The riddle of the Mozart Effect

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The Chinese are producing musical albums with some curious titles. Obesity and Constipation are two. Insomnia is another. There's Liver, Heart, and Lungs, and also an orchestral piece that I've nicknamed The Kidney Bladder Suite." Most of the albums use traditional Chinese instruments and are flawlessly performed. The Chinese "take" these musical compositions like they'd take an herbal medicine, to help them get over the problems described in the album titles, or strengthen the organs named in those titles. [sections] On a recent visit to Japan, I came across more compilations of classical and romantic music with prescriptive suggestions. For headaches and migraines, the Japanese suggested Mendelssohn's "Spring Song," Dvorak's "Humoresque," or even a dose of George Gershwin's "An American in Paris." And at hospitals throughout India, traditional Indian music is used medicinally. In Madras, the Raga Research Center has assembled an interdisciplinary team of doctors who experiment with different ragas for use in music therapy. They have found two particular ragas beneficial in treating hypertension and mental illness. [sections] This is nothing new, really The roots of shamanic and indigenous music reach back to the dawn of civilization, when the sound of the drum, rattle, and other primitive instruments would bring communities together, launch crop plantings and harvests, and march tribes into battle. People believed that music and sound magically allowed the powers above and below to come together.

Humans, we have to assume, have known since they first sang or played their first musical instrument (a bone flute between 43,000 and 82,000 years ago) that music evokes powerful forces. Evidence even suggests that dance and song preceded speech, which means that music is humanity's original language. Researchers, in fact, have found that two-thirds of the inner ear's cilia -- the thousands of tiny hairs that lie on a flat plane like piano keys -- resonate only at the higher "musical" frequencies (3,000 to 20,000 hertz). This would seem to tell us that at one time human beings communicated primarily through song or tone.

Modern scientists agree that many different kinds of music can be therapeutic. Some people respond well to reggae or jazz. Others are uplifted -- indeed healed-after listening to Gregorian chant, or heavy metal. But researchers lately have learned that the work of one composer in particular -- Wolfgang Amadeus Mozart -- mysteriously rises above all other forms of music in its power to heal the human body. This special ability of Mozart's music to heal is called the Mozart Effect. Scientists are not only beginning to understand that some forms of music are more healing than others, with Mozart's at the top, but they're also starting to understand why.

Stammering Depardieu

Alfred Tomatis, M.D., a celebrated French physician, has spent five decades studying the healing and creative powers of sound and music, the Mozart Effect in particular. Many of his patients call him Dr. Mozart. Tomatis has tested more than 100,000 clients in his listening Centers throughout the world for listening disabilities and vocal and auditory handicaps, as well

as learning disorders.

One of his better-known patients was Gerard Depardieu, the French actor. Many movie-goers have heard Depardieu speak with a mellifluous voice, but in the mid- 1960s, he was a tongue-tied young man still struggling to become an actor. Coming from a background of family difficulties, educational failures, and personal sorrows, Depardieu could not express himself. He could hardly speak. And the more he tried, the worse his stammering became.

A drama teacher directed him to the Tomatis Center in Paris, where he met with Tomatis himself. Tomatis diagnosed the cause of Depardieu's voice and memory problems as deeper emotional problems underlying his physiological difficulties and told him that he could help him. Depardieu asked what the treatment would involve -- surgery, medication, or speech therapy. Tomatis responded, "For the next several weeks, I want you to come here every day for two hours and listen to Mozart."

"Mozart?" Depardieu asked, puzzled.

"Mozart," Tomatis repeated.

The next day Depardieu returned to the Tomatis Center to don headphones and listen to Mozart. After only a few sessions, he began to experience positive changes in his daily routine. His appetite improved, he slept better, and he found himself with more energy. And soon he was speaking more clearly. After several months, Depardieu returned to acting school with new poise and confidence, and went on to become one of the consummate actors of his generation.

"Before Tomatis," Depardieu says, looking back, "I could not complete any of my sentences. He helped give continuity to my thoughts, and he gave me the power to synthesize and understand what I was thinking."

Tomatis found again and again that regardless of a listener's tastes or previous exposure to the composer, the music of Mozart invariably calmed listeners, improved spatial perception, and allowed them to express themselves more clearly. He found that Mozart indisputably achieved the best results, long-term, whether in Tokyo, Cape Town, or Amazonia.

One-and-a-half pound Krissy

In recent years, the music of Mozart, who lived from 1756 to 1791, has become part of many doctors' pharmacopoeia as they've seen patients rebound under its influence. Krissy, for example, weighed just over one-and-a-half pounds when she was born prematurely in a Chicago hospital with a life-threatening condition. Doctors put her on total life support. Other than an occasional pat on the head, the only positive stimulation she received was from constant infusions of Mozart that her mother begged nurses to pipe into the neonatal unit. Doctors did not think Krissy would five; her mother, however, believes that the Mozart saved her daughter's fife.

Krissy could not sit up at age one and did not walk until she was two. Her motor skills were poor, and she was anxious and introverted. Despite all this, at age three she tested far ahead of her years in abstract reasoning. One evening, her parents took Krissy to a chamber music concert. For days afterward, she played with an empty tube from a paper towel roll, which she placed under her chin like an instrument, and she bowed" with a chopstick. Her mother enrolled Krissy in Suzuki violin lessons, and the four-year-old could immediately reproduce from memory pieces seemingly several levels beyond her physical ability. With the support of her parents,

teachers, and fellow students, Krissy stopped wringing her hands in fear and began to socialize.

In the past several years, many stories like Krissy's have emerged. While we all know intuitively that music can alter our mood, the enhancing effects of music on creativity, learning, and health have become known to researchers around the world. (See sidebar "Musical Notes" on page 111.) And Mozart's music, in particular, is getting a strong thumbs-up from scientists:

* In monasteries in Brittany, monks play music to the animals in their care and have found that cows serenaded with Mozart give more milk.

* In Washington State, Department of Immigration and Naturalization officials play Mozart and baroque music during English classes for new arrivals from Cambodia, Laos, and other Asian countries and report that it speeds up their learning.

* The city of Edmonton, Alberta, Canada, pipes Mozart string quartets into the city squares to calm pedestrian traffic. Officials found, in addition to other benefits, drug dealings have lessened.

* In northern Japan, Ohara Brewery finds that when Mozart is played near yeast, that yeast makes the best sake. The density of yeast used for brewing the traditional rice wine -- a measure of quality-increases by a factor of ten when the yeast "listen" to Mozart.

The power of Mozart's music came to public attention largely through innovative research at the University of California in the mid- 1990s. At the Center for the Neurobiology of Learning and Memory in Irvine, a research team began to look at the effects of Mozart on college students and children. Frances H. Rauscher, Ph.D., and her colleagues conducted a study in which thirty-six undergraduates from the psychology department scored eight to nine points higher on the spatial IQ test (part of the Stanford-Binet intelligence scale) after listening to ten minutes of Mozart's "Sonata for Two Pianos in D Major" (K.448).

Mozart's music "may `warm up' the brain," suggested Gordon Shaw, a theoretical physicist and one of the Irvine researchers. He suspects that complex music facilitates certain complex neuronal patterns involved in high brain activities like math and chess. By contrast, simple and repetitive music could have the opposite effect. The day after the Irvine findings were announced, music stores in one major city sold out of Mozart recordings.

In a follow-up study, the scientists explored the neurophysiological bases of this enhancement. Spatial intelligence was further tested by projecting sixteen abstract figures similar to folded pieces of paper on an overhead screen for one minute each. The exercises tested whether seventy-nine students could tell how the items would look when they were unfolded. Over a five-day period, one group listened to the original Mozart sonata, another to silence, and a third to mixed sounds, including the music of Philip Glass, an audio-taped story, and a dance piece.

The researchers reported that all three groups improved their scores from day one to day two, but the Mozart group's pattern recognition soared 62 percent compared to 14 percent for the silence group and 11 percent for the mixed-sound group. The Mozart group continued to achieve the highest scores on subsequent days. Proposing a mechanism for this effect, the scientists suggested that listening to Mozart helps "organize" the firing patterns of neurons in the cerebral cortex, especially strengthening creative right-brain processes associated with spatial-temporal reasoning. Listening to music, they concluded, acts as "an exercise" for facilitating operations associated with higher brain function. In plain English, it can improve your

concentration and enhance your ability to make intuitive leaps.

Following the Irvine studies, a number of public schools introduced Mozart pieces as background music and reported improvements in their pupils' attention and performance.

Why does music heal?

To understand why music in general can heal -- and why Mozart is particularly therapeutic for many people -- one must understand sound and its effect on physical matter. In Cymatics, Hans Jenny, a Swiss engineer and doctor, describes the science of how sound and vibration interact with matter. Jenny shows that intricate geometric figures can be formed by sound. For instance, Jenny has created vibrations in crystals with electrical impulses and transmitted the vibrations to a medium such as a plate or a string. He has also produced oscillating figures in liquids and gases.

The forms and shapes that can be created by sound are infinite and can be varied simply by changing the pitch, the harmonics of the tone, and the material that is vibrating. When chords are added, the result can be either beauty or chaos. A low Om sound, for example, produces a few concentric circles with a dot at their center, a high EEE many circles with wobbly edges. These forms change instantaneously when a different note or tone is sounded.

Imagine what effects sounds have on delicate cells, tissues, and organs. Vibrating sounds form patterns and create energy fields of resonance and movement in the surrounding space. We absorb these energies, and they subtly alter our breath, pulse, blood pressure, muscle tension, skin temperature, and other internal rhythms. Jenny's discoveries help us to understand how, like a potter shaping clay at her wheel, sound shapes and sculpts us both inside and out.

It's been partly through the work of Linda Rodgers that scientists and physicians have become aware that the vibrations transmitted by music can positively affect a patient, or negatively affect the patient if it's the wrong music for that patient. A clinical social worker and classically trained musician from Katonah, New York, Rodgers became interested in the effects of music on surgical patients in the wake of a traumatic tonsillectomy she underwent as a child. She had become highly sensitive to the anxiety that can erupt in the face of surgery and the need to somehow defuse it.

In 1982, Rodgers went to work at Mount Sinai Hospital in New York and obtained permission to watch open heart surgery. There she began to investigate patients' ability to hear under anesthesia. She soon uncovered a wealth of research indicating that they do continue to hear, even when rendered unconscious. One of the classic experiments involved an anesthetized cat whose EEG channels all dramatically responded to the barking of a dog. "The auditory pathway, unlike all other sensory systems, has an extra relay," Rodgers explains. "Auditory fibers are not affected by anesthetics, so they continue to transmit sound. Simply stated: We never stop hearing!" And our conscious participation is not needed.

Rodgers has successfully implemented music protocols in operating rooms. To protect against patients inadvertantly hearing harmful noise or tasteless (and possibly injurious) remarks-such as "This old bag won't make it" -- during surgery, Rodgers recommends that audiotapes selected by each patient be played before, during, and after surgery on cassette players with earphones. Rodgers says that as patients learn to invoke music's powers, "It is reasonable to expect a more rapid recovery from surgery, with fewer complications, reduced number of days in the hospital, and a more positive response to coping with future medical problems."

Why Mozart?

Why not call the transformative powers of music the Bach Effect, the Beethoven Effect, or the Beatles Effect? Does Mozart's music have unique properties, eliciting universal responses that only now are yielding to measurement?

Mozart doesn't weave a dazzling tapestry like that of the great mathematical genius Bach. He doesn't raise tidal waves of emotions like the epically tortured Beethoven. He doesn't soothe the body like a good folk musician or slam it into motion like a rock star. However, he is at once deeply mysterious and accessible. His wit, charm, and simplicity allow us to locate a deeper wisdom in ourselves. Tomatis asserts in Pourquoi Mozart? (Why Mozart?) that Mozart's "music has a liberating, healing power which exceeds by far what we observe in his predecessors, ... his contemporaries, or his successors."

To many listeners, Mozart's music seems to impart balance. If it indeed imparts energetic balance -- and we do know that it, like all sound, changes the energy of our bodies in specific ways -- then Mozart's music is doing what many systems of healing strive to do. Whether through acupuncture, herbal medicines, dietary planning, or assorted other measures, many systems of healthcare seek to help the patient find energetic balance. Mozart's music may be energy-balancing extraordinaire. It's not too fast, or too slow. Somehow it's "just right."

The rhythms of music, we know, affect the rhythms of the autonomic nervous system, which regulates a vast biological landscape within our bodies. We can understand, therefore, how important the simplicity and clarity of Mozart's music may be to our emotional and physical bodies.

I liken the effects of different music to the effects of different foods, which also have the power to alter energy patterns and change our physiology, for both good and bad. A hot Mexican meal, or a sweet dessert, each will affect us -- temperamentally and physically -- much differently than a spinach salad. With foods, a steady diet of the most delicious and sensuous is not necessarily the best for us. Sometimes it's the simple tastes that serve us best on a regular basis. We may crave the taste of a steak dinner or a hot fudge sundae, but brown rice primavera might be the most nutritionally beneficial.

So it may be with music. We are likely fed well by a variety of music, but some forms are more likely to bring order and stability to our emotions. Tomatis is convinced that Mozart's music is exceptional at bringing harmony to body and mind. Gerard Depardieu, whose speech difficulties were healed by listening to Mozart, actually listened to Mozart that had been "filtered." It had certain frequencies taken out and others amplified according to Depardieu's specific needs. Some people do not hear certain frequencies as well as they should and they end up with "deficiencies" in these frequencies. By "feeding" the patient these frequencies, the deficiencies are corrected. Tomatis uses Mozart because it filters better than any other kind of music. You could liken the filtered frequencies to "sonic vitamins," or "sound nutrients." They were the specific frequencies, or vibrational nutrition, that Depardieu required. Tomatis has found that Mozart, better than any other kind of music, is a nutritionally balanced musical meal and it is easier to filter out needed frequencies from his compositions than from other composers.'

Wolfgang Amadeus Mozart, the child prodigy who wrote operas, symphonies, piano concertos, piano sonatas, and music for organ, clarinet, and other instruments by the time he was twelve years old -- and who would seem to have known he was going to die young (in his mid-thirties)

-- may have left the world a library of the most delicious healing sound yet discovered.

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