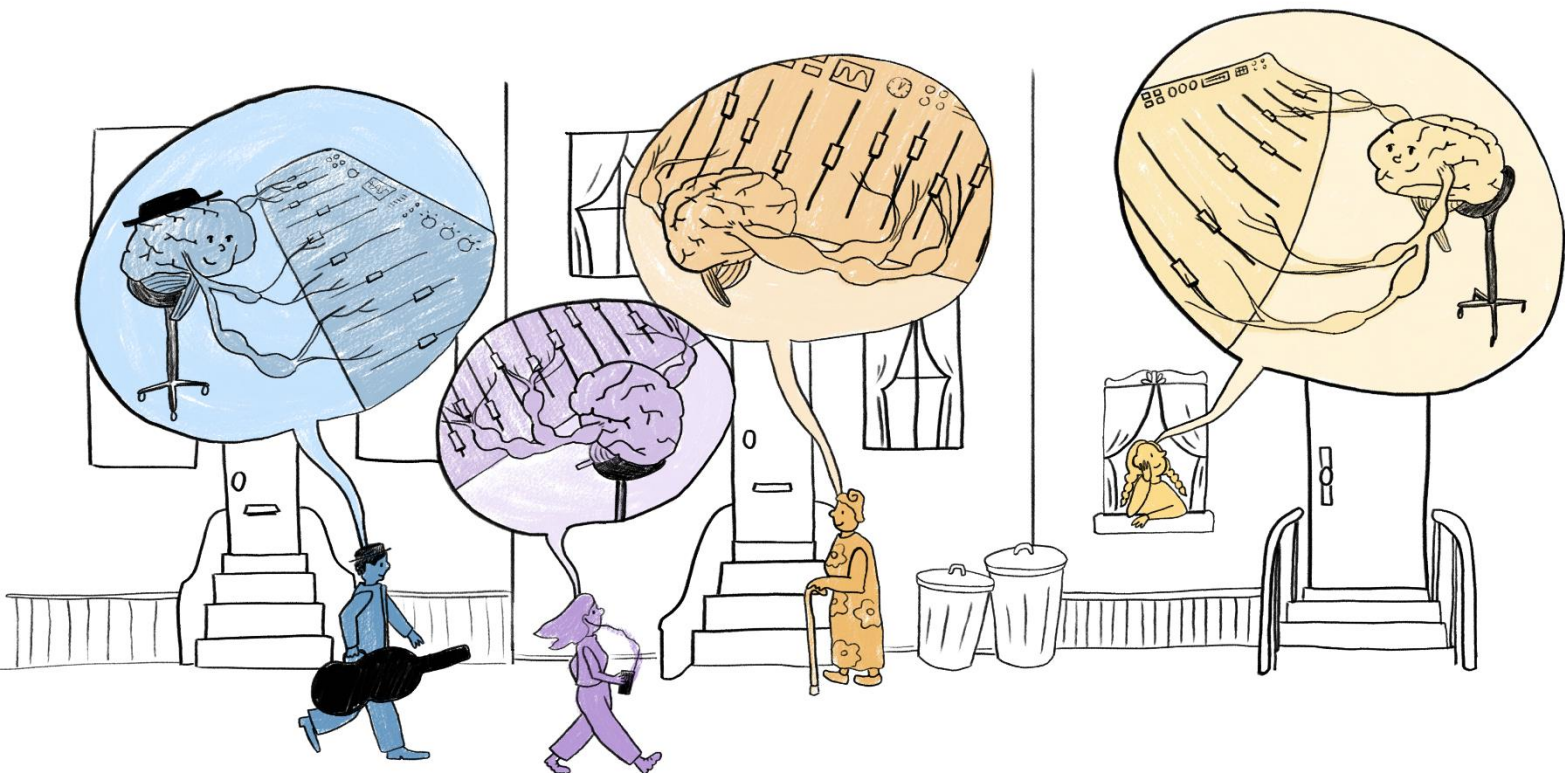




## Auditory Neuroscience Laboratory 2022 Holiday Newsletter

[www.brainvolts.northwestern.edu](http://www.brainvolts.northwestern.edu)





An idling truck, a sputtering lawnmower, a buzzing leaf blower on a distant lawn, the chatter of café conversation, a cellphone notification. These sounds don't damage our ears, yet they should concern us for the sake of our brains.

Chronic noise requires our hearing to be always “on,” leaving our brains fatigued and dulling our perceptions. We become less able to detect the sounds we want to hear and the subtle timing cues we need to understand speech. During this holiday season, let us notice the sound all around us and turn down the noise. Let's make room for the sounds that nurture our brains and feed our souls, like music and conversation with family and friends.

**Nina**

Trent Nicol, Jennifer Krizman, Silvia Bonacina, Anoop B. J., Chaitra V., Jacob Farley, Jenna Cunningham, Charlie Culbert

Joseph Luetkehans, Courtney Baker, Benjamin Livingston, Nicole Balassone, Anika Kaushikkar, Carl Youel, Maggie Powers, Rachel Kim, Lane Herbert, Brooke Sawyer, Macy Hoeveler

Artist collaborator: Katie Shelly

## Brainvolts 2022 by the numbers

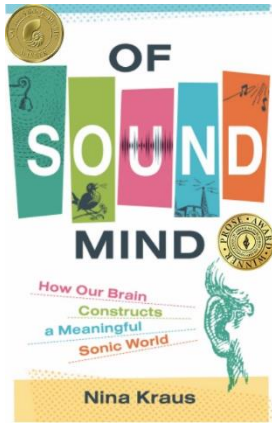
- 6 publications
- 35 keynotes
- 2 science talks
- 28 podcasts & interviews
- 3 new lab members
- 9 students



## 2022 Highlights

### Of Sound Mind

Now in paperback and translated into six languages, [\*OF SOUND MIND: How Our Brain Constructs a Meaningful Sonic World\*](#) tells the story of how sound impacts our lives and shapes who we are. It received the PROSE award in Biomedicine from the Association of American Publishers and the NAUTILUS GOLD Award in Science and Cosmology. This is a story about the power of sound and the biological reasons for us to make good choices in education, medicine, and our personal lives.



### Sound Embodies Betweenness

In his recent book *The Matter with Things*, Iain McGilchrist writes about his view of the world. He combines philosophy, medicine, the sacred, and physics. Iain believes that we overvalue individual things and undervalue the relationships *between* them. If you're interested in peering into Nina's scientific heart, have a listen to the conversation Iain and Nina shared recently.

<https://youtu.be/IsMmvuxfhiM>

### Frequency Following Response Workshop

After two years of pandemic restrictions, we traveled to Barcelona to the International FFR workshop hosted by Carles Escera at Brainlab (Universitat de Barcelona). The workshop brought the growing research community together to talk about the origins and interpretation of this response, discuss recording and analyses, and new directions in this expanding field. Join us in 2024 when Northwestern University hosts the next edition of this workshop.

We got to be with colleagues from around the globe and reunite with Brainvolts alumni.



## Our Life in Sound

BBC filmmakers of the docu-series How to Live to 101, traveled to Brainvolts for their upcoming episode, "Aging and Senses." Eighty-seven-year-old Bobby Lewis has had a rich life in sound. As a jazz musician for over 50 years, his hearing brain benefits from his experience with the rhythm and timing of music, yet as a war veteran, the sounds of explosions damaged his hearing. Nevertheless, his biological response to sound is uncommonly robust. Bobby epitomizes how the hearing brain interacts with what we know, with our emotions, with how we think, with our movements, and with our other senses.



## We Hear with Our Brain



Following total loss of hearing due to neurofibromatosis, Matt Hay received a brainstem implant which delivers sound signals directly to his brain. Most people recover little more than the awareness of sound following this surgery, but Matt has outstanding hearing abilities. Matt and Nina shared rich conversations even in challenging listening circumstances. Matt attributes his remarkable hearing to auditory training. He designed his own training program using music to re-train his brain. Years

later, he found audiologist Angela Alexander whose training methods gave him enormous help to hear speech sounds. Our ongoing engagement with people with hearing loss strengthens the view that hearing is a holistic experience and that music can provide a little-recognized form of auditory training.

## Learning about Concussion using Rhythm

Jacob Farley works closely with Dr. Cynthia LaBella, head of the Lurie Children's Hospital Institute for Sports Medicine. Jacob has done a great job collecting data and recruiting participants this year. We continue to assess the impact of concussion on children's auditory processing in analyses led by Silvia Bonacina. Specific attention has focused on the neural processing of sound and listening in noise. We have discovered that concussion disrupts rhythm skills. We are looking into how digital music medicine can speed concussion recovery.



Filippo practicing a rhythmic task (Interactive Metronome) with mamma Silvia

## Dartmouth Update

In collaboration with the Space Medicine Innovations Lab at Dartmouth, headed by astronaut Jay Buckey and the Muhimbili University of Health and Allied Sciences in Dar Es Salaam Tanzania, we

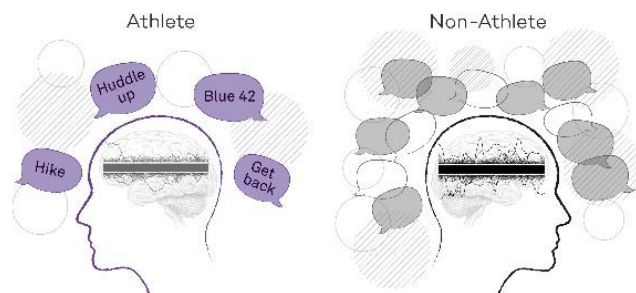


found hearing disruption in young adults living with HIV. We continue to monitor these individuals as they age. [Niemczak, 2022, Otolaryngology-Head and Neck Surgery](#)

## Athlete Update

Our Big 10 collegiate student-athletes resumed a full competitive schedule. Likewise, we ramped up our data collection for our NIH-funded longitudinal study examining the effects of sports-related concussion and participation in contact and collision sports. To date, Brainvolts has conducted over 3500 testing sessions.

### Athlete Brains Are Quieter



We continue to learn how playing a sport can benefit sensory perception. Athletes have quieter, that is to say less noisy, brains than non-athletes. This enables better connection with their surroundings. Athletic activity also enhances neural encoding of certain aspects of sound, especially in female athletes. [Krizman, 2022, Scientific Reports](#)



While sports participation benefits our health, we have discovered that a concussion can harm the hearing brain. Moreover, even without an overt head injury, seemingly healthy athletes who play sports with the most contact demonstrate disrupted sound processing. [Kraus, 2022, submitted](#)

## Accented Speech

Jen, through her NIH R-21 grant, is studying how sound processing differs in native and non-native listeners, especially in difficult listening environments.

We are looking for English monolinguals with hearing loss, Chinese-English bilinguals, and Spanish-English bilinguals (ages 30-55 years old). If you are interested in participating, please contact us at [brainvolts@gmail.com](mailto:brainvolts@gmail.com).



## Music and Hearing Loss

Postdoctoral fellow Anoop won a grant from the American Hearing Research Foundation to investigate neural activity evoked by musical notes, with a focus on people with hearing loss. In addition to traditional analyses, brain responses will be made audible, providing another dimension to assess what hearing loss does to sound processing.



## Alumnae Award



Northwestern University honored Nina as the 46<sup>th</sup> recipient of the Outstanding Alumnae Award. She told those assembled, “this award is not about me. It honors the work we do — sound touches everything we care about — and the people who do it.”

## Welcomes

We are thrilled to welcome extraordinary sound man Charlie Culbert. As a musician, recording engineer and sound artist, he is helping us make brain responses audible so we can listen to how different people hear the world. By measuring a specific brain’s response to individual notes, we can assign them to a keyboard to ‘play’ that person’s brain.

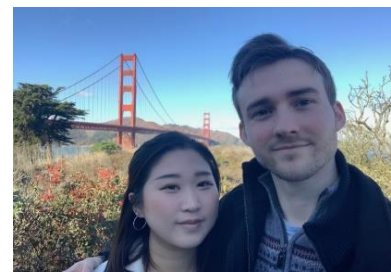


Nina & Charlie

We are proud to be partnering with Northwestern University Athletic Trainer and Concussion Care Specialist Matt Nerrie to study the hearing brain of our athletes.

## Send offs

We miss Rembrandt Otto-Meyer terribly. He now works as an Operations Analyst at Montaro, providing insights to premium brands in San Francisco.



Rembrandt Otto Meyer



Danielle Colegrove

Danielle Colegrove, a longtime member of the NU Sports Medicine staff, has been promoted to Associate Athletic Director at UIC. We look forward to continuing collaborations.

## On a Different Note



Nina has been promoted to “Nonna Nina.” Young Julian is at least as interested in sound as she is. He made his first trip to Trieste this summer and took in the magical silence and sounds of the woods he hiked with his Nonna... well, cradled in his front-carrier.

Nonna Nina singing to 3-month-old grandson, Julian

## More Marathons

Jen is training for her next race in January at Disneyworld, where she will complete a 5K, 10K, half-marathon, and full-marathon on successive days. She recently completed the Disney Wine and Dine Challenge, running a 10 K and a half marathon on back-to-back days.



Jen showing off her medals (left) and posing for a picture with her sister and the big bad wolf (right).

## Farm Life

Trent’s home front has expanded with more “kids.” Once again, he welcomed a set of fraternal twins. This time, goats!

I thought it was Goatmas!



Naaaaa!

Smoke & Ember

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<https://bit.ly/3dsToWW>

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