
A RESEARCH PROJECT ON MUSIC & MEMORY ACROSS THE LIFESPAN
What makes music so memorable
throughout your life?

The Extraordinary World of Music and the Mind

From the AARP Music and Memory Project by John Colapinto, AARP
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Music and Memory

Music has immense power. Its melodies can unite us emotionally, and its rhythms can move us physically. Though it's been around for thousands of years, researchers are still learning about the potential benefits of music, including its effect on the brain and our memories. This project looks at the extraordinary role music plays in our lives and on our health.


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Part I "Hey Jude"

In 2007, a young man named Colin Huggins began playing music on the streets of New York using a battered upright piano he'd bought on Craigslist.

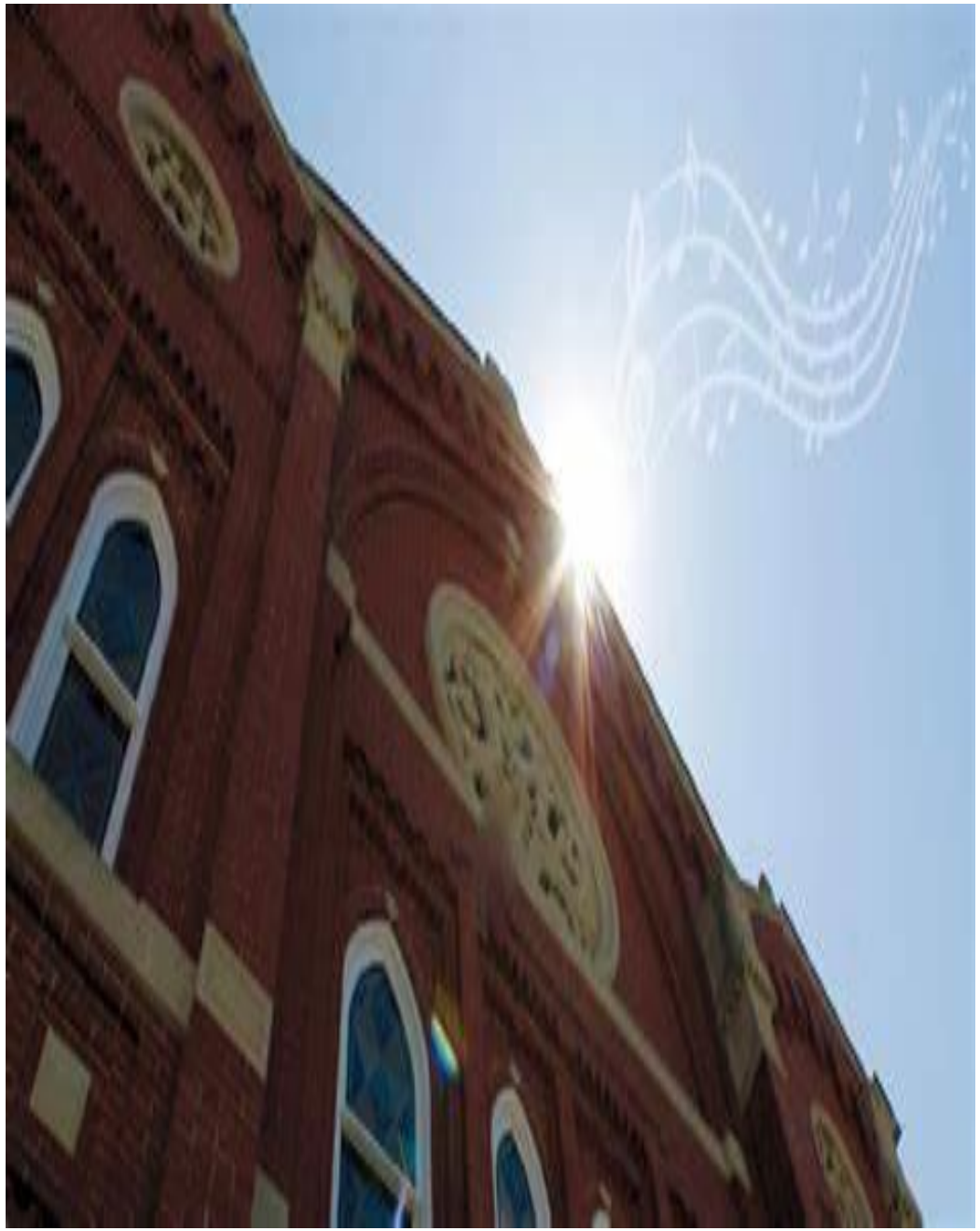
He was a former accompanist for the American Ballet Theatre, but playing and singing pop songs outdoors had convinced him of the almost mystical power of music to soothe, delight and heal his fellow New Yorkers. He began to push the piano all over downtown, even managing to get it onto a subway platform at 14th Street.

At first, four or five college-aged kids began to sing along (“take a sad song and make it better”), and by the time Huggins hit the crescendo (“better, better, BETTER”), a group of middle-aged businessmen in long black coats on the opposite platform were singing too. With the irresistible coda (“nah, nah, nah, nah, nah, nah-nah-nah-naaaah”), everyone on both platforms — male and female, Black and white, young and old — was singing, clapping, smiling at one another. The transformation was miraculous.

- For more than 50 years, the medical specialty known as music therapy has harnessed this extraordinary aspect of music to treat diseases ranging from depression to chronic pain to movement disorders to autism to Alzheimer's disease.
- In recent years the scientific community began to study the mystery of how an acoustic signal — air vibrations — can have such profound effects on damaged bodies and brains. Experts are gaining a deeper understanding of the importance of music in everyone's day-to-day life, and its astonishing effects on the healthy, normal brain.

- The human voice has a central place in virtually all forms of religious worship, from the chants of shamans in Indigenous tribes, to Islam's call to prayer, to the extraordinary overtone singing perfected by Buddhist monks in Tibet, to the hymns and psalms of Judaism and Christianity.

- According to historian of religion Karen Armstrong, "Scripture was usually sung or chanted that separated it from mundane speech, so that words — a product of the brain's left hemisphere — were fused with the more indefinable emotions of the right."



- Recent scientific studies have shown that music's power is not psychological but based in measurable physiological changes.

- Singing along with others to a beloved song (such as "Hey Jude") causes the brain to secrete the chemical oxytocin, a naturally occurring hormone that creates the warm sensations of bonding, unity and security that make us feel all cuddly toward our children and others we love; infuses us with feelings of spiritual awe; and can alleviate chronic pain or the debilitating sensations of anxiety or the isolation of autism.

- One area of medicine where the power of music has been particularly remarkable is in the treatment of the dementias, including Alzheimer's disease, whose stubborn and terrible symptoms have been resistant to most forms of treatment.

Xiyu Zhang's music awakens memories for dementia patients.

Part II “Fly Me to the Moon”

- On a recent afternoon, in an assisted living community for dementia patients on Manhattan’s Upper East Side. Seventeen patients gathered in a community room, and staff members helped seat them in chairs that faced the front of the room, where Xiyu Zhang, a 37-year-old music therapist, introduced herself to the group. Her audience stared back, blankly. (“They don’t all remember me,” she later told me. “They see me every two weeks, but many don’t know why I’m here.”)

- She began strumming an acoustic guitar and singing: “**Fly me to the moon / Let me play among the stars / Let me see what spring is like …**”
- The effect was immediate. Chins lifted from chests, eyes opened. Smiles flickered on one or two faces. A woman began to sing certain phrases: “**on Jupiter and Mars … in other words … hold my hand.**”
- Over the next 45 minutes, Zhang fanned the spark of group attention into a steady blaze with (“Blue Moon,” “Catch a Falling Star,” “You Are My Sunshine”) and **got nearly every person singing along.**.

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- Between verses, she called out questions: “Who sang ‘Singin’ in the Rain’?” A white-haired woman said, “Gene Kelly!” “What is the girl’s name in *Wizard of Oz*?” A woman in the second row blurted out, “Dorothy!” “And her dog?” “Toto!” “That’s amazing!” Zhang cried.

- And it was amazing for people who, before the music started, would not have been able to recall the names of family members or the career they had pursued for 40 years — or been able to break free of the inward-turning silence in which the disease had wrapped them.

- Isolation is one of the most frightening and unsettling symptoms of the memory loss that's synonymous with Alzheimer's and other dementias — a memory loss that separates a person from their very self. For what are we, ultimately, but the sum of our personal recollections?
- At the end of Zhang's session, as the patients were led back to the elevators, the mood was a little like a bubbly cocktail party breaking up. Restored for the time being to a sense of self through the activation of better-preserved neural networks, the patients traded words and laughter with caregivers and one another.


Sometimes, it's not the
song that makes you
emotional, it's the people
and things that come to
your mind when you
hear it.

- Music therapy's roots date back to World Wars I and II, when service members with traumatic brain injuries and "combat fatigue" (now called post-traumatic stress disorder) were discovered, by chance, to improve in mood and function when listening to music.
- Veterans hospitals began hiring musicians to play to patients. Physicians realized that the treatment's effectiveness would be enhanced if musicians learned the basic tenets of psychology, neurology and physiology, so that they could tailor their playing to a patient's specific needs. In1944, Michigan State Univ. launched the first degree program in music therapy.

Part III "Let Me Call You Sweetheart"

- Concetta Tomaino was 24 years old in 1979 when she graduated with a master's degree in music therapy from NYU. She would go on to become a pioneer in the use of music to treat dementia, and today, she is a legend in the field, the dedicatee of neurologist Oliver Sacks' 2007 book *Musicophilia*.
- In 1978, fulfilling the1,200 hours of clinical fieldwork for her master's at a nursing facility in Brooklyn, she encountered her first dementia patients — a population not then generally considered to be candidates for music therapy.

- As was common in that era, the dementia patients were severely neglected: heavily drugged, hands encased in mittens to prevent their clawing at themselves, outfitted with nasal gastric tubes for feeding, and left to scream and wail in confusion and anxiety on an upper floor of the facility.

- “Nobody went up there,” Tomaino recalls. “It was this horrible, horrible place. The cacophony!” A nurse told her, “Oh, it’s so sweet of you to come, but they don’t have any brains left, so don’t expect too much.”

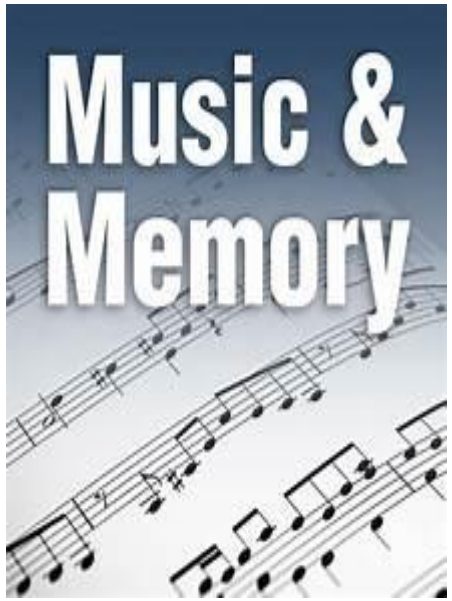
To see this 4 minute video, please copy the link below and paste in your browser :

https://videos.aarp.org/detail/video/6341500069112/therapist-shows-powerful-link-between-music-and-memory?autoStart=true&q=%20

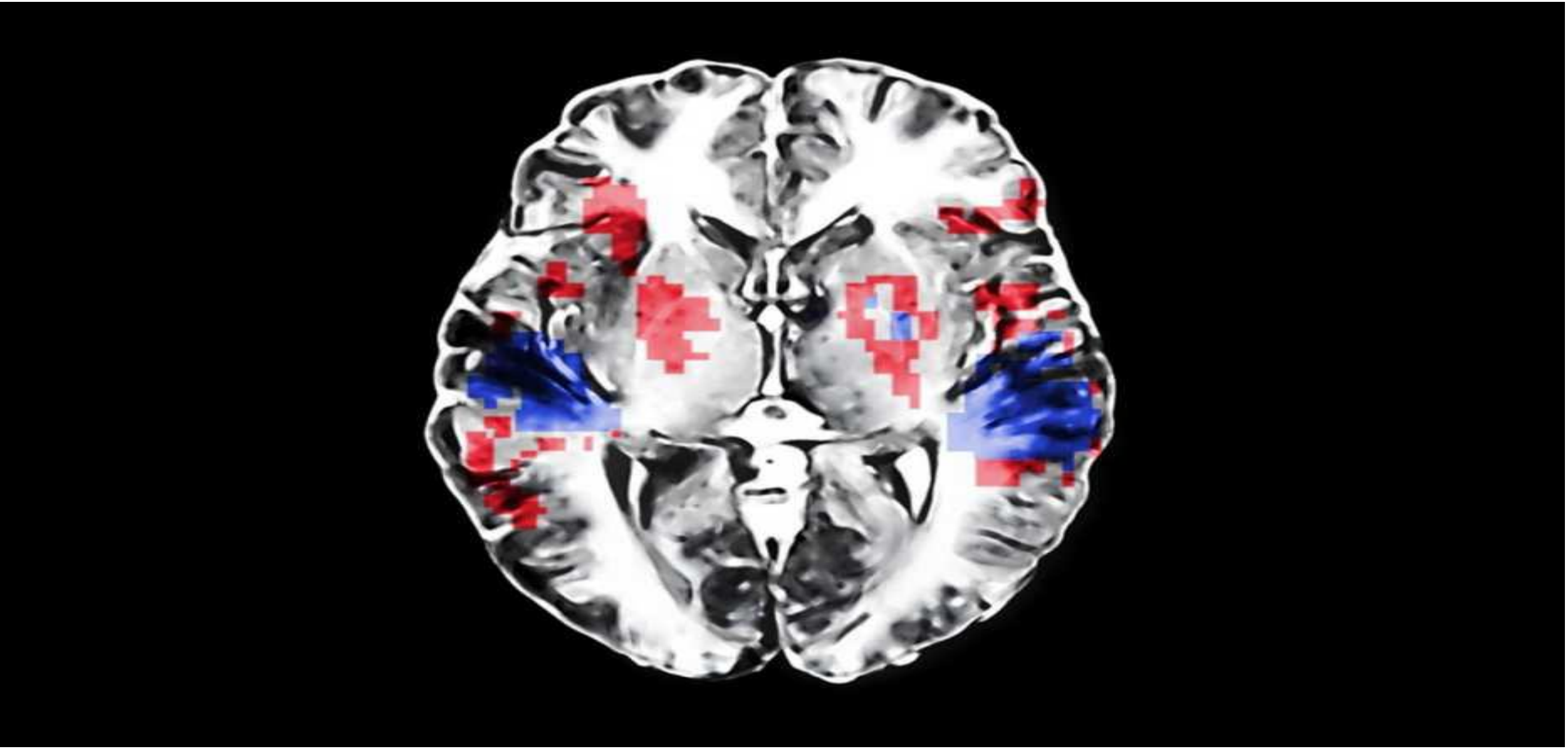
- Two years later, Tomaino was hired as the music therapist at Beth Abraham Hospital in the Bronx — where Oliver Sacks was a neurologist. He was already famous for his 1973 book *Awakenings*, which chronicled his use of the experimental drug L-dopa to awaken patients who had been “frozen” for decades in a coma-like state from a virus called encephalitis lethargica. Tomaino saw an obvious parallel with dementia patients. “So I said to Oliver, ‘Did you ever see this?’ He said, ‘No! Show me!’ ” Sacks was floored. “He said, ‘We gotta look at this and figure out what the heck is going on!’ ”

- Through the 1980s, with Sacks' input, Tomaino studied the positive effects of music on the mood and memory of Beth Abraham's dementia patients.
- The work drew increasing attention after the 1990 release of the movie adaptation of ***Awakenings***, and reporters descended on Beth Abraham in search of new medical miracles.
- In a joint interview with *The New York Times* in 1991, Sacks called **music a "neurologic necessity,"** and Tomaino said that music could "locate the lost personalities" of dementia patients

- Two years after that, Tomaino convened the first-ever conference on Clinical Applications of Music in Neurological Rehabilitation.
- In 1995, the Institute for Music and Neurologic Function was created at Beth Abraham. Since then, there has been an explosion of interest in the field of music and memory.



- Mysteries remain about how memories are created, stored and retrieved in the brain and how music acts to revivify them in dementia patients, but answers have begun to emerge, thanks to advanced brain scanning technology that did not exist when Tomaino and Sacks did their early research — specifically, fMRI.
- This technology uses a strong magnetic field and radio waves to track blood flow throughout the brain, showing what areas are active during physical tasks, like moving the fingers (which "lights up" areas of the motor cortex in an fMRI scan), or during cognitive tasks, including decision-making and memory.



A brain scan showing areas stimulated by new, recently heard music (blue) and by long-known tunes (red).

- All memories are electric and chemical signals in our brains that travel through a network of neurons.
- It was believed that there was a dedicated memory module of the brain where the past was stored.
- fMRI revealed that many areas of the brain are involved with memory:

- from the **brain stem** (seat of automatic tasks like breathing and blinking)

- the emotion centers (including the amygdala, with its fight-or-flight reflexes)

- to the seeing and hearing centers
- from the executive areas of the brain (where thinking and decision-making occur)
- to the part where long-term memories are processed.

- Even the memory of your mother can be lost if something chokes off the electrochemical signals that flash along those neurons. This is what is thought to occur with Alzheimer's disease.

- Certain brain waste products — so-called tau tangles and amyloid plaques — as well as other factors, the theory goes, can disrupt and destroy neurons and their connections, especially in areas of the brain associated with memory — even as strong a memory as Mom.

- **Alzheimer's is progressive**. As more brain cells die, more of the past vanishes.

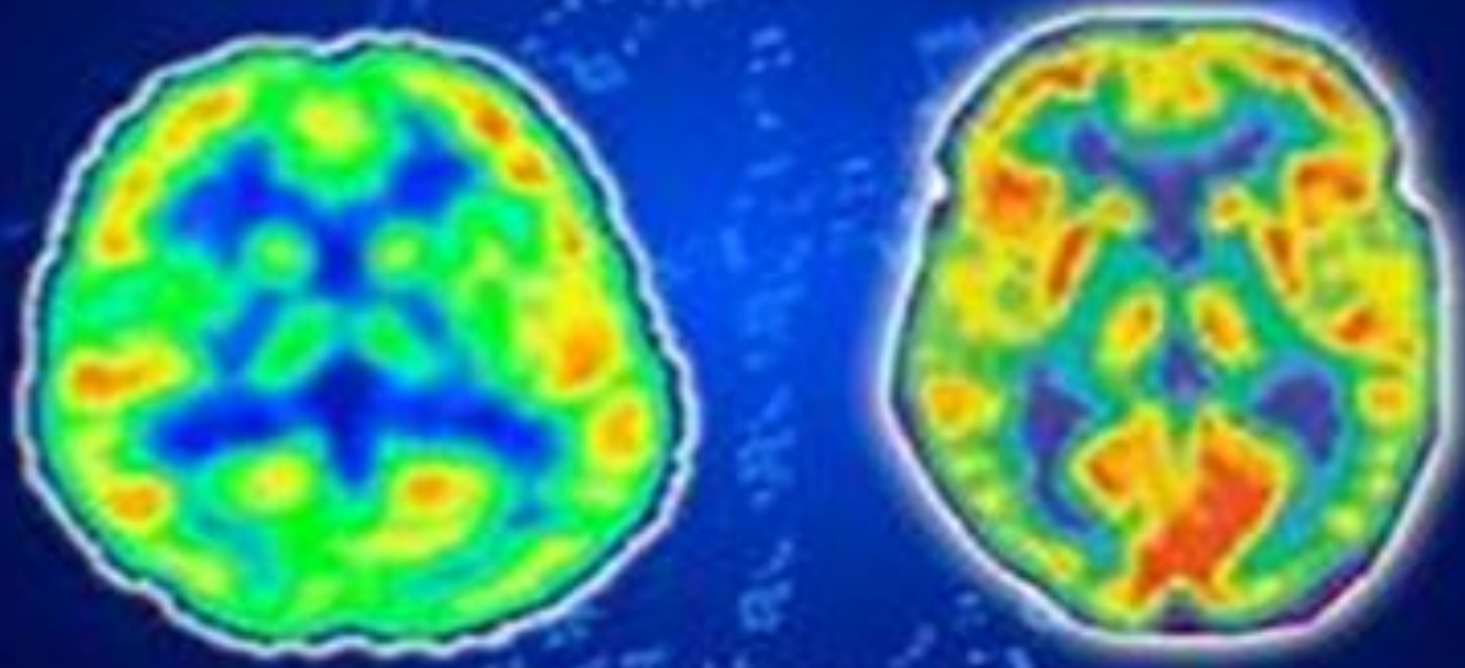
- Of all the attempts to hold on to memories in the face of this loss — through drugs, **diet** and exercise — **music has proved to be among the most successful.**

- Again, fMRI offers a possible explanation for why. **Listening to music**, fMRI reveals, **is** (like memory itself) a **full-brain workout……..**

THE BRAINS REACTION TO MUSIC

The Brain at Rest

The Brain's Reaction to Music



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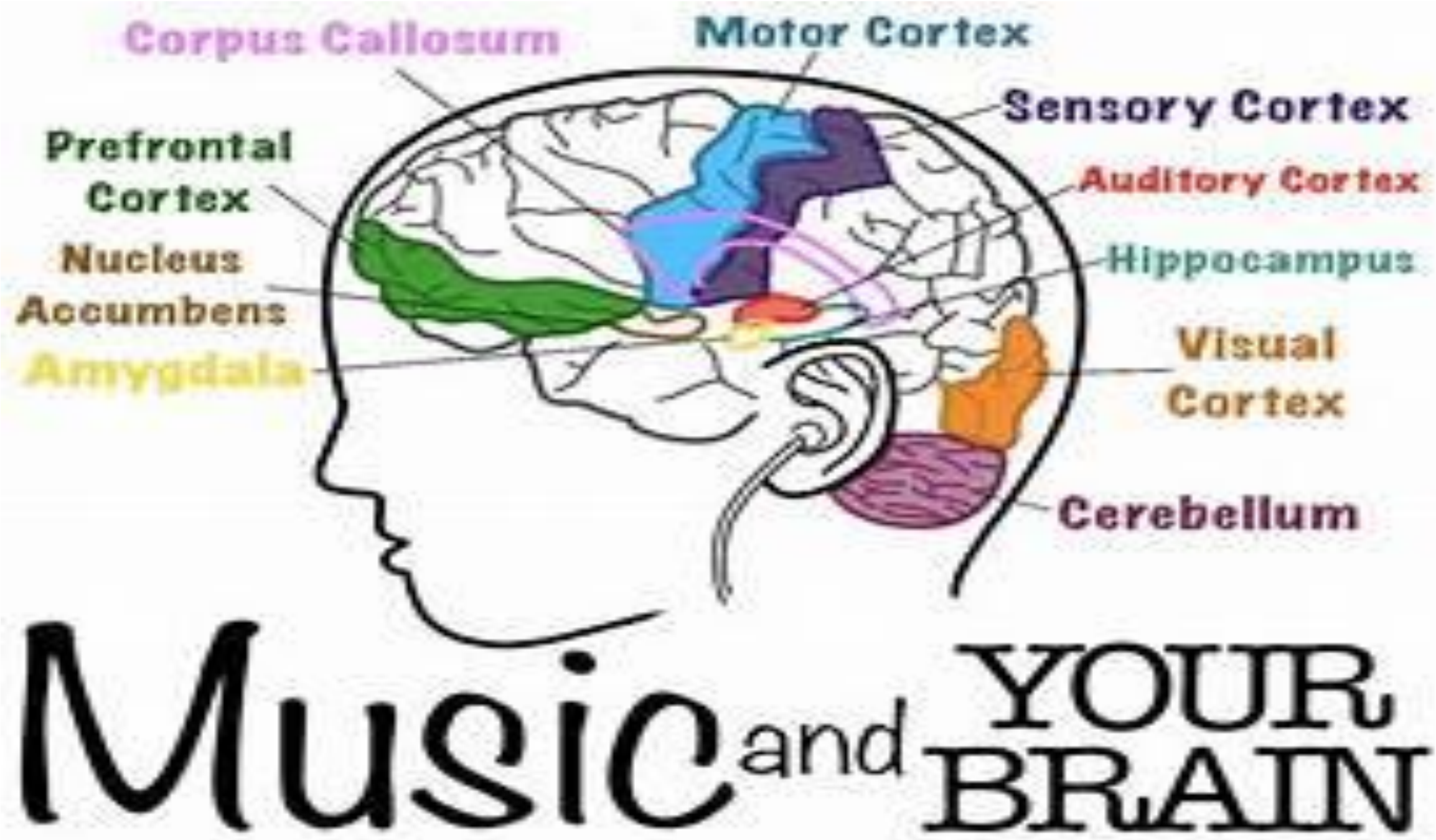
Corpus Callosum
Motor Cortex
Sensory Cortex
Prefrontal Cortex
Auditory Cortex
Nucleus Accumbens
Hippocampus
Amygdala
Visual Cortex
Cerebellum
Music and YOUR BRAIN

- **Brain stem**. Rousing classical music makes the pulse and blood pressure rise; soothing lullabies make them drop.

- **Motor centers**. These are the source of the irrepressible urge to tap the toe or bob the head in time with music.
- **Language centers**. They light up to a song with lyrics we remember.
- **Auditory cortex.** This is where music's pitches and tones are processed.
- **Emotion centers**. Here feelings of yearning, joy, exultation, sadness, fear or loss are touched off by changes in the music's tempo, pitch, volume;

- **In the Executive centers,** thoughts and memories connected to the music are activated.
- **Visual systems.** Think of how a dark and stormy passage of Beethoven's Ninth Symphony can call up images in your mind of black and turbulent skies. Disney did it for us with "Night on Bald Mountain" in *Fantasia*.

- This full-brain workout hints at why melodies and lyrics — particularly those from songs that have personal significance to us — have such a peculiar sticking power in our memories.

- fMRI scans reveal that such “auto-biographically salient” music is written into many parts of the brain — the movement center, for instance-not touched by Alzheimer’s until the very last stages of the disease.

- **Music, by stimulating these preserved parts of the memory network,** seems to reach into those areas of the neocortex, the brain's wrinkled outer layer, **to find those neurons that have not yet died off, thus triggering memories thought to be lost forever.**

- Many caregivers and clinicians report that the memory-enhancing, mood-improving benefits of music are temporary, lasting only as long as the music is playing — and for a period of about 15 minutes afterward.

Research: Parkinsons Disease

In 2021 a project led by Michael Thaut, a professor of music and of neuroscience in Toronto……

…..did groundbreaking research involving people with Parkinson's disease and those recovering from stroke, showing that when rhythmically strong music was played to such patients, they synchronized their walking gait with the music and moved more quickly and with better joint control.

- The therapy is called rhythmic auditory stimulation. "Stroke patients walk much more symmetrically and faster," Thaut said "Parkinson's patients don't have that shuffle and tendency to fall over."…

…they recognized it in terms of ‘that is music I know,’ ” Thaut says. “ ‘I know what that is! That is the music I danced to when I met my wife.’ **This activation spreads throughout the entire cortex — and the whole network comes alive.”**

The music gives them a sense of orientation in the here and now—and an identity: **‘That is part of my life. I know who I am**.’ ” he adds.

The most interesting of Thaut's findings is that after four weeks of listening to their favorite music daily, patients' brains had a greater density of white matter. "If you have an increase in white matter density or volume in a certain area of the brain," Thaut says, "that means there are more highways active between the neurons.

There's more traffic." A dead neuron cannot be brought back to life, but music appears to bolster connections between preserved neurons. "So we are building as much as we can around destroyed stuff," Thaut says.

Thaut claims, “We can assume that active and positive stimulation is good for brain health. Engaging in music you like and enjoy is definitely a great part of it. Can it reduce risk for dementia in the medical sense, like aspirin against stroke? No. There are many factors—genetics, injuries, etc.—that contribute to disease. But it may provide boosts to keep the brain healthy longer.”

Tony Bennett's previously undisclosed Alzheimer's disease

by John Colapinto.

“Visiting him in his apartment on Manhattan’s Central Park South, I saw a man unable to converse, who barely registered my presence and who, I was told by his wife, Susan, had forgotten the use for common objects like a fork or keys.

Yet when his longtime piano accompanist began to play, Bennett, at the sound of the first notes, came alive, walked to the piano and proceeded to perform, impeccably, an hour of music from his set, recalling every lyric, crescendo, melody, physical gesture. It was impossible to believe he was in the late stages of a devastating illness that two years later would end his life.”

According to the Global Council on Brain Health, these six key behaviors can delay the onset of Alzheimer's and ease the course of the disease:

- Maintaining social ties
- Challenging the brain
- Managing stress
- Exercising regularly
- Eating right
- Getting restorative sleep

For more information on building and preserving memory and cognition, visit: **aarp music and memory project** or **aarp.org/brainhealth**, and https://www.aarp.org/health/brain-health/info-2023/how-music-affects-the-brain.html

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