

THE SONG IS YOUApril 1, 2002Stanley Troup

Several weeks ago while glancing through the March 7, 2002 edition of the New England Journal of Medicine I noted a book review by Thomas E. Finucane, a faculty member at the Johns Hopkins University. The book under review is title "Brain Death" and Dr. Finucane began his review as follows: "Emerging from a reverie, a seven-year-old friend once asked me whether music had been discovered, or invented." Having just completed a draft of this evening's presentation, I found it strangely reassuring that I essentially am asking a similar question as that asked by Dr. Finucane's precocious seven year old.

The beginnings of this presentation probably took place a bit more than one year ago when my wife and I had the good fortune to spend a week cruising the Caribbean in the company of the English Chamber Orchestra.

We had reached the island of Antigua where a concert was scheduled to take place on the broad lawn behind the original copper and lumber store, now a lovely hotel. It was a bright, sunny early February afternoon and we took seats in the shade provided by an overhanging corner of the roof. The first piece to be played that afternoon was the bassoon concerto by Mozart. That piece is one of his earliest concerti, written when he was not yet 19, for a Baron Thaddeus von Durnitz, one of the aristocratic dilettantes who occasionally commissioned pieces by the composers of the day.

The piece begins with several bars of orchestral melody and then the solo instrument enters with singing passages, leaps and runs perfectly suited to that amusing instrument. No sooner had the bassoon soloist

begun her portion when we became aware of a 2<sup>nd</sup> soloist positioned just above us on the overhanging portion of the roof. A mockingbird entered the performance no more than one measure behind the bassoon soloist, singing what seemed to me a pitch - perfect round, a canon, really, for the next 16 measures or so, faithfully replicating all of the leaps, trills and wonders of Mozart's music.

I cannot, of course, be certain of just how much Mozart that particular mockingbird had heard in the past but he clearly was unprepared for the complexities of the orchestral portions that followed. After several abortive attempts to re-enter the performance the bird gave up and flew away, probably to seek therapy from an avian analyst!

It is reported that when, at the premier of Stravinsky's 'Rites of Spring', in Paris, in which piece the composer had first used the upper register of the bassoon, the members of the Parisian audience promptly went ballistic and began to beat each other over the head with their umbrellas, starting the finest riot in recent music history. Had a mockingbird with whom we had that brief recent acquaintance been present those many years ago, the audience members would have been well advised to open their umbrellas overhead rather than abusing their neighbors who had a different opinion of Stravinsky's new music.

That rather stunning, and to me nearly miraculous, spontaneous performance by the mockingbird in Antigua set me ruminating about music, its origins, its meanings and the role of music throughout the animal kingdom as well as in human culture.

Thomas Carlyle, English author and essayist, and great friend and admirer of Ralph Waldo Emerson, once called music "the speech of angels". For our early purposes this evening I fear that we will need a somewhat less poetic definition.

In a recent essay titled "The Music of Nature and the Nature of Music" in the journal, *Science*, Patricia Gray and her colleagues at the National Academy of Sciences, defined music as "patterns of sound varying in pitch and time, produced for emotional, social, cultural and cognitive purposes." This rather formal, cold, even sterile definition somehow fails to encompass or capture the richness of the universe represented by the term, music.

Music is a form of communication, acoustically based, with rules that permit combining a finite number of sounds in what proves to be an infinite number of ways. Music is a universal among all human cultures and serves both to link and to limit us in individual and collective identity as members of regions, religions, continents, cultures, networks and nations.

It is tempting, and almost unfailingly instructive, to delve back and attempt to learn what earlier and far more serious students of nature thought about some of these matters.

Charles Darwin addressed the questions of the origin of music and its meanings in Volume 22 of his works. In an essay included in "The Descent of Man," he expressed the view that musical sounds antedated and "afforded one of the bases for the development of language." Darwin deemed it a surprising fact that certain rodents utter musical sounds. With a literary style and charm that most contemporary editors would prohibit, Darwin noted that "Singing mice have often been mentioned and exhibited, but imposture has commonly been suspected. We have, however, at least a clear account by a well-known observer, the Rev. S. Lockwood, of the musical powers of an American species, the *Hesperomys cognatus*, belonging to a genus distinct from that of the English mouse. This little animal was kept in confinement, and the performance was repeatedly heard. In one of the two chief songs, the last bar would frequently be prolonged to two or three; and he would sometimes change from C. Sharp and D, to C

natural and D, and then warble on these two notes awhile, and wind up with a quick chirp on C. sharp and D. ----"

-- Darwin noted that the Rev. Mr. Lockwood gave both songs in musical notation; but added (rather harshly judgmental to my view) that "the little mouse had no ear for time."

My initial astonishment at the Antigua mockingbird's ability to sing Mozart's solo bassoon portion of the concerto was born probably of equal parts of ignorance on my part and the hubris so characteristic of our species. My natural species arrogance has diminished progressively as I have learned more about birds' songs as my reading in preparation for this presentation progressed.

Advances in audio technology have permitted examination of birds' songs in exquisite detail. For example, every elementary rhythmic effect found in human music has been identified in bird song. Simple harmonic relations, retention of melody with change of key; all this is found. Many birds regularly transpose motifs to different keys. Patricia Gray, et al., mentioned earlier, point out that some birds pitch their songs to the same scale as Western music, and they speculate that this is one basis for human attraction to these songs.

The simple melodic canon that so delighted us when the Antigua mockingbird sang Mozart turns out to be bush league, to shamelessly mix metaphors. The Socorro mockingbird of Mexico sings a long series of short themes and its immediate neighbor will then respond to each theme with the identical theme.

The champion might well be the California marsh wren (*Cistothorus palustris* for the birdwatchers among us) who may sing as many as 120 different themes in a fixed sequence. Each theme is matched by its neighbor in a leader-follower sequence. For you serious gospel

and blues fans we are talking about major league call and response patterns.

Any residual remnant of pride or hubris on my part related to our species innovation in music or instrumentation was obliterated on learning of the Palm Cockatoo of northern Australia and New Guinea. Each male of amatory inclination breaks a twig from a tree, then shapes it into a drumstick.

The bird chooses a hollow log with a unique preferred resonance and, holding its newly fashioned drumstick with its claw, drums on the log with its own sequence of rim shot, flam, press roll or paradiddle suitable to its courtship ritual.

I have read that the evolutionary paths of man and whales separated some 60 million years ago. Despite that developmental detour over all these millennia the songs of the whales are remarkably similar in structure to those of man. The songs of the whales were first recorded nearly 60 years ago although the Inuit and others had heard the songs resonating through their thin-walled boats for years. An enormous literature has appeared since those earliest observations. The songs of the humpback whales have rhythm similar to those in human music. They use phrases of a similar length to ours - a few seconds - and create themes out of several phrases before singing the next theme. Gray et al. point out that the whales could extend their songs without the need for repetition but, like human composers, they prefer to reiterate their material. Some authors have speculated that whales, with a large cerebral cortex comparable to that of the human, may well have a similar attention span and this might account for the similarity in the length of our songs.

Even though the humpback whales are capable of singing over a range of at least seven octaves, humpbacks use musical intervals between their notes that are similar to or the same as the intervals in human musical scales. In some whale songs the

structure is similar to human compositions: a statement of theme, a section in which the theme is elaborated (what we would term the developmental section of the composition) and then a return to a slightly modified version of the original theme (that is, the A B A form). After reading some of these scientific and - to be sure - speculative interpretations it is difficult to deny that we humans are late comers to the musical scene. Music is universal among every human culture. Although music making may vary dramatically between cultures, the very fact that music is present in every culture studied, it must be that there is a deep, abiding, fundamental need to create, listen to and perform music.

Music has the capacity and serves the function of binding us in various collective identities as no other cultural marker can. Neither spoken nor written language, neither clothing nor costumes, not habit nor habitat, none of these has the universality and the power of music in creating identity and defining our nature.

Although we are not the oldest musicians in the animal kingdom, nor are we the oldest instrument makers, we are not without a certain history. Prehistoric instruments have been unearthed in France as well as in Slovenia. These appear to be a form of flute and resemble most closely the recorder of present-day. They were created from animal bone and some are estimated to be greater than 50,000 years old. Whether or not we are entitled to derive today's national characteristics from those ancient instruments it is at least of interest that the Neanderthal flute found in Slovenia was made from a bear and a 4,000-year-old flute found in France is from a vulture.

Given the sophistication of these instruments it has been suggested that humans have been creating instrumental music for several hundred thousand years.

Mark Jude Tramo, in his essay titled "Music of the Hemispheres," emphasizes that all of us are born with the capacity to appreciate emotion and meaning in music; regardless of whether we have acquired any knowledge of music theory or can read musical notation. The ability to recognize and memorize musical patterns provide some insight into how our central nervous systems process music.

In the past decade technological advances in diagnostic hardware that can be grouped under the rubric of "scanning" has permitted neurophysiological insights otherwise not possible. Careful study of patients with brain tumors, strokes and epilepsy also have contributed to our current understanding, however incomplete.

First, agreement exists that no "music center," as such, is present in the brain. No grossly identifiable, anatomically discreet structure whose work is solely, exclusively that of music cognition has been located. All of the brain structures that participate in the processing of music also contribute to other forms of cognition.

For example, that area in the brain known as the planum temporale, the price of musicians blessed with perfect pitch, also is involved in the processing of language - at which those so gifted in pitch recognition seemingly enjoy no advantage over the rest of us mere mortals.

The processing of musical sounds takes place in the auditory cortex which is located along the upper surface of the temporal lobe of the brain. Although the right side of the brain has long been viewed as the musical side - and to be sure, it does much of the heavy lifting, musically speaking, evidence obtained from studies of patients with brain damage demonstrate that our perception of music emerges from the interplay of pathways on both sides of the brain.

Studies of patients with epilepsy suggest that different regions of the auditory cortex process different aspects of rhythm. For example, when we tap out a rhythm with a finger, motor areas in the frontage cortex, not the auditory cortex, are active. Interestingly, they also are active when we are just listening and preparing to tap. Mark Jude Tramo, whom I cited earlier, points out that the particular brain areas that are active in right handed individuals who are preparing to tap depend on the type of rhythm. For rhythms that are metrical, whose beats are evenly spaced, the left frontal cortex, the left parietal cortex and the right cerebellum are active. For irregular rhythms which can be much harder to tap out - and I can bear ample personal witness to that difficulty - more of the cortex and cerebellum are involved with a shift in activation of the frontal cortex from the left to the right side of the brain.

Something that bears more directly on matters I will address in a moment are observations that suggest that areas in the brain where we hear music are partially segregated from those areas of the brain where we feel it - that is where the music has an emotional impact.

Whether the music is recognized as pleasant or unpleasant seems to determine what part of the brain shows increased activity.

Composers for centuries have used their music to manipulate emotions and we listeners, for the most part, respond according to their skill and artistry and to our own experience and sensitivities. We have good reason, I believe, to accept the view that the music making of birds is designed to facilitate courtship and reproduction.

Perhaps there is more to that than we know. In the case of highly developed mammals such as the whale, some of the singing is for courtship but that does not appear to be its sole function. Information about food

supply, for example, seems to be transmitted by their songs. And who knows what other messages, secret or public, are broadcast in song, sent ricocheting along the bottom of the sea, informing the casual cetacean correspondent of the ideas or intentions of the soloist. Or for that matter, is it not possible that the joyous birdsong of a bright blue spring morning carries more than the message of invitation to a roll in the hay of the newly constructed nest? We still have much to learn about the music that surrounds us.

Music made by other species is evident everywhere in the natural world, all about us. But what of music making by man? When did it begin and how did it evolve to the present state? I could shorten this presentation a great deal by providing the simplest answer. We don't really know. However tempting, I will not take that easy out.

I have found it impossible to disentangle the arguments about the origins of music and speech in man. We can find at least three separate theories, each advocated by powerful proponents.

For Charles Darwin music was an inherited remnant of the courting instinct of our animal ancestors and only later in the evolutionary process did language appear.

His good friend, the British philosopher Herbert Spencer -who played a powerful role in the popularizing of Darwin's evolutionary theories - differed from Darwin and argued that speech came first and that singing developed as an emotionally intensified form of speaking. About the same time the celebrated composer, Richard Wagner - whose credentials as an evolutionary and ethnic commentator I find seriously flawed - argued that language and music issued from a common source, what he referred to as "sprechstimme" or "speech-music". While hardly an expert on Wagner, I suspect that was one of the few compromises he attempted during his long life.

The three critical components of music, the absolute essentials, are rhythm, melody and harmony. While we can only conjecture about the origins of rhythm and melody, their order of appearance is as mentioned. A distinctive feature of music, whether in animal song systems or in human music, is the use of regular rhythms.

While most animals, including the human, move in a metric, alternating manner, what is special about the human is the ability to train and time the movements to an external timekeeper such as a drum or to a metronome.

Studies of the brain have demonstrated that this ability to keep time is separate from the ability to recognize and produce the tonal features of music. As indicated, we can only guess about the origins of rhythm as a precursor but essential ingredient in the development of human music, but the conjectures come easy to me.

The steady beating of the heart, the metered motion of our hominid antecedents as they made their way in the hunt, perhaps in groups, grunting in rhythm in order to stay in touch with one another or in an attempt to assure survival in case of attack; all these flights of fancy make possible to me the prospects of the next step in the creation of music, the addition of varying tonal elements that will constitute melody.

Melody is defined in the Random House unabridged second edition as the "succession of single tones in musical composition producing a distinct musical phrase or idea." The new Grove International Dictionary of Music gives a similar but slightly more nuanced definition. Here, melody is defined as "pitched sounds arranged in musical time in accordance with given cultural conventions."

However defined, melody is a universal human phenomenon traceable to prehistoric times. Primary

concerns with melody appear to have been related most specifically to verbal - even preverbal - modes of social exchange. The most universal example of the relation between pitch change, melody if you will, and communication surely is the cry of the infant.

Infant behavioral research has documented what every parent, particularly the mother, knows intuitively, that changes in pitch expressed by the preverbal infant are employed effectively to communicate needs as well as affective states such as pleasure, pain or unhappiness.

Musicologists do not all agree on whether rhythm or melody is more central to music. Hans von Bulow, the first of the virtuoso European conductors, was an outspoken champion of the supremacy of rhythm. Andrew Miller, who is here with us this evening, tells me that it was von Bulow who paraphrased the opening of the book of Genesis by asserting that "In the beginning, there was rhythm."

Richard Wagner, perhaps the most ardent of the melodists, whose music von Bulow championed, held that melody was, as he expressed it in his book titled "On Conducting," "the perfect expression of the inner being of music."

It was not only on this topic where they found disagreement. Von Bulow's wife, Cosima, the daughter of Franz Liszt, ran away with Wagner and became his second wife. Von Bulow, not one to take that sort of insult lightly, dropped Wagner and began promoting Brahms. It was von Bulow who coined the aphorism that, Bach, Beethoven and Brahms were the three 'B's of music.

There is no dispute, however, that the third essential ingredient of music is harmony. Harmony can be defined simply - I hope not too simply - as the simultaneous combination of tones of different pitch or quality. The entrance of harmony into Western music

can be dated somewhat more accurately than can rhythm or melody.

In the music of ancient Greece, from which both the term and the concept of harmony derive, harmony signified the combining of separate notes, a higher note and a lower note, simultaneously. This had not been a part of musical practice in classical antiquity.

In their book, "The Music of Man," Yehudi Menuhim and Curtis Davis emphasize the historical role of the crusades in the evolution of music in the Western world. Plainsong, later known as Gregorian chant, had been in existence for several hundred years at the time of the first crusade. By the time the Crusaders captured Jerusalem in 1099 A.D. an enormous variety of music had been heard along the way. The Gregorian chant, as I understand it, was music of a single line. Multiple singers whose voices varied from high to low, did the chanting of the sacred texts, but they all sang the same notes. By the 12<sup>th</sup> and early 13<sup>th</sup> century harmony had entered church music, not harmonies that we necessarily would recognize today, but multiple voices singing different notes at the same time. By the middle ages, well before the Renaissance, Western music had evolved. All of which leads me to yet another major function of music in our lives.

And that is the all encompassing social function of music in our society. Music helps create our individual and collective identities, marks us in terms of geography and ethnic characteristics.

In this country alone we have hip-hop music, Appalachian bluegrass, rock, country, Western, gospel, blues, Dixieland, bebop, West Coast jazz; the list goes on and on.

We have political music that identifies us. What would Democratic conventions be like without "Happy Days Are Here Again?" I'm less certain about a Republican anthem today; perhaps "We're In the Money"

might do the job. Not to mention the musical advertising jingles on radio and the use of classical music on television to-hype products from diamonds to dust mops. Colleges and universities have their anthems to inspire loyalty and fight songs to cheer on their athletic teams. Even the Cincinnati Reds and the Cincinnati Bengals have music to identify them but their musical branding has had about the same success as the teams have enjoyed on the field of late. Since the tragedies of September, 2001 patriotic music has enjoyed increasing prominence. Our military efforts today and the actual combat are so technological and seem so remote that music is much less in evidence but such was not always the case.

Napoleon, it is reported, said that a good march is worth 100 cannons. I suppose that remark could also be taken as an expression of his taste in music but also my effort to extract a pun wherever I can.

The power of music as a political force is difficult to overestimate. Recent history provides painful examples. During the Cultural Revolution in China Western music was outlawed and harsh punishment was meted out to those who violated the ban.

The April 2002 issue of the publication, "Chamber Music" includes an article title "The Politics of Music" by Amanda MacLane in which she states that Mao Zedong silenced an entire generation of Western classical musicians.

She reports, without identity or attribution, that the hands of a leading Chinese pianist were amputated so that he could no longer play Beethoven. Pol Pot, the Khmer Rouge leader in Cambodia banished music during his regime and we have the immediate example of the Taliban authorities in Afghanistan who similarly banished all music. Putatively, the latter was explained on the basis of strict Koranic interpretation. In fact, religious Islam is filled with beautiful music. The prohibition must be

interpreted on the basis of political fear by the leadership.

What is it about music that has led so many demagogues and dictators to fear music? All, of course, had not. Hitler's affection for the music of Wagner is well-known.

Long, learned explanations and theories exist. My shorthand take on them is that music has the capacity to directly stir the emotions as can no other form of communication. It has been said that "the eye is the channel of the mind but the ear is the channel of the heart."

When words are put to music the power can be multiplied. No one captured this more fully than the late great composer of popular song, Harold Arlen. He is best known for his songs that added so much to the movie, "The Wizard of Oz," particularly the wistful, wonderful "Over the Rainbow," by no means the best song he ever wrote.

In discussing music with his good friend, Alec Wilder, Arlen said "words make you think a thought and music makes you feel a feeling, but a song makes you feel a thought."

I have particularly sought explanation in my reading for the powerful emotional appeal of music. It saddens me to report that my amateurish explorations have failed to yield a consensus. The question is neither original nor neglected. Plato, Aristotle and his students wrestled with this. Religious figures, Kant, Hegel, Darwin, the celebrated German physiologist Helmholtz who probably did more to explicate the physiology of sound than any figure in scientific history, Freud, every serious composer, classical, romantic or contemporary, all these have taken a shot at the problem. We still do not know.

During this journey in search of musical understanding, although I have increased my limited knowledge of the field, a question based on a personal bias remains unanswered. My bias is that of all the arts, visual, graphic, acoustical, literature in all its forms, sculpture, painting, drawing, there is an immediacy of emotion induced by music that is nearly instant and more intense than is true for all the other art forms. I suspect that all of us have been moved to tears or near tears on hearing a particular piece of music. Great writing, poetry in particular for many, may induce feelings of deep sadness or great pleasure, and certainly of amusement or overt laughter; viewing paintings, photographs or sculpture, great architecture, all these may evoke feelings of awe and inspiration in time but music alone is capable of doing this almost instantly.

Our emotional responses to other art forms seems to be more measured and time-dependent.

They can be just as profound but on the average, there is a time lag. Or so it seems to me. I have sought explanation for this as broadly as I am able. It came as something of a surprise to me that our university library has a text titled "The Encyclopedia of Human Emotions." This multiple authored volume reviews the basis for the emotions, as best as is known, for every stimulus I might have imagined, including a few I would rather not mention, every art form, every psychological provocation that Freud, Jung and Skinner has ever mentioned.

If it is true, as I believe it to be, that music has the capacity to most directly penetrate to our emotional core, the answer must rest deep within our central nervous system. I have earlier made an effort to describe present understanding of the complex circuitry in our brain that relates to music, whether it be listening or performing, or even thinking about it. Language and vision have locations and networks at least as complex and perhaps even better studied. But

my strong impression remains that music is unique in its ability to reach rapidly into those centers of emotion that harbor some of our richest experiences. I find some support for this strongly held notion in a recent comment by the neurobiologist, Walter Freeman.

Professor Freeman has written, and I quote, "Neither conventional neuroscience nor aesthetics can explain the deep emotional power of music to move humans to action."

Ezra Pound, in an essay titled "A Retrospect," written in 1918 before his descent into madness, wrote that "Only emotion endures." Perhaps, somehow, music is best able to access it.

Whatever the case, our responses to music frequently are highly individual, even idiosyncratic. We have different tastes in music and frequently different responses to the same piece of music. We obviously bring much of ourselves to the appreciation, interpretation or understanding of a particular piece of music. In that sense, we are all our own composers. I think that may be an unintended part of the message that the lyricist Oscar Hammerstein provided with his title for the lovely Jerome Kern melody, "The Song Is You." And so, I believe it is.

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