

Tracking Musical Chills

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Whether it is blues, bebop, or Bach, listeners report a surprisingly broad array of physical responses to music. Philosopher Susanne Langer famously claimed that music sounds the way emotions feel, but she was referring more to “forms of growth and attenuation, flowing and stowing, conflict and resolution, speed, arrest, terrific excitement ” (27), that is, to subjective sensations and analogies rather than to outward physical manifestations of emotions. In recent decades, psychologists of music have begun to investigate these overt responses, discovering—in one study that analyzed four hundred reports from approximately three hundred subjects—that

by far the most common response was tears, meaning anything from getting moist eyes to uninhibited crying. In most cases tears were associated with positive feelings, but there were also examples of tears in connection with sadness and grief. Next in frequency came shivers/chills, thereafter gooseflesh, to feel warm/perspire or feel cold, muscular relaxation, changed breathing, heart race, pressure over the chest, hairs standing on end, various stomach responses, muscular tension, trembles/quivers, lump in the throat, dizziness, pain and single examples of clouded eyes and dry mouth. Among overt behaviors, the dominating response was moving or dancing to the music, followed by singing, shouting, smiling/laughing and—in a certain contrast to the preceding ones—closing one’s eyes, sitting absolutely still hardly breathing and being unable to sing, play, or talk because of overwhelming feelings. (Gabrielsson, 441)

Although Gabrielsson and other theorists have investigated and described the particular properties in music that reliably provoke some of these varied



strong physical responses, few have attempted to explain them from an evolutionary or even biological point of view. If song and dance evolved together, as some propose (e.g., Dissanayake; Mithen), it is not surprising that the sounds of music prompt physical movement like toe-tapping, head-nodding, swaying back and forth, and perhaps singing along. But what would be the evolutionary origin and biological purpose of shivers while listening to music or, for that matter, tears? Or near-catatonia?

Like many if not all readers of *TER*, I have had most of the experiences recorded by Gabriellson and am curious about their evolutionary antecedents. By coincidence, one such response—chills—happened to occur just days before I read Jaak Panksepp's suggestion about their biological source (*Affective* 278–79). When I describe this musical situation to friends, some have said that they get chills just hearing about it.

In 2007, I attended a June festival of “art song” at the University of British Columbia in Vancouver. Every evening featured a recital by a professional singer, and throughout the day we attended song-related talks and demonstrations. The most interesting to me were coaching sessions in which professional singers made suggestions to voice students about their interpretation of a prepared song. Before attending this festival, I naively thought that singers learned the music of a song and then simply opened their mouths and sang (rather as pianists learn their pieces and sit down at the piano and play). Until I saw the awkward, self-conscious voice students, I had not realized how important (or difficult) it was to convey the music with face, gesture, and posture even if one already possessed a beautiful, expressive, and well-trained voice.

In contrast to chills experienced in listening to instrumental music (i.e., music without words), my particular experience of music with lyrics is perhaps contaminated since I cannot separate the emotional effect of words from that of the music. Be that as it may, it occurred in one short section of a song by Henry Purcell (ca. 1659–95), “The Blessed Virgin’s Expostulation”—not a title that immediately suggests the likelihood of strong emotional response. Performed by a well-trained student soprano, it began with a florid declamatory recitative in B-flat minor, with much repetition of words and musical melisma, that is, singing a single syl-

lable of text while moving between several different notes in succession. This is a characteristic of Purcell in particular and early Baroque in general (see text and musical score). The entire song is like a miniature seven-minute opera: recitatives alternate with arias and there is great dramatic variety in dynamics of mood, volume, and tempo.

THE BLESSED VIRGIN’S EXPOSTULATION

Tell me, tell me some, some pitying angel,
 Tell quickly, quickly, quickly say,
 Where, where does my soul’s sweet darling stray,
 In tiger’s or more cruel, more cruel cruel Herod’s way?
 Ah, ah rather, rather let his little, little footsteps press
 Unregarded through the wilderness,
 Where milder, milder, where milder savages resort,
 The desert’s safer, the desert’s safer than a tyrant’s court.
 Why, why, fairest object of my love,
 why, why dost thou from my longing eyes remove?
 Was it, was it a waking dream that did foretell thy
 wondrous birth,
 Thy wondrous, wondrous birth?
 No vision, no, no vision from above?
 Where’s Gabriel, where’s Gabriel now that visited my
 cell?
 I call, I call, I call: Gabriel! Gabriel!
 He comes not.
 Flatt’ring, flatt’ring hopes, farewell flatt’ring hopes, farewell.
 Me Judah’s daughters once caress’d,
 Call’d me of mothers the most, the most bless’d.
 Now fatal change, of mothers most distress’d.
 How, how shall my soul its motions guide?
 How, how shall I stem the various, various tide,
 Whilst faith and doubt my lab’ring soul divide?
 For whilst of thy dear, dear sight beguil’d,
 I trust the God, but oh! I fear, but oh! I fear the child.

Text by Nahum Tate (1652–1715); Music by Henry Purcell (from *Harmonia Sacra* Vol. II)

The Virgin is alone as she expostulates, that is, requests to know. She asks some pitying angel to tell her where her

child has strayed and muses that it would be better if he were in a desert with tigers than in Herod's court. Free-associating, she wonders whether it was a waking dream that earlier foretold his miraculous birth. Suddenly, using tones from an A-flat major chord, she decides to ask the angel Gabriel who had once visited her to come again and tell her how to deal with the division in her soul between faith and doubt (apprehension, distress). In a rising A-flat major arpeggio and crescendo she declaims "I call" five times and then on high F, just after the accompanying chord changes to F major (in I-6 position), she loudly, even desperately, calls out the name "Gabriel!" four times (as each preceding single chord changes chromatically). Following this piercing call is a sudden reduction in volume as she realizes he has not come: "He comes not." But then again the previous section is repeated, this time with three "I calls" but four more *forte* "Gabriels" followed again by an utter realization that he will not come: (*piano*) "He comes not, flatt'ring Hopes farewell."

My musical chills occurred at the first "Gabriel" and lasted through "He comes not," only to be revived in a similar way at the second repetition of the passage. Tears were incipient also, probably occasioned by sympathy for what this young vulnerable girl would eventually have to bear, ordeals that—as the unwitting Mother of God—she half suspected but did not yet know.

Since the days of Susanne Langer's philosophical writings about musical emotion, empirical research on the subject has become both abundant and provocative. At least three contemporary psychologists have offered detailed musicological and psychological explanations for musical chill experiences like mine.

British music psychologist John Sloboda collected eighty-three responses to a questionnaire that asked music lovers to describe particular musical passages that evoked in them strong emotions. Analyzing the printed scores at these affecting places, he found that chills were correlated with sudden changes of harmony and with abrupt changes in dynamic level. (This latter device is a staple in patriotic music and religious music where the organ and massed voices swell in a great crescendo at or near the end of a work.)

American cognitive scientist, David Huron, has developed a psychological theory of expectation that he applies to musical emotion, finding that all music-induced instances of chills—as they also may occur in responses to music of both awe and laughter—are responses to the violation of an expectation, an explanation that seems also to pertain to Sloboda's "sudden," "abrupt" changes in harmony or dynamics.¹ Manipulation of expectation also pertains to heightened emotional response to particular passages in reading literature, according to Canadian scholars David Miall and Don Kuiken, through literary devices of "defamiliarization" and "foregrounding" (see also Miall).

Huron traces the physiological origin of what he calls musical *frisson* to the fear response, specifically when an animal decides to stand its ground and fight using an aggressive display—rather than fleeing or remaining still (freezing in place), which are alternative responses to fear with different physiological concomitants. Chills result in pilo-erection, as when a person is cold, shivers, and has "goosebumps." Although fluffing out hair or feathers originated as a thermoregulatory mechanism to help retain body warmth, in hirsute animals it has been co-opted or "exapted" for use in aggressive or threat displays because it makes an animal appear larger. Huron's hypothesis suggests a phylogenetic explanation for Sloboda's findings. Our expectation is indeed violated by unexpected chord changes and gathering crescendos, reliably producing chills and shivers as these musical devices stimulate ancient receptors in our subcortical brain that evolved to respond quickly to signals of possible danger. Unanticipated and sudden (or gradually expanding) forceful sounds suggest the presence of a creature with a large resonant chest cavity capable of loud noises, thereby provoking an atavistic, unconscious mini-fear response.

I was not familiar with the Sloboda and Huron findings at the time of my chill response to Purcell's song. Later, though, I noted that my particular case was indeed correlated with a sudden change of harmony a la Sloboda, thus violating my expectation a la Huron. However, the crescendo was *gradual*, not an abrupt change in dynamic level as with Sloboda's subjects. I was prompted to investigate their work after the unexpected encounter with Panksepp's evolutionary explanation of musical chills in his monumen-

tal 1998 work, *Affective Neuroscience*, mentioned earlier, that seemed quite accurately to represent my particular experience in Vancouver. More detailed discussions of musical chills can be found in Panksepp (“The Emotional Sources”) and Panksepp and Bernatzky.

Panksepp’s highly original idea is that chills arise from feelings triggered by music in which the acoustic properties are similar to those in the separation-distress call of young animals when they fall out of the nest or otherwise find themselves alone and abandoned, lost, and cold. This high-pitched primal cry of despair and helplessness beseeches caretakers to come and provide care and attention. Rather than being only a thermoregulatory response to fear, chills also indicate the physical and emotional cold of abandonment, including the vicarious coldness that we may sympathetically feel when we hear the call of someone in separation distress.

As if describing my own experience, Panksepp and Bernatzky remark that “a high-pitched sustained crescendo, a sustained note of grief sung by a soprano or played on a violin (capable of piercing the ‘soul’ so to speak) seems to be an ideal stimulus for evoking chills” (242). In view of the Virgin’s being “lost” and in despair, calling in vain for comfort that does not come, her four piercing, increasingly desperate “Gabriels” (repeated rather than “sustained”) recall the separation-distress that any human can feel vicariously—“He comes not.” Panksepp and Bernatzky cite evidence indicating that chill-producing music arouses primitive sub-cortical regions such as the periaqueductal gray of the mid-brain that has been implicated as an epicenter of affective consciousness in mammalian brains (144). Additionally, they suggest that the chill response to music is partly controlled by endogenous opioids, perhaps induced by a rush of endorphins and/or perhaps by a sudden decline in endogenous opioid activity.

To what source should I trace my chill response—to an atavistic primitive fear response or to a primordial reaction to abandonment? Does it matter? Passionate listeners to music may or may not want to learn about the mechanics of their most exalted experiences. Certainly diners or lovers *in medias res* have more commanding preoccupations than to ponder the physiological correlates of digestion or copula-

tion. But even post-apotheosis, tracking musical chills to their source in periaqueductal grey or endogenous opioids may seem a travesty to some, absurdly laughable to others. It is an interesting problem: Why should some of us want to know such things? Why should some recoil from knowing them? And what might be gained from such evolutionary explanations of profound emotional response?

Adopting an evolutionary point of view changes one’s basic perspective on the world and oneself. Those without this perspective might erroneously conclude that I consider my experiences of art to be “nothing but” synapses and neuropeptides. But this is decidedly not so. Panksepp and Bernatzky “re-emphasize that any attempt to explain music in either evolutionary or neurophysiological terms will miss the enormity of musical meaning that is constructed through diverse socio-cultural dimensions of aesthetics” (141). It is true that I live in the United States in the twenty-first century, have been educated in Western classical music, have heard thousands of live and recorded musical performances of all kinds, am acquainted with the story of The Annunciation as well as Purcellian style and other of his works. As such a person, however, reflecting on my experience of musical chills, the fact that synapses and endogenous opioids are in the service not only of a baby mammal’s cries of abandonment but also of my brushes with the numinous is itself a revelatory kind of understanding.

Tracing elements of human experiences of the arts to evolutionary origins and functions such as play, shared attention, ancestral mother–infant interaction, sexual display, mediation of anxiety, group coordination, the need to produce and consume imaginative artifacts and so forth is a way of confirming the arts’ personal and social importance as well as their biological deep-rootedness. Evolutionary speculations or assertions need not short-change the preciousness of individual experiences. I am confident that John Sloboda, David Huron, Jaak Panksepp, and I are as profoundly affected by music as anyone. Our reasons for becoming psychologists, neuroscientists, and evolutionary scientists of music have grown out of our own susceptibility to and aptitude for this abidingly affecting and interesting subject as well as a respect for the clarifications of scientific understanding. Learning

that the arts have subcortical foundations only adds to our wonder. Our deepest musical experiences “speak to us of our humanness and our profound relatedness to other people and the rest of nature” (Panksepp, *Affective* 279). It is fascinating and humbling to trace the most exalted human accomplishments and emotions to the psychology and neurology that we share with other living things. I daresay that Susanne Langer would have welcomed attempts to understand the biological antecedents that suggest how and why music can be “a tonal analogue of emotive life” (*Feeling* 27).

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NOTE

1. Huron’s rich and well-supported ideas extend the pioneering work of Leonard B. Meyer, who proposed in 1954 that musical emotion results from manipulating expectation.