

Thank you for participating in the first session of the 2024 Learning for Life Series!

Founded in 1975 by Shirley Welsh Ryan, the series aims to educate participants on important technological advances and current events. This year's program is focused on How Data from the Arts, Science, and Artificial Intelligence Improves Our Lives.

October 9, 2024 | Music and Mind

Moderator

Jonathan Bailey Holland is dean and Kay Davis Professor of Music at Northwestern University's Bienen School of Music. His music has been performed and commissioned by the Atlanta, Baltimore, BBC, Cincinnati, Charlotte, Columbus, Dallas, Detroit, New World, Richmond, and San Antonio symphony orchestras; the Cleveland Orchestra, Philadelphia Orchestra, Los Angeles Philharmonic, Florida Philharmonic, Chicago Youth Symphony, Cincinnati Symphony Youth Orchestra, Abeo Quartet, Concerto Soloists of Philadelphia, Hotel Elefant, der/gelbe/klang, and Roomful of Teeth; and soloists Ignat Solzhenitsyn, Sarah Bob, and Demarre McGill, among many others. He has received awards and honors from the Guggenheim Foundation, The Boston Foundation, Civitella Ranieri Foundation, Massachusetts Cultural Council, Fromm Music Foundation at Harvard University, American Academy of Arts and Letters, American Music Center, ASCAP, the Presser Foundation, and others.



He studied composition with Ned Rorem at the Curtis Institute of Music, where he earned a Bachelor of Music degree. He holds a PhD in Music from Harvard University. He previously served as the Jack G. Buncher Head of the School of Music at Carnegie Mellon University and chair of Composition, Contemporary Music, and Core Studies at Boston Conservatory at Berklee. He was a founding faculty member in the low-residency MFA program in music composition at Vermont College of Fine Arts, where he also served as faculty chair from 2016 until 2019. In addition, he has served on the faculty of the Curtis Institute of Music.

Panelists

Renée Fleming is one of the most acclaimed singers of our time. A 2023 Kennedy Center Honoree, winner of five Grammy® awards and the US National Medal of Arts, she has sung for momentous occasions from the Nobel Peace Prize ceremony to the Super Bowl. In 2023, the World Health Organization appointed her as a Goodwill Ambassador for Arts and Health. Renée's new anthology, *Music and Mind: Harnessing the Arts for Health and Wellness*, was published in April. A



prominent advocate for research at the intersection of arts, health, and neuroscience, as Artistic Advisor to the Kennedy Center, Renée helped launch the first ongoing collaboration between America's national cultural center and its largest health research institute, the National Institutes of Health. She has led panels and presentations on this material in more than seventy-five cities around the world, earning Research!America's Rosenfeld Award for Impact on Public Opinion.

Borna Bonakdarpour is Associate Professor of Neurology Feinberg School of Medicine. He is a cognitive behavioral neurologist whose research interests include the neurobiology of language breakdown and recovery, and primary progressive aphasia using various neuroimaging methodologies. He is also interested in the efficacy of music interventions for neurologic patients. In 2020 he and music practitioner Clara Takarabe, created the Music and Medicine program at Northwestern Memorial Hospital.



Leora Cherney is the Scientific Chair of Think and Speak at the Shirley Ryan Ability Lab and Professor of both Physical Medicine & Rehabilitation and Communication Sciences & Disorders at Northwestern University. She has 40 years of clinical and research experience in the area of adult neurologic communication disorders. She is the founder and director of SRA lab's Center for Aphasia Research and Treatment which offers an Intensive Comprehensive Aphasia Program (ICAP) and weekly aphasia community groups.



Overview

Our panel began with **Jonathan** asking Renée asking what sparked her interest in the intersection of music and mind.

Renée described two early drivers - - how being a singer naturally engages the mind-body connection and her interest in scientific articles on neuroscience and music. A pivotal moment came when she and Dr. Frances Collins, then head of the National Institutes of Health, met at a dinner party, spontaneously played music for the party, and observed the immediate impact on the mood of the party attendees. Renée suggested to Dr. Collins that the NIH and the Kennedy Center collaborate to explore and fund work in the science of engaging with music. The collaborations grown over the last seven years and highlighted the depth and richness and societal importance of this field. The National Endowment for the Arts has also been a strong partner. (A summary of the programs Renée has been involved with is at the end of this document.)

Jonathan turned to Borna and Leora to describe some of their work, illustrating what Renée introduced.

Borna leads the Laboratory for Interventions and Neuroimaging of Cognition at Northwestern, focusing on language disorders and the effects of music and started the Northwestern Music and Medicine Program during the pandemic. He described the experimental tools including magnetic resonance imaging.

Unlike other sensations such as smell, taste, or even vision, sound is extensively processed before it reaches the surface of the brain. From the cochlea, there are at least four or five stops before sound and tone are at the brain. Among the structures involved in music processing are the auditory-motor pathway, the auditory-limbic pathway, the somatic motor system, the visceromotor system, and the acoustically-activated vestibular pathway. Borna then shared numerous examples of the dramatic effects of musical interventions and what can be learned from concurrently studying the brain waves of patients - - demonstrating the specific target engagement of the interventions and possibility of “dosing” these interventions.

Leora directs Shirley Ryan AbilityLab’s specialized Intensive Comprehensive Aphasia program. Briefly defining aphasia as a language disorder where people have difficulty with understanding and producing words and sentences. Leora stressed that intelligence is not affected – patients with aphasia do not necessarily have issues in thinking. With many of the patients she works with having suffered a stroke, she focuses on speech and language therapy. Melodic intonation therapy, developed in the early 1970s, is a widely used tool for patients with severe aphasia. Employing both rhythm and melody, it can often jumpstart language production and can be offered in a hierarchical approach, gradually increasing the length of sentences and difficulty of words. Studies of this approach over the years has revealed the therapy targets the whole brain – both the right and left sides. To illustrate this therapy, **Renée** shared a video of a patient at Houston Methodist achieving dramatic improvements in a single session.

Jonathan asked **Renée** to share her own experience with NIH researchers, undergoing a functional MRI, to study how her brain was activated during speaking, singing, and the imagining of singing. Interestingly, it was the imagining of singing that activated the most parts of her brain. The researchers surmised that the imagining of singing in the loud environment of the fMRI machine required a dedicated focus and concentration perhaps not required for active singing which is second nature for her.

Jonathan asked Leora about the aphasia choir she recently launched.

Leora described the many benefits of the choir from social connection, life enjoyment, and confidence. MRIs of participants before joining the choir and

then after a 4-month period of group singing showed measurable structural changes in the brain, illustrating again that neural circuits are shared by language and music. Additionally, the experience was enhanced by selecting songs familiar and enjoyed by the group, pointing to the potential of customization of therapy.

Jonathan asked Borna to expand upon the possibility of personalization.

Borna relayed his early experience in melodic information therapy using classical Persian music. He referenced the work of preeminent auditory neuroscientist Northwestern Professor Nina Kraus who describes the “sound brain” and how it depends critically upon environment and culture. He referenced a wonderful book, **The Other Classical Musics, Fifteen Great Traditions**, edited by Michael Church.

Jonathan turned to Renée to ask about her recent book, **Music and Mind**.



Renée described the book as a way to share in an accessible manner, the incredible breadth of work currently underway. The contributors represent this breadth, discussing childhood development, mental health, aging and disorders of aging, and the underlying basic science. And artists provide their perspective.

Renée additionally shared the suggestion that each of us give ourselves the gift of an artistic experience every day.

Jonathan and Renee discussed the critical importance of arts education and further resources (shown below) for our audience.

reneefleming.com/advocacy

NeuroArts Blue
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nih.gov/sound-health soundhealth.ucsf.edu jameelartshealthlab.org

NIH Music and Health

SOUND HEALTH NETWORK

WHO 75+ Jameel Arts & Health Lab

Music and Mind
Harnessing the Arts for Health and Wellness
EDITED BY Renée Fleming

Your Brain on Art
How the Arts Transform Us
Susan Magsamen and Ivy Ross

I HEARD THERE WAS A SECRET CHORD
DANIEL J. LEVITIN
MUSIC IN MEDICINE

Music Has Power
in Senior Wellness and Healthcare
Best Practices from Music Therapy

OF SOUND AND MIND
How Our Brain Constructs a Meaningful Sonic World

Project UnLonely
HEALING OUR CRISIS OF DISCONNECTION
JEREMY NOBEL, MD, MPH