

New Brain Research on Emotion and Feeling: Dramatic Implications for Music Education

BENNETT REIMER

Know then thyself; presume not God to scan:

The proper study of mankind is man.

These words, by English poet Alexander Pope (1688–1744), reflect a major historical turn in thought about the human condition and how to best understand it. Pope lived during the period that would become known as the Enlightenment, when the power and potential of reason began to be regarded as the surest source of valid insights about what it means to be human. In a real sense, contemporary science, in all of its many forms, is a child of the Enlightenment, its birth signaled by Pope's pronouncement.

If we are to follow the command of the oracle of ancient Delphi to "know thyself," the words that Pope echoed, we need to know what to study to accomplish this goal. To study ourselves—to look deeply and carefully into the substance of our human being—requires both a mindset to do so and a system of investigation best suited to the complexities that we embody. Science offered both—a way to understand our nature and the instrumentalities to study it. All of us, whatever other beliefs we might hold about the world

and our place within it, have been profoundly affected by the scientific revolution that Alexander Pope announced.

That revolution, reaching to every corner of human existence, including our understandings of the nonhuman universe, approaches its greatest challenge from its most fundamental premise: We are who we are, we think and act as we do, our reality is what it is, by virtue of the embodied brain that we happen to have. Under this premise, all aspects of our lives, physical, mental, emotional, ethical, spiritual—yes, even musical—are functions of brain activity in its embodied environment. The proper study of mankind, finally, Pope might have said, is the brain, the ultimate foundation for all that makes us human.

Here are a few astounding facts about the human brain:

The brain has an estimated one hundred billion neurons. . . . Each neuron has an average of ten thousand connections that directly link itself to other neurons. Thus there are thought to be about one million billion of these connections, making it the most complex structure, natural or artificial, on earth. . . . A "synapse" is the connection that functionally links neurons to one another. Because of the spider-web-like interconnections, activation of one neuron can influence an average of ten thousand neurons at the receiving ends. The number of possible "on-off" patterns of neuronal firing is immense, estimated as a staggering ten times ten one million

times (ten to the millionth power). The brain is obviously capable of an imponderably huge variety of activities; the fact that it is often organized and functional is quite an accomplishment! (Siegel 1999)

When the brain is conceived as a sort of gigantic computer compressed into a very small space, we can be forgiven for feeling a bit uneasy about the sense of mechanization that this implies. It somehow seems to leave us—the experiencing beings that we are—out of the equation, as if we were automatons responding blindly to brain impulses. What seems to be ignored by this view is our consciousness, the very condition that allows us to think thoughts such as "to think thoughts." Is consciousness itself entirely a matter of brain function? Is what we feel, moment by moment, hour by hour, day by week by year over the span of our lives, making us the individuals we recognize ourselves to be, reducible to neurons firing within our skulls, directing our bodies to act as they do? Are varied states of awareness and our responses merely mechanical functions? Is that what it all comes down to?

Consciousness Studies

Such questions are among the great challenges that brain research faces. There have been important strides in recent years toward understanding vari-

ous brain structures and brain functions; we have no doubt learned more about the brain in the past dozen years or so than in the previous dozen or so centuries. We are still left, however, with a significant gap between such findings and their relation to our experienced lives and our consciousness. That gap is now being addressed, no doubt more thoroughly than ever before in history, by the field of consciousness studies, in which a variety of leads toward an explanation of this fundamental aspect of the human condition are being pursued, one of which I will deal with later on. We are still a long way, I believe, from fully closing the gap between brain research and consciousness research, if, in fact, that gap can ever be entirely closed.

Why should those of us dedicated to two dimensions of human capacities—music and education, both of which are near the top of the scale of holistic functions of human mentality—care very much about the extremely detailed work going on in present brain research? After all, the natural sciences, including brain science, traditionally have proceeded by processes of reduction and analysis into smaller and smaller parts. Our interest, our professionalism, is very far removed from such work—so far that brain research findings often seem to be either academic for us or even irrelevant. As John Flohr and Don Hodges put it in their excellent overview of music and neuroscience, “Unfortunately, a direct translation from neuroscience research into music education at this time is very problematic” (Flohr and Hodges 2002). For example, it may be of passing interest to know which parts of the brain are activated by musical engagements, but in itself this would seem to change nothing and suggest nothing that is useful to us in the actualities of how we go about our work. Is brain research, then, in its focus on operations far below the level of consciousness, too atomistic to be of practical value to us? Could it even be, in a sense, a threat to our values, trivializing them by its reductionism?

Here is how Edward O. Wilson, the Pulitzer Prize-winning scientist and

author, explains why we should care—in fact, why we must care—about all dimensions of brain research:

Reduction is the traditional instrument of scientific analysis, but it is feared and resented. If human behavior can be reduced and determined to any considerable degree by the laws of biology, then mankind might appear to be less than unique and to that extent dehumanized. Few social scientists and scholars in the humanities are prepared to enter such a conspiracy, let alone surrender any of their territory. But this perception, which equates the method of reduction with the philosophy of diminution, is entirely in error. . . . Biology is the key to human nature, and social scientists cannot afford to ignore its rapidly tightening principles. But the social sciences are potentially far richer in content. Eventually they will absorb the relevant ideas of biology and go on to beggar them. (Wilson 1978, 14)

I would add to this only one thing: The humanities are just as important as the social sciences. As a person situated within the humanities, I am concerned above all with the quality and breadth of human experience at the levels of meaning, fulfillment, joy, and spirit. I find myself fascinated by brain research because of the inklings that it gives us, here and there, of how we are biological organisms for whom these experienced qualities of meaning or joy are enabled by the very structure of our physical being, even at its smallest, most elemental levels. Is it possible that knowing what brain research is beginning to suggest could help us achieve more deeply what we value in our personal and professional lives and in helping others achieve more of the values that music particularly offers? If brain research can be connected to such aims, we will have truly begun to beggar that research—to make it seem impoverished—as Wilson claims we should.

Despite the fact that my expertise (such as it is) is as a philosopher and not in any sense as a brain researcher, I am, therefore, emboldened to discuss this topic because of Wilson’s challenge to the social sciences and humanities. I believe that he is correct to suggest that the natural sciences and humanistic scholarship need to be seen as partners, not adversaries, each adding in its own

unique way to the validity of the other without in any way merging with or “integrating” with the other. (That, by the way, is precisely what Wilson means by “consilience” in his influential book by that name. He does *not* mean “integration” as that term is so often used in education [Wilson 1998]). In that spirit, I offer my reflections on brain research from my perspective as a philosopher, seeking the human meanings arising from what brain studies suggest.

The State of Brain Research

I would characterize the bulk of modern-day brain research as a hodgepodge as provocative, puzzling, astute, clever, courageous, and easily misinterpreted, as we witness so often by popularizations and advocacy attempts that are embarrassing in their unwarranted and misleading claims. My posture in dealing with much of this research is to regard it at the level of “We cannot yet say that . . .” or “It is likely that . . .” rather than “It is now established that. . . .” Nevertheless, despite its many abuses by those with a stake in using it improperly, I believe we are ready to begin drawing tentative implications from some of the findings of brain research that do in fact seem to connect with and even clarify our values. I will begin with a few brain research implications that underlie the major one that I want to emphasize: dealing with emotion and feeling.

The first implication is that brain physiology, while displaying an overall structure in which certain locations seem to be central to particular mental and physical functions, nevertheless is surprisingly individual and, therefore, remarkably diverse. Brain diversity from person to person exists in a variety of ways, for example, in the efficiency of neuronal connection-making; in the numbers of neurons in particular networks; in the amount of energy consumed in the linking of neurons; in the effects of experiential stimuli on neuron activity; in the ease or difficulty of pattern creation among neuronal networks; in the differences in strength and scope of memory storage and retrieval mechanisms; in the developmental aspects of brain maturation, not

only as a whole but in each particular mode of brain function; in the efficiency and acuity of sensory input to the brain; in the differences of attention patterns that transmit environmental data to the brain; and, by no means least, in the differences in quality of nutrition and in the availability of opportunities to learn. There are many more examples of the distinctiveness of brain operation from person to person that can be added. These examples give a sense of the magnitude of brain individuality, which can be compared meaningfully with face individuality. Human faces have shared characteristics, yet, amazingly, also are always distinctive, even in the case of so-called identical twins, both in faces and brains, apparently.

The major addition to my short list of brain individuality potential is the high degree of likelihood that differing life experiences will cause differing developments to take place in the brain. That applies to *all* life experiences, each getting processed by the brain as particular to the individuality of each person—what life offers to each person and the way and degree that each person attends to the ongoing flow of his or her life experiences. The brain is not separate from the experiencing individual; it is, in fact, the essential intermediary between outside and inside.

Music and the Brain

In musical experiencing, for example, two fundamental processes underlie all others. The first is the immediate, nonverbal response to musical sounds—the absorption in one's attention of their impact as we create them and respond to them. That "music-think" is what I have termed "knowing within" and "knowing how," or "musical perceptual structuring," and what Bruce Torff and Howard Gardner have termed the "experiential" aspect of engagements with music (1999).

The second process, intimately linked with the first but not identical, is dependent on the contributions of symbol systems such as words, notations, analytical diagrams, and so forth. These are the dimensions that I have called "knowing about" and "knowing

why" and what Torff and Gardner, following my explanations, term the "conceptual aspect of musical processing." Both the experiential and the conceptual dimensions are cognitive. That is, both are processed, each in its own way and with complex interactions among them, by the brain. Both create the conscious, meaningful undergoing that we call "musical experience."

Importantly, the diverse emphases among the experiential and conceptual

that professionals must attain, nor do they have the levels of physical mastery required for professional performance.

Of central importance to music education is that all musical engagements, whether at the level of novice or professional—all the way from young children to seasoned veterans—activate both brain hemispheres and involve cerebral cortex activity and memory retrieval mechanisms. There are, however, substantive differences in brain activation

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dimensions, required by the diversity of ways that music can be encountered, call on and influence diverse brain developments. For example, we are on fairly firm ground in brain research (albeit not without controversy) in claiming that the brain activates differently for novices and experts. That is the case not only in music but probably in everything else that humans do. For example, a study at the Santa Lucia Foundation Neuroresearch Center in Rome found that professional wine experts—sommeliers—have distinctively different brain activation patterns than novice wine drinkers. Although both experts and novices activate the primary and secondary gustatory brain areas, only the experts activate areas involved in memory encoding and emotional responses and the area of the frontal cortex that processes language and recognition ability (Gaffney 2003).

Among musical experts—that is, professionals—brain studies suggest that the conceptual dimension is far more dominant than among novices. This is no surprise because novices, who often enjoy and value music deeply, do not generally bring to their experiences of music the levels of conceptual cognition

patterns stemming from differing emphases in attention and in the strategies employed by the differing ways in which each musical role is learned. Each role is likely to entail widely distributed brain activity, but not identically with the others. This is true for singing, playing, improvising, composing, arranging, listening, analyzing, describing, evaluating, and understanding the relationships of music to other subjects and to its historical and cultural dimensions (these being the role identifications in the U.S. National Content Standards for music education). The individuality of one musical role from another probably stems from two aspects of brain function. First, each role requires a different set of brain involvements because each requires its own particular set of discriminations to be made by the combined brain/body entity. Second, the brain must make the particular connections among those discriminations that are related to the particularities of each role. As Don Hodges explains (2000), musical processing is distributed throughout the brain in neural modules that perform particular functions, the modules being engaged according to the demands that various tasks make on the

brain. The brain's responses to the demands of particular tasks—what I have called role requirements—are learned rather than inherent. The particular role that one plays—the “outside,” so to speak—programs the brain to serve its needs, with the “inside” responding to the demands made by each role and also to the instructional processes that each role requires.

Apparently, then, there is not a singular brain/body set of activations for a singular phenomenon called “music.” Instead, there are as many sets of activations as there are viable ways to interact with music, each demanding the brain's support and instructing it as to how to provide that support. Those modes of musical interaction (or musical roles) include, the research suggests, whether or not each role is pursued professionally. To further complicate the picture, all individuals, as mentioned previously, inevitably develop their unique pattern of brain/body activation within each role and within their particular level of interest in that role.

What all this adds up to—let me emphasize again—is that it is simplistic to think in terms of a generalized brain involvement in a generalization termed “music.” This, I would point out, is what Howard Gardner's theory of multiple intelligences tends to do, neglecting the substantive distinctions among the many different musical roles that cultures provide and the diversity of brain/body involvements of individuals playing each role. That oversimplification of musical experience diversity, I am afraid, also pervades music education in our beliefs, program offerings, practices of teaching, assessments, and research. Because of our growing understandings of brain dissimilarity as related to musical role dissimilarity, we are faced with scientific evidence of our need to rethink much of what we do and how we do it. This adds to and complements recent philosophical arguments that we have not yet recognized how nondiverse and uniform our approach to music education has been. We have thereby restricted the opportunities that we offer our students, who, taken as a whole, represent the entire spectrum of

both brain development potential and interests in music. This is a striking convergence, or consilience, of humanities and science, each strengthening the other in leading us to a more securely based vision of what music education might be.

The Brain and Emotion

That vision has recently been clarified by still another brain-function/value-orientation complementarity that is perhaps even more important in its implications than what I have discussed so far. I refer to the work of Antonio Damasio in his three recent books, *Descartes' Error: Emotion, Reason, and the Human Brain* (1994); *The Feeling of What Happens: Body and Emotion in the Making of Consciousness* (1994); and *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain* (2003). His work, or the work of any other single researcher, is by no means sufficient for any inclusive treatment of recent advances in brain research on the relation of emotion and feeling to human consciousness and cognition. Thus, I make no claim that this particular scientist's contribution is the only valid, interesting, or helpful one; not at all. It is far too early for any one of the many attempts being made to unravel the mysteries of the brain/emotion interplay to have become dominant, nor can we yet aggregate all of the attempts into an authoritative explanation. We must be modest here, giving provocative work its due but not leaping too fast to any assumption that this issue is resolved.

Nevertheless, I want to call attention to this particular explanation because it so strikingly fits with, and adds empirical verification for, long-standing philosophical work that has had important influence on music education. Science is now verifying beliefs that until now could only be verified intuitively. The consilience between science and philosophy, when it appears out of the blue and so powerfully confirms one's beliefs and practices, is, indeed, dramatic. It deserves our attention and, if not our unquestioning endorsement, at least our careful, even hopeful, examination.

Unfortunately, that examination entails one of the most difficult issues in all of brain research: the brain's involvement in emotion. This is because unlike much other brain function and physiology research, which yields evidence related to sense experience or definable intellectual operations, emotion is the paradigm case of what is called an “essentially contested concept,” one that has defied consensual definition over all of recorded history. That the brain is the seat of emotions has been recognized for a very long time. Hippocrates (460–377 B.C.E.) said “From the brain and the brain alone arise our pleasures, joys, laughter and jest, as well as our sorrows, pains, and griefs.” No scientist today would dispute that ancient intuition. Yet, as emotion theorists Paul Ekman and Richard Davidson point out, “Although everyone agrees that more [research] data are needed, they disagree about how much reliable data are now available, and what kind of data will be most useful in furthering our understanding of the emotions” (1994, 47).

Damasio's data and their implications do, in fact, further our understanding, I believe, and in ways directly relevant to the values of music. I can give only a brief overview of his work and what it suggests for our professional beliefs and actions. Readers interested in delving into his writings will find his books remarkably accessible, even charming, and pervaded with a humane spirit.

For Damasio, the historical tendency to overvalue reason and rationality at the expense of emotion and its intimate connection to the body has given us a false picture of the human mind and has negatively affected human values. Furthermore, Damasio explains, emotion is the root of and the basis for feeling, which carries emotion to another level. It is not emotion as such that accounts for our human condition; many animals are likely to experience emotion. The feelings that arise out of emotion are what cause and allow us to be the unique creatures we seem to be. Feeling carries emotion to the level of conscious awareness of what we are undergoing. Although emotion activates the brain as a collection of changes in the state of the body, feeling those changes—being

aware that we are undergoing a set of related, complex brain/body events—requires the juxtaposition of what is happening in the brain and its body with an image of something to which those happenings are related. Damasio suggests that such an image could be, “the visual image of a face or the auditory image of a melody” (1994, 145). When this junction of inside and outside, brain/body activation with environmental occurrence, reaches the level of awareness that they are interconnected, we call it consciousness, Damasio explains. To be conscious is to be aware, through a coming together of brain, body, and environmental conditions, that we are experiencing, that we are undergoing something, and that we know that we are doing so. Feeling is the connecting mechanism that allows this transition to happen—the transition from a person undergoing something both internally and externally and having the recognition that she or he is doing so. In this case, the person is a “self,” feeling what that self is undergoing. As Damasio puts it, “feelings are poised at the very threshold that separates being from knowing, and thus have a privileged connection to consciousness” (1999, 43).

Despite the richness and depth of his explanations throughout his writings, especially in *The Feeling of What Happens* (if you can read only one of his books, this is the one to read), Damasio struggles in his attempts to explain how consciousness occurs and the central role that feeling plays in that occurrence. That struggle is attributable, to a large extent, to the fact that we do not have language available to conceptualize the specificities of this phenomenon, and, perhaps, we may never have it, given the shortcomings of language to express what is above and beyond language. Not everything in our experience, after all, can be represented accurately by language, something we music educators (and educators in the other arts) know full well. We certainly experience feeling and consciousness, just as we certainly experience music. Putting those experiences into the representations that language is capable of mediating can be very frustrating and unsatis-

fying because of the disparities between language and felt, aware experience.

Nevertheless, several insights that Damasio offers from his brain studies clarify how music works and how we might be more effective in teaching it. One insight in particular is both clear and explainable, the notion of “the emotionally competent object.” One aspect of feeling, he explains, is its location within the body. Whether a stimulus to the brain/body entity is received from inside (for example, sensing hunger or pain) or from the outside (for example, listening to a piece of music), the brain/body reacts, in musculature, heartbeat, respiration, blood chemistry, electrical impulses, and so on. The brain maps all of this and, at a certain “critical pitch” of the nervous system (Damasio borrows the term “critical pitch” from Susanne Langer), the process reaches the level of feeling—that is, awareness or consciousness of what we are undergoing. That capacity—that critical pitch producing consciousness (in our case consciousness of having the experience we call “musical”—is built into the human brain/body complex as an inherited mechanism. Even infants exhibit responses to—and awarenesses of—the feeling content of music.

Here’s the important part for us. Feelings are perceptions, like visual, or aural, tactile, or gustatory perceptions. When something is perceived from outside the body, feeling combines that which comes from the object or event perceived with brain/body responses inside the body. Thus, although feelings are internal, they are intimately linked to something that caused them. That outside influence is the emotionally competent object. Damasio puts it this way: “*The sight of a spectacular seascape is an emotionally competent object.*” (2003, 91; emphasis in original). The object causes all sorts of brain/body responses, which are experienced consciously as feelings. The object need not be a seascape, of course; I would mention as another example the sound of a stirring piece of music.

Furthermore, we respond to the object—to events in the outer world—

in a dynamic, interactive way, Damasio says:

The brain can act directly on the very object it is perceiving. . . . In the case of feeling, the object itself can be changed radically. . . . (F)eelings are not a passive perception or a flash in time. . . . (T)here is a dynamic engagement of the body. . . and a subsequent dynamic variation of the perception. We experience a series of transitions. We sense an interplay, a give and take [between outside and inside]. (2003, 91–92)

That “give and take” changes both the brain’s functioning and how we perceive the object or event with which it is interacting. The brain changes to adapt to, for example, a musical listening experience that one is having. That adaptation is imprinted in brain physiology and function. Even from a recording, which remains identical from one experience of listening to the next, what we perceive in the music changes from one hearing to the next because the brain is no longer what it was on each previous hearing. Our brain is changed, so we are changed and so our experience is changed.

The lesson for us as music educators is that every musical experience that we offer our students affects their brains, bodies, and feelings. In short, it changes their minds permanently, and, if we are conscientious, it does so progressively. We call such a process “learning.” That capacity to learn, to grow and develop, occurs with everything else that we humans experience in our lives, of course, because of the brain’s plasticity—its enormous power to change itself in response to whatever our life’s experiences present to it. The function of music education is, precisely, to foster musical learning—the changes that occur in brain, body, and feeling as musical experience becomes more deeply discriminative and more widely situated or, that is, more musically intelligent.

Where in music do we find its capacity to offer the experiences of meaningful feeling it so uniquely makes available? Such experiences, after all, have been treasured by humans throughout history and are considered by many, myself included, to be the foundational

value of music, the basis for all of its many other values.

An extremely simple, elegant way to express where in music one finds its root value—that is, its unparalleled capacity to engage us in significant affective experience—is found in the title of Damasio's second book, *The Feeling of What Happens*. This simple phrase captures within it, and finally brings clarification to, decades, perhaps centuries, of philosophical debate on the

thing musical out of any and all delineations.

How does it do this? By making things happen that only sounds configured to do so can accomplish. "*Valse Triste*" can validly be called "sad," just as "*Jingle Bells*" can be called "happy." What makes them *music* is what happens to their sounds as they unfold. The feeling of what happens then includes sadness or happiness; or a description of a march to the gallows; or the passing of

meaning. Nussbaum goes on to say that music, in "its very indefiniteness from the point of view of the propositional use of language, gives it, frequently, a superior definiteness in dealing with our insides" (269). I would argue this happens not just frequently but always. As Damasio comments, "How intriguing that feelings bear witness to the state of life deep within" (2003, 140).

This definiteness, this preciseness, is what we feel and treasure as we experience "the feeling of what happens" in music. In his wide-ranging book *Consciousness* (2002), Adam Zeman states the same idea by quoting Langer, who said, "What is felt is always action in an organism." Creating and responding to art, Zeman explains, are "active processes, consuming time and energy. . . . part and parcel of an attentive exploration of the world." That exploration is a process "of seeking and interpreting significant detail" (190–91). Artists deal, precisely, in significant detail—detail, that is, that grasps our awareness and our feelings by its actions, or "what happens" to them in their becoming. Feelings unfold as the music unfolds. That unfolding, created for conscious undergoing perhaps more powerfully and precisely by music than any other of life's opportunities, takes us deeply within the conscious condition achieved by the human brain and body. Experience of that sort, music likely its paradigm, enables us to "know thyself" deeply, reaching to the core of our condition as conscious organisms. At bottom, I suggest, that is what is so satisfying, so spiritual, if you will, about musical experience in all of its manifestations.

We in music education are nurturers of consciousness. The experiences and learning that we offer are directly related to the nature of consciousness itself as the feeling of what happens. Being human includes sadness, happiness, and all of the emotional, cultural, political, and ethical dimensions of human life. Music encompasses all of it and takes all of it further, to the feelings of what happens to all of it when it is transformed into the dynamics of musical sound as each particular music in the world creates that dynamic. That is

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relation of music and affect and why music seems to cause affect as powerfully as it does. It pinpoints what underlies all the missteps that philosophers of music have made over the centuries by trying to explain musical affect at the level of emotion rather than the level of feeling. Acres of trees have lost their lives to the paper required for arguments about why and how some music is "sad" and about why we would willingly subject ourselves to such music when no one particularly wants to feel sad. A whole literature exists on this issue, a literature that, if not sad, is certainly depressing. Damasio's phrase allows us to escape this musical and philosophical black hole.

Sadness is an emotion. Music can certainly indicate sadness or other easily identifiable emotions—what Peter Kivy calls "the garden variety emotions" (1984, *passim*). Similarly, music can indicate various images, stories, or events. Music is very poor at this kind of delineation, but it does it nevertheless. That is not its primary function, however; all such delineations can be accomplished as well, if not much better, in a great variety of other ways. What music does, as nothing else can, is *make some-*

seasons or *An Appalachian Spring*; or social/political/moral/religious statements, all of them framed in the animated energies that music brings to awareness. The intricacies, specificities, and exactitudes of what happens to musical sounds, as composers, performers of compositions, conductors, improvisers, and arrangers choose to make the sounds happen, is what our brains and bodies process as feeling at the level of consciousness. We cannot adequately label with words the feelings that we undergo as the sounds happen in the course of musical experience because our conscious undergoing of them cannot be captured in the delineative manner in which language functions. As Martha Nussbaum puts it in her monumental book on emotion, *Upheavals of Thought* (2001), it is an "important recognition that musical structures are not translatable into linguistic structures" (258–59). That is, what happens in music is not translatable into language. We willingly listen to sad music not to feel sad, but to go beyond sadness to where the music takes us. It takes us to the feelings of what happens which both contain sadness and transform it into musical experience—into musical

what makes music so special, I propose: its endless capacity to expand the intricacies, depths, breadths, and diversities of conscious awareness, made available to our minds and bodies through felt, sonic experiences.

Every musical experience that we have changes who we are. Although musical experience occurs in the present during which we are engaged in it, it also endures within us, in our brains and bodies. As brain research suggests, we are changed by each of our experiences: Our selfness accumulates as our experiences accumulate. Why else would we bother to learn anything, except that doing so transforms us beyond the immediacy of a particular learning experience? The brain's plasticity sees to that, allowing us not only to know within a particular experience of music and everything else in our lives but also to develop, to become, to evolve in our personhood, each of our experiences stamping itself indelibly with its contribution.

The Education of Feeling

We are back to learning and to the primary mechanism for it—education. In a

more profound way than I have ever before been able to grasp, brain research has deepened the meaning of a phrase that I encountered early in my career and have used all of my adult professional life: Music education is the education of feeling. In light of all I have said here, that well-known phrase can be viewed with renewed power. The education of feeling that music uniquely accomplishes by its employment of the significant unfolding of sounds is, as directly and abundantly as humanly available, an expansion of our humanity. That sounds dramatic and far from the technicalities of brain research. I am suggesting that there may very well be a defensible consilience of our biology and our devotion to music education.

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Bennett Reimer is a professor emeritus in the School of Music at Northwestern University. This article was originally delivered as a talk at the convention of the Music Educators' National Conference in April 2004.