

# Hearing, Seeing, and Perceptual Agency

Ingrid Monson

I'll begin by declaring my sensory solidarity with W. J. T. Mitchell. In asking, *What do pictures want?* he offered an explanation that is easily transposable to music:

Vision is as important as language in mediating social relations, and it is not reducible to language, to the “sign,” or to discourse. Pictures want equal rights with language, not to be turned into language. They want neither to be leveled into a “history of images” nor elevated into a “history of art,” but to be seen as complex individuals occupying multiple subject positions and identities.<sup>1</sup>

Musical sounds are complex individuals, too, and tired of being pushed around by a language—which has presumptuously thought of itself as the ultimate model of signification and mediation! The linguistic turn, after all, seemed to colonize ever-larger spheres of human activity under its sign: culture as text; the body as text; music as text; image as text. The antiphenomenology of Derrida, arguing that the difference between *différance* and *différance* is not audible, only writable (surely a disaster for music), had the audacity to find the very “possibility of conceptuality” to lie in “writing”—

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The online version of this essay provides links to the music and video files that I discuss. Please go to [criticalinquiry.uchicago.edu](http://criticalinquiry.uchicago.edu) and follow the links to this essay.

1. W. J. T. Mitchell, *What Do Pictures Want? The Lives and Loves of Images* (Chicago, 2005), p. 47.

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his metaphor for a system of relations.<sup>2</sup> It is as though the other senses are presumed incapable of the play of difference and, thus, inherently more essentialist.

More recently there has been a sensorial turn in anthropology, which aims to overturn linguistic hegemony and, with it, linguistic models of culture. Borrowing a phrase from the philosophy of Michel Serres, David Howes has proposed to unseat the “empire of signs” by fostering an “empire of the senses.”<sup>3</sup> It is easy to get caught up in this “sensual revolution,” especially when music is one’s object of study. How vindicating, after all, to have one’s phenomenological and affective needs supported by a rhetoric of liberation. But a concern with the senses and their irreducibility to language is nothing new, at least in the study of music and art.

Mitchell’s imaginative and perspicacious writings on iconology, the pictorial turn, and what pictures want offer a rich encounter with the history and theoretical implications of the image.<sup>4</sup> In music comparable issues occur. In music, Charles Seeger’s systematic musicology argues that the “linguocentric predicament” lies at the heart of all musicological study: “a large proportion of what is communicated by systems of human communication other than speech is not communicable by speech.” In other words, there is a disjunction between “music knowledge and feeling in music” and “speech knowledge of and feeling about music” that cannot be completely bridged. Seeger’s structural and systematic proclivities led him toward a universalizing framework for thinking about the interrelationships among concept and percept in which he posited a worldview as the interaction between “intellection of reality” and “feeling of reality.”<sup>5</sup>

In this essay I would like to develop the idea of something I call *perceptual agency*—the conscious focusing of sensory attention that can yield differing experiences of the same event. By agency I mean “the socioculturally mediated capacity to act,” and I refrain from confusing it with simple free will or resistance.<sup>6</sup> Agency is intimately connected with practice, in my view,

2. Jacques Derrida, “Différance,” *Margins of Philosophy*, trans. Alan Bass (1968; Chicago, 1982), p. 11.

3. David Howes, “Introduction: Empires of the Senses,” in *Empire of the Senses: The Sensual Culture Reader* (New York, 2005), p. 1.

4. See Mitchell, *Picture Theory: Essays on Verbal and Visual Representation* (Chicago, 1994).

5. Charles Seeger, *Studies in Musicology, 1935–1975* (Berkeley, 1977), pp. 23, 39, 47, 34.

6. I borrow Laura Ahearn’s succinct definition from her “Language and Agency,” *Annual Review of Anthropology* 30, no. 11 (2001): 112.

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since it is what people choose to do given the particular structural and discursive configurations in which they live.

Bourdieu's notion of practice envisioned the practical competence necessary to navigate everyday life, but its rhetorical extension into the practicing of musicians is not hard to see. The activity of practicing—mastering scales, rhythms, harmony, patterns, repertory, and style by repeating passages over and over again—is simply part of what it is to be a musician. Once musicians have this musical knowledge in their fingers (and ears), they may no longer have to think consciously about the things they drilled into their bodies through practicing. Thus mimesis and repetition—of live or recorded sources—lead to embodied knowledge and the freeing of the conscious mind for creative aesthetic discovery and expression.<sup>7</sup> Consequently, in my view, there are conscious, formerly conscious, and unconscious aspects involved in these creative processes.

I mostly discuss auditory perceptual agency in musical listening and performing, as well as the relationship between hearing and the mind. The similarities and differences between hearing and seeing in acts of perceptual agency are of particular interest here and also the inevitability of linguistic reports of that experience. I have chosen agency as a figure to organize my discussion because it indexes several strands of social and cultural theory that have been key to my intellectual trajectory. I have chosen perception for its ability to link the social, cultural, and scientific. Indeed, the larger question lurking behind this essay is, What is to become of social construction (not to mention the humanities) in an increasingly biological and technological episteme?

### Listening

To illustrate what I mean by perceptual agency I'd like you to engage in some perceptual acts yourself, via the internet. The first musical example is Lee Morgan's solo on "Ping Pong," a Wayne Shorter composition recorded by Art Blakey and the Jazz Messengers on 12 February 1961. In this passage you hear Morgan's exuberant solo accompanied by piano, bass, and drums (musical example 1).<sup>8</sup> In my jazz history courses I teach my students to listen from the bottom of the band up. In other words, I ask them to focus

7. See Pierre Bourdieu, *Outline of a Theory of Practice*, trans. Richard Nice (Cambridge, 1977). My use of practice theory is informed by its usage in anthropology. See Jean Comaroff and John L. Comaroff, *Christianity, Colonialism, and Consciousness in South Africa*, vol. 1 of *Of Revelation and Revolution* (Chicago, 1991), and Sherry B. Ortner, *Making Gender: The Politics and Erotics of Culture* (Boston, 1996).

8. See Wayne Shorter, "Ping Pong," *The Complete Blue Note Recordings of Art Blakey's 1960 Jazz Messengers* (Mosaic Records MD6-141, 1961). Personnel: Lee Morgan, trumpet; Wayne Shorter, tenor sax; Bobby Timmons, piano; Jymie Merritt, bass; Art Blakey, drums.

their listening first on the bass line, then on the ride cymbal of the drum set, and then on piano comping patterns—the typical elements that go into establishing the rhythmic feel or groove of the piece. Semiotically speaking, the rhythmic feel is an example of what Michael Silverstein calls reflexively calibrated metapragmatic discourse—in this case, musical lines that combine to provide a musical context or framework in which the emerging interactions between the solo and accompaniment take place.<sup>9</sup> You may have noticed as you listened that there is quite a bit of activity from the accompanying musicians as Morgan plays.

I would like you to listen to the solo again, this time focusing first on Blakey's drum accompaniment, then on Timmons's piano comping, and finally on Merritt's walking bass line. Although I have no doubt that you can manage this yourself, I have not been able to resist the coercive possibilities of digital technology. I've remixed the solo in musical example 2 to boost the drums in the first twenty seconds of the audio, the piano in the next twenty seconds, and the bass line towards the end. Please feel free to resist this transparent manipulation of your perceptual freedom by focusing on other parts of the texture as well. This, too, will teach you something about perceptual agency.

This practice of shifting the focus of attention is something that not only enriches the listening experience for audiences and consumers of recordings but is an integral aural skill for improvising musicians who must be able to locate themselves temporally and spatially and with respect to rhythm, harmony, melody, and the calls and responses of the other members of the band. The better one knows the tune the less conscious attention needs to be focused on the basics of its structure and the more attention can be freed up for aurally scanning other parts of the band for moments of improvisational opportunity. Perceptual agency as an embodied practice, it seems to me, is an aural skill central to musicians in many genres.

The ability to track individual lines in a musical texture is something that we usually take for granted, yet psychoacoustician Reinier Plomp has argued that the “most striking property of the hearing system is its ability to *analyze* the world of superimposed sounds and to separate them according to their various sources.”<sup>10</sup> The ability to track a musical line or to under-

9. See Michael Silverstein, “Metapragmatic Discourse and Metapragmatic Function,” in *Reflexive Language: Reported Speech and Metapragmatics*, ed. John A. Lucy (New York, 1993), p. 47. On music and metapragmatics, see Ingrid Monson, *Saying Something: Jazz Improvisation and Interaction* (Chicago, 1996), pp. 185–91, and R. Keith Sawyer, “The Semiotics of Improvisation: The Pragmatics of Musical and Verbal Performance,” *Semiotica* 108, nos. 3–4 (1996): 269–306.

10. Reinier Plomp, *The Intelligent Ear: On the Nature of Sound Perception* (Mahwah, N.J., 2002), p. 12.

stand a conversation after a third or fourth speaker joins is evidently a complex perceptual process that involves both analyzing the sounds heard and synthesizing them into a coherent stream. In experimental contexts, speech or tones intermittently interrupted by bursts of white noise are heard, nevertheless, as a continuous stream. Plomp calls this the *continuity effect*; Richard Warren terms it *auditory induction*. The human ear, evidently, has the capacity to reinstate sounds that have been masked by noise or other auditory interference and in the process create a more stable interpretation of the auditory landscape.<sup>11</sup>

I first became aware of this phenomenon when I played trumpet in the Klezmer Conservatory Band, and we all transcribed our parts from cassette copies of 78s. When the group would rehearse we would often argue about what was really on the 78s. Although the melody parts were generally audible, the accompaniment (or inner) parts were often difficult to hear over the hiss of the ancient recordings and the other musical parts in the ensemble. I noticed that most of us would complete a line whose beginning was clear, but whose ending was not, by focusing intensely on the part and filling the gap with a continuation that made musical sense to us, whether or not an instrument on the recording could actually be heard. The more we listened, the more we thought we heard. The band members inferred what *might* have been played and would argue with one another over whose completion was “correct.”

Albert Bregman’s concept of the *auditory streaming* effect is similar to the continuity effect. A sequence of alternating low and high tones when played at a slow tempo is heard as a single line. When the pace of the alternating tones increases sufficiently, the listener’s ear begins to hear two separate streams, one grouping the high pitches together and the other linking the low. Although at the slower tempo listeners can perceive the correct order of tones that are played to them, once the streaming effect kicks in, the hearer can no longer identify the actual sequence of pitches. Bregman’s research focuses on the automaticity of everyday listening and thus describes nonagentive (or unconscious) aspects of perception. The auditory streaming effect thus is not in itself an example of perceptual agency but is a phenomenon that musicians and composers have consciously employed in their creative activities.<sup>12</sup>

11. See Richard M. Warren, Charles J. Obusek, and John M. Ackroff, “Auditory Induction: Perceptual Synthesis of Absent Sounds,” *Science*, 9 June 1972, p. 1151; quoted in Plomp, *The Intelligent Ear*. Cognitive psychologists emphasize that it is the brain, not the ear, that produces the continuity, but I continue with the figure of speech more common in the humanities.

12. Bregman argues that “music often tries to fool the auditory system” by manipulating “factors that control the formation of sequential and simultaneous streams” (Albert S. Bregman,

The streaming effect is greater the larger the frequency separation between the two tones and the faster the tempo. When the perceptual system begins to hear the sequence of tones as two parallel streams, the ear fills in the missing pitches (interpreted as interrupted by the other tone) in each line. Psychologists view this as a reconstruction of the sounds on the basis of probability. Plomp argues that this is not a matter of moving from audition to conception but rather a more complex process in which our hearing system translates complex acoustical phenomena into perceptual images through a combination of both bottom-up and top-down auditory processing.<sup>13</sup>

### Seeing and Hearing

Lee Morgan's solo on "Ping Pong" drew attention to the way in which the process of listening is deepened by noticing the ear's capacity to shift attention while simultaneously hearing the ensemble as a whole. The music of Mali's revered Senufo bala artist Neba Solo provides further examples of perceptual agency.<sup>14</sup> The accompaniment part to his composition "Klema" is a pattern comprising of two interlocking melodies—one played by the left hand (musical example 3) and the other by the right hand (musical example 4). To successfully coordinate the hands, the bala player needs to also hear a composite pattern that integrates the two parts (musical example 5).<sup>15</sup> To play the pattern over and over again (just why is repetition so pleasurable?) is to focus at times on the composite pattern, at others on the left hand, at others on the right. Now and then Neba Solo interpolates a few notes of variation in the right-hand part, which enlivens the periodic cycle as he sings a poignant text of patience. To those who criticized his musical ambitions for what had traditionally been considered a humble village instrument, he says:

Although the day is far away, one day it will arrive.  
 Even if you talk behind my back, it won't hurt me.  
 Your criticism, like the millet that that blows away in the wind after  
 pounding,

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*Auditory Scene Analysis: The Perceptual Organization of Sound* [Cambridge, Mass., 1990], pp. 457, 460).

13. Bottom-up (data-driven) processing refers to the input producing sensation; top-down (conceptually driven) processing refers to the conceptual process of interpreting the sensation. This is roughly equivalent to passive and active, or nonagentive and agentive, respectively, but it should be borne in mind that some top-down processes are also unconscious. See Plomp, *The Intelligent Ear*, pp. 1, 7, 34–37, and Bregman, *Auditory Scene Analysis*, pp. 17–19.

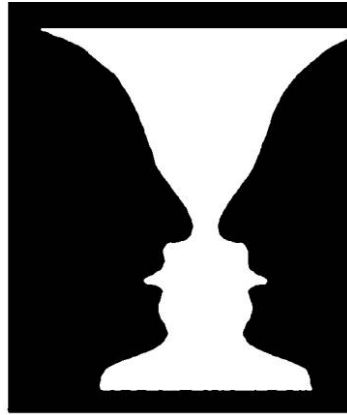
14. The bala is a wooden xylophone with calabash resonators. In French it is called a *balafon*, in Bamanankan, *bala*, and in Senufo, *cekiw*.

15. Musical examples 3–5 are my own performances.



FIGURE 1. Duck-Rabbit.

FIGURE 2. Rubin vase.



Like the leaves that have fallen from the trees, is light.

I will wait for the good day that God will one day give me.<sup>16</sup> [Musical example 6]<sup>17</sup>

A visual parallel to this interlocked form of attention shifting can be found in the visual illusion of the well-known image of the duck-rabbit, analyzed by Mitchell, which can be seen as a duck (with the head facing left) or as a rabbit (with the head facing right) (fig. 1).

Although viewers can control which image emerges by rotating their attention around the eye in the figure, they cannot see both animals at the same time.<sup>18</sup> The pleasure of images like this lies precisely in their ambiguity and the perceptual play they invite. Following psychological usage, Mitchell calls images of this type “multistable” and classifies them as one of three general types of metapicture. The duck-rabbit is not formally or generically self-referential but rather contextually self-reflexive—the simplest kind. The ambiguity stimulates the observer to engage in a perceptual play that does not have large ambitions but rather draws attention to the joys of the act of seeing itself.<sup>19</sup> Like the rhythmic feel or groove, it is a reflexively cal-

16. I am in the process of writing a book about Neba Solo that is based on ethnographic research in Mali and an ongoing collaboration and exchange that has included a short residency of Neba Solo’s group at Harvard University in November 2005 and a summer school class in Sikasso, Mali, in the summer of 2007.

17. Neba Solo Group, recorded by Ingrid Monson, Centre Culturel Français, Bamako, Mali, 19 Mar. 2005. Personnel: Neba Solo, solo bala, and Mahamadou Traoré, drum set.

18. Here I am skeptical of Wittgenstein’s claim that it might be possible to experience the duck-rabbit image as whole. See Mitchell, *Picture Theory*, p. 74. Although with practice it’s possible to rapidly shift between the images, there always seems to be a temporal lag between the images.

19. See Mitchell, *Picture Theory*. Mitchell discusses multistable images on pp. 45–48 and types of metapicture on pp. 56–57.

ibrated metapragmatics of perception. The shifting context is contained within the image or musical flow.

As in any theoretical framework, there are limits to which a metaphorical analogy can be stretched—boundaries to the insight provided by mapping one interpretive domain onto another. In comparing the accompaniment pattern of Neba Solo's "Klema" to the duck-rabbit, there is nothing comparable in the visual realm for the composite or resultant pattern (as it is often called) that serves as the framework for the temporal integration of the melodies of the right and left hand. This is clearer in another famous multistable image, the Rubin vase (fig. 2), which is perceived differently according to whether the observer takes the color black or white for the background. Although both multistable images (the duck-rabbit and the Rubin vase) are ambiguous, they seem to observe the gestalt principle of exclusive allocation: it is impossible to see both images at once.<sup>20</sup> The visual boundaries function in one direction or another but are not themselves independent objects of reflection.

In Neba Solo's accompaniment pattern, the composite pattern is a *third* term that literally adds the two melodies together and fuses them into a single stream, something like moving from stereophonic to monophonic.<sup>21</sup> It provides an additional stable point of view in the musical pattern. A musician's ability to hear the composite pattern as well as the left- and right-hand patterns is crucial to reliably maintaining the coordination of the parts in performative time, where the stability of the pattern may be threatened by the simultaneous performance of other musical ideas. If the perceptual shifting in the duck-rabbit is double (either-or), in "Klema" it is triple. The musician must be able to shift from the composite pattern to the left hand and right hand and back again. The resultant pattern consequently provides a phenomenological axis around which musicians can rotate their attention in the course of performance.<sup>22</sup>

The affinity between the visual and the musical as nonlinguistic modes of apprehension and practice is particularly apparent in Western musical notation, which is essentially a graph of pitch and rhythm that iconically represents pitch on an axis of higher and lower and rhythm on a mapping of time to space. When three notes subdivide the same time span as two notes, the former move more quickly than the latter. Although it has been customary in the Western tradition to speak of notation as music *writing*

20. For a discussion of exclusive allocation, see Bregman, *Auditory Scene Analysis*, p. 12.

21. I do not mean to imply that all of Neba Solo's music makes use of composite patterns; this is only one of many types of accompanimental patterns.

22. For additional examples of multistable aural phenomena or illusions, see Diana Deutsch, *The Psychology of Music* (San Diego, 1999), pp. 299–348.



(the genesis of which has generated an enormous amount of influential writing in musicology), it has always seemed to me that musical notation is as much about *imaging* music as it is about writing.<sup>23</sup> Indeed, much of the discourse in musical theory and analysis has been concerned with the visual representation of auditory arguments. Schenkerian graphs, which reduce a complex notational surface to its underlying structural motion (with elaborate visual symbols to convey the argument), provide an obvious example, but omnipresent charts, graphs, and spectograms also concern themselves with encapsulating a temporal flow into a spatial representation.

Figure 3 provides a notational representation of Neba Solo's accompaniment part in "Klema." The top two staves present the right-hand and left-hand patterns. The third staff represents the composite pattern that results from adding them up. Even if you don't read musical notation, you can see that the spaces where the rests occur (the small figures that could be seen as 7s) are more filled in in the resultant melody. You can also see at a glance that there are more notes in the same space in the third staff, from which can be inferred that the composite has a greater rhythmic density. I've reduced the resultant (composite) pattern by writing the left hand in the same octave as the right hand, which I would justify by arguing that hearing the resultant *rhythm* is of greater significance in facilitating temporal integration than the octave of the pitches. I've pulled a fast one, however, if I don't also tell you that playing the pitches in the same octave precludes the possibility of perceiving the hands as two separate parts be-

Klema Neba Solo

FIGURE 3. "Klema," by Neba Solo. Main accompaniment pattern. Key: Numbers refer to the slats of the bala ordered from the beginning of the pentatonic scale. T = hands together, r = right hand, l = left hand.

23. The classic essay on the development of musical notation, including its use of an iconic mode of pitch representation, is Leo Treitler, "The Early History of Music Writing in the West," *Journal of the American Musicological Society* 35, no. 2 (1982): 237–79.

cause I've eliminated the frequency separation that makes the individual parts audible. Notice also that there are only two points in the pattern in which the hands strike at the same time (marked with T for together).

In ethnomusicology and music theory the most detailed analyses of the perceptual interplay of musical parts and wholes (composites) have occurred in the study of West African drum ensembles, most notably in the musical genres associated with the Ewe, Akan, and Dagbamba.<sup>24</sup> In that context they are usually associated with 3:2 or 4:3 polyrhythmic patterns. "Klema"'s accompaniment part is not polyrhythmic in this sense but rather interlocking or hocketed. The parts do not stand in a rhythmically proportional relationship; yet, physically speaking, there are four strokes in the right hand to three strokes in the left. When played alone, the first stroke in each pattern can be heard as a downbeat. Their interlocking combination thus staggers the beginnings of each pattern, which then challenges the ear to decide which pattern's beat is *the* beat. Although bass parts generally define the beat in most American popular genres, the beat in this instance is defined in the right. The resultant pattern assists in coordinating the interlocking; that is, it helps in hearing the place where the two hands strike together and timing the offbeats of the second two strokes of the left hand. In teaching me to play this pattern Neba Solo sang the first three beats of the composite pattern (but only after I'd struggled for quite some time to find where the hands should meet and the offbeats fall).

Analyses of West African drum ensembles have generally been understood as analyses of rhythm when, in fact, the ability to hear a resultant rhythm as more than one part requires a pitch or timbral contrast between the musical ideas. West African drum ensembles from several traditions utilize a family of different-sized drums and percussion instruments, which produce rhythms at a variety of pitch levels. In Ewe ensembles, it is usual to hear the basic time-keeping pattern at a relatively high pitch on the bell or rattle, the supporting drum patterns at a medium pitch level, and the lead drum patterns and ideas on the lowest pitched drum. Meki Nzewi has called these patterns melo-rhythmic as a way of emphasizing the interplay of pitch and rhythm in music that has often been trivialized by Western critics as merely rhythm. Kofi Agawu has also criticized Western musical scholarship for making a fetish of rhythm in African music.<sup>25</sup> The melo-rhythmic quality of African drumming is crucial to the phenomenon of

24. Examples from this literature include Willie Anku, "Principles of Rhythmic Integration in African Drumming," *Black Music Research Journal* 17, no. 2 (1997): 211–38, and David Locke and Abubakari Lunna, *Drum Damba* (White Cliffs Media WCM-9508, 1996).

25. See Kofi Agawu, *African Rhythm: A Northern Ewe Perspective* (Cambridge, 1995) and "Representing African Music," *Critical Inquiry* 18 (Winter 1992): 245–66.

West African talking drums, which emulate the pitch contours (melodies) and phrase rhythms of tonal languages such as Yoruba and Dagbani.

David Locke's close analyses of the Dagbamba and Ewe drumming genres (in which he is an accomplished and experienced musician) have drawn attention to the perceptual fluidity of West African drum music. He suggests that musicians focus more on the whole of the ensemble than on their individual parts and that a good deal of the challenge of performance lies not in technique but perception. By this he means that the key skill is not the technical difficulty of playing a particular part but the perceptual ability to hear where it fits within the musical ensemble. The true test of whether a supporting drum player knows her or his part is whether or not he or she can successfully enter at the correct point in the underlying time line (the bell pattern) and maintain the pattern within the ensemble.<sup>26</sup>

One example of the "positive ambiguity of phrasing" that Locke discusses is the phenomenon of the mental reordering of a rhythmic phrase by shifting where the beginning of a pattern is heard. For beginning players the path to perceptual agency often develops in response to the perceptual confusion that arises after becoming embarrassingly lost in the musical texture. While playing the seven-stroke bell pattern in an Ewe drumming workshop many years ago, I noticed that even though I knew I had not wavered in my physical playing of the pattern, I now perceived the pattern to begin on stroke four rather than stroke one. I was disoriented because I could no longer hear the correct beginning of the cycle. Once I learned it was a matter of focusing my perception, not realigning my hands, I realized that if I was secure enough in the composite rhythm I could shift my ears from one rotation of the pattern to the other without becoming lost.

Recently Locke has described musical phenomena like this in African drumming as "musical cubism." By drawing attention to the perspectival complexity of the melo-rhythmic polyphony in the music of the Dagbamba and provocatively comparing it to a Western art movement that took much inspiration from African art Locke aims to emphasize the sculptural and geometric qualities of West African music.<sup>27</sup> The sculptural metaphor resonates deeply with the embodied experience of playing polyrhythms; a common description of playing a strong cross-rhythm compares it to the feeling of carving through the other parts or pushing against them.

26. See Locke, *Drum Gahu: The Rhythms of West African Drumming* (Crown Point, Ind., 1987), pp. 7, 23.

27. See Locke, "Cubism in African Music Improvisation," paper presented at the annual meeting of the Society for Ethnomusicology, 16–19 Nov. 2006. I thank Locke for sharing the yet-to-be-published manuscript of the article on which his talk was based.

### Science Meets the Humanities

The physicality of the image of carving brings to mind pianist Vijay Iyer's work on "embodied cognition." At the heart of this notion is the idea that cognition is an activity "that is structured by the body and its situatedness in its environment—that is, *as* embodied action." Iyer builds on work in cognitive science that has demonstrated the importance of "sensorimotor" couplings in the perception of rhythm. So connected are the aural and motoric in our minds that it is apparently not possible to imagine the rhythmic component of an auditory image (that is, hearing something in one's head) without involving neural pathways associated with motor activity. His broader review of the literature leads him to the conclusion that a combination of auditory, visual, and motoric sensibilities are deeply at play in musical perception. Consequently, Iyer argues that musical perception must be treated "to some degree as a practice."<sup>28</sup>

This sudden leap from the vocabulary of cognitive neuroscience to that of social and cultural theory opens the door toward thinking about the productive interdisciplinary conversations that could arise between the humanities and sciences. If the specter of science has often implied to humanists the objectivism Bourdieu desired to move beyond through the ideas of practice and *habitus*, the genetic determinism that ideas of social and discursive construction sought to overturn, the structuralism that Anthony Giddens's open-ended and recursive structuration theory endeavored to undermine, and the metaphysics of presence that Derrida deconstructed, I have been pleasantly surprised to discover that much in the recent wet mind cognitive neuroscience literature resonates with themes that have dominated debates in social and cultural theory in the last twenty years, including poststructural understandings of the subject, ideas of social construction, contingency, and processes of emergence.<sup>29</sup>

Take Gerald Edelman's indeterminate account of how neural processes give rise to consciousness. "There is no single circuit activity or code that corresponds to a given conscious 'representation.' A neuron may contribute to that 'representation' at one moment, and in the next have no con-

28. See Vijay Iyer, "Microstructures of Feel, Macrostructures of Sound: Embodied Cognition in West African and African-American Musics" (Ph.D. diss., University of California, Berkeley, 1998), pp. 24, 30–31, 101. Iyer is now a very highly regarded jazz pianist and composer, whose activist musical artistry deserves attention in its own right. See [www.vijay-iyer.com](http://www.vijay-iyer.com). For an earlier example of a cross-culturally oriented approach to music and cognition, see Elizabeth Tolbert, "Theories of Meaning and Music Cognition: An Ethnomusicological Approach," *The World of Music* 34, no. 3 (1992): 7–21.

29. See Bourdieu, *Outline of a Theory of Practice*; Anthony Giddens, *The Constitution of Society: Outline of the Theory of Structuration* (Cambridge, 1984); Derrida, "Différance"; and Stephen Kosslyn and Olivier Koenig, *Wet Mind: The New Cognitive Neuroscience* (New York, 1992).

tribution to make.<sup>30</sup> For any given mental image, in other words, there can be several (even hundreds, thousands, or millions of) different underlying neural states, depending on the context of interaction (with the body or environment) and the particular individual.<sup>31</sup> Edelman views consciousness as arising from what he calls “reentrant interactions” between brain areas involved in mediating memory and perception. These reentrant interactions are indeterminate (more than one pathway can produce a particular outcome) and make possible the spatiotemporal correlation that leads to consciousness.<sup>32</sup> Like Derrida’s *différance*, in other words, the conscious experience of reality seems to arise from differing and deferring, that is, the systematic play of difference in and over time.<sup>33</sup> But, unlike Derrida, there is no need to avoid the sensory because it is not about presence but rather the brain’s construction of a coherent picture that fills in missing information and is guided by sensory input from the world, memory, a network of relations in the brain, and sociocultural context.<sup>34</sup> Consciousness, in other words, is emergent, constructed, and phenomenological.

My interest in the literature on perception and cognitive neuroscience has been driven by twin circumstances: my engagement with the music of Nebo Solo, which so creatively makes use of aural illusions and perceptual ambiguities, and the pronouncement by a former president of the university that employs me that the lack of gender diversity in science was more likely due to genetic disadvantage in mathematical skill and an unwillingness to work eighty-hour weeks than a discriminatory environment.<sup>35</sup> Although I had presumed that many scientists at Harvard would be supportive of Lawrence H. Summers—they after all had benefited from his financial investment in science—I soon discovered that many were critical of his thinking on scientific grounds.

The implications of work on the human genome, it seems, have stimulated a critique of reductionist models of the relationship between genetic code and the development of organisms. A central component of antireduc-

30. Gerald M. Edelman, *Wider Than the Sky: The Phenomenal Gift of Consciousness* (New Haven, Conn., 2004), pp. 106–7.

31. Kosslyn, in conversation with the author, 24 Apr. 2007, wrote that the number of different neural states producing an outcome could be in the millions.

32. Edelman describes them as “degenerate,” meaning that widely different neuronal groupings can carry out the same function or produce the same output. See Edelman, *Wider Than the Sky*, pp. 154, 174. The inverse is also true; the neuronal grouping can produce a variety of outcomes.

33. See *ibid.*, pp. 106–7, and Derrida, “Différance,” p. 11.

34. See Edelman, *Wider Than the Sky*, pp. 124–25.

35. See Lawrence H. Summers, “Remarks at NBER Conference on Diversifying the Science and Engineering Workforce,” 14 Jan. 2005, [www.president.harvard.edu/speeches/2005/nber.html](http://www.president.harvard.edu/speeches/2005/nber.html)

tionist biological arguments concerns the switching on and off of particular genes in response to environmental, that is, extraorganismic factors.<sup>36</sup> Susan Oyama's description of the complex interrelationships among genes, organism, and environment sounds as if it could have been written by Derrida or Bourdieu.<sup>37</sup> "Change, then, is best thought of not as the result of a dose of form and animation from some causal agent, but rather as a system alteration jointly determined by contemporary influences and by the state of the system, which state represents the synthesis of earlier interactions. The functions of the gene or of any other influence can be understood only in relation to the system in which they are involved." She also writes: "Decisions' are not written in the nucleus but are made on the basis of developmental contingency."<sup>38</sup> Although there are conflicting views on the topic—Watson argues, for example, that despite the contingency of biological development scientific reductionism has not been undermined—the emphasis on processes of emergence and genetic-environmental interactions in recent literature would seem to offer interesting possibilities for intellectual engagements among humanists, scientists, and social scientists.<sup>39</sup>

For music, the cognitive literature seems to offer a way to luxuriate in the sensuous lushness of musical sound itself, without losing the complex understandings of mediation, discourse, social construction, and emergence that have been the product of the language- and text-oriented interpretive paradigms that have prevailed in the humanities and anthropology in the last twenty years. Poststructuralist interpretive frameworks have seemed to require conceptual suppression of the phenomenological character of music—by thinking of it as text or discourse—in order to reap the benefits of the complex understanding of relationality that is produced by thinking of a system as produced by semiotic interplay.<sup>40</sup>

Releasing complexity and relationality from the metaphor of text or writing (by drawing on contingent understandings of sensory experience) would seem to open a space for understanding aurally transmitted musics without retreating into the common romance of sensory immediacy that so often accompanies discussions of music's special properties. Thomas

36. For an account of genetic switching accessible to humanists, see James D. Watson and Andrew Berry, *DNA: The Secret of Life* (New York, 2003), pp. 209–10, 224–27.

37. Derrida, because of the systematic play of difference; Bourdieu because of the similarity between *habitus* and the idea of a process of synthesis.

38. Susan Oyama, "The Problem of Change," in *Brain Development and Cognition: A Reader*, ed. Mark H. Johnson (Cambridge, Mass., 1993), pp. 26, 25. I thank Stephen Kosslyn for sending me this article.

39. See Watson, *DNA*, pp. 201–2.

40. I attempted to bridge this gap in my *Saying Something*, pp. 207–9, by speaking of a discursivity in music that is phenomenal.

Turino, for example, uses a Peircian framework to argue that music's emotional power is due to the fact that its signs operate at the levels of Firstness and Secondness, rather than Thirdness. In Turino's argument, icons and indices are less mediated than signs and hence more direct and emotional.<sup>41</sup> As the studies of perception discussed here have shown, the complexity of the relationships among body, brain, and aural images makes clear that sensory experience itself is highly mediated, whether or not linguistic mediation is present.

In addition, the idea that certain types of music are more visceral and direct than others has often mapped a Cartesian view of the mind/body problem onto racial categories in a remarkably durable discursive configuration. As Simon Frith's cogent exposition of this problem notes, in rock music criticism a series of dialectically defined binaries—low/high, body/mind, rhythm/harmony, black/white, sexual/contemplative, primitive/complex—has tended to construct African American music as the space of the “untrammled id,” instinctive and free, low and vital, and consequently a fetishized space of authenticity for those wishing to cast off bourgeois inhibitions.<sup>42</sup>

In this context one of the most appealing qualities of the new cognitive science is its insistence that the mind is of the body and that sensory and emotional feeling are integral to reason itself.<sup>43</sup> Judith Becker's sophisticated use of this literature to explore music, emotion, and trance cross-culturally illustrates that appealing to scientific studies to revise the legacy of Cartesian dualism need not result in a reduction of musical experience to scientific parameters or lessening the importance of cultural experience for musical and religious expression. As she notes, the emerging view of consciousness as produced through an “interaction with the world through perception and action” recontextualizes the philosophical legacy of Merleau-Ponty and Heidegger.<sup>44</sup>

My suggestion is not that we replace the interpretive paradigms that have shaped interdisciplinary dialogue across the humanities and social sciences with discourses of cognitive neuroscience but that we allow them to mingle and see what happens. As Bakhtin once put it, “the living utterance, having taken meaning and shape at a particular historical moment in a socially

41. See Thomas Turino, “Signs of Imagination, Identity, and Experience: A Peircian Semiotic Theory for Music,” *Ethnomusicology* 43, no. 2 (1999): 232–34.

42. Simon Frith, *Performing Rites: On the Value of Popular Music* (Cambridge, Mass., 1996), pp. 129, 123–44.

43. See Antonio R. Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (New York, 1994).

44. Judith O. Becker, *Deep Listeners: Music, Emotion, and Trancing* (Bloomington, Ind., 2004), pp. 111, 118–19.

specific environment, cannot fail to brush up against thousands of living dialogic threads.”<sup>45</sup>

### Biology?!

Despite the dynamically contingent understanding of the human consciousness, perception, and development present in the scientific literature, readers of the *New York Times* are more likely to take away the impression that recent science supports a revived sociobiology viewing behavior as genetically determined. A recent example is provided by Dennis Overbye’s “Free Will: Now You Have It, Now You Don’t,” which cites a bevy of scientific opinions and studies to argue that “the conscious mind is like a monkey riding a tiger of subconscious decisions and actions in progress, frantically making up stories about being in control.” Relying on studies showing that the brain fires signals before a research subject is consciously aware that she has chosen to move, Overbye argues that since the conscious brain is “only playing catch-up,” free will is an illusion.<sup>46</sup> Consequently, his inability to resist the molten chocolate cake on the dessert menu is a foregone conclusion. That a more dynamic view of the interplay between thought, action, brain, and moral decision might exist in the literature could not be learned here. The humor provoked by linking the theme of predestination with chocolate illustrates the rhetorical opportunities journalists have found in this discourse of neodeterminism. A few days later Maureen Dowd lampooned George Bush by citing several passages from Overbye’s article to ask whether the Decider’s actions were based on his “genetic and political coding.”<sup>47</sup>

Oyama explains why she continues to beat the apparently dead horse of determinism by reiterating what scientists supposedly agree on: development is a matter of interaction among genes, environment, and the organism: “I would like nothing better than to stop beating him,” she writes, “but every time I think I am free of him he kicks me and does rude things to the intellectual and political environment. He seems to be a phantom horse with a thousand incarnations, and he gets more and more subtle each time around.”<sup>48</sup> The durability of these sociobiological discourses is precisely why the humanities and social sciences cannot ignore them. We can expect to have our social constructionist arguments challenged by this popular neo-

45. M. M. Bakhtin, *The Dialogic Imagination: Four Essays*, trans. Caryl Emerson and Michael Holquist (Austin, 1981), p. 276.

46. Dennis Overbye, “Free Will: Now You Have It, Now You Don’t,” *New York Times*, 2 Jan. 2007, p. F1.

47. Maureen Dowd, “Monkey on a Tiger,” *New York Times*, 6 Jan. 2007, p. A15.

48. Oyama, “The Problem of Change,” p. 21.



sociobiology. Consequently we might as well make use of the full array of interdisciplinary responses available to us.

On this too Mitchell has been a few years ahead. In “The Work of Art in the Age of Biocybernetic Reproduction” he draws attention to the interface between biology, cybernetics, and art in a manner that provocatively suggests that our twenty-first century postmodern historical moment is quite different from the modernist age that came before us. “The epithet for our times, then, is not the modernist saying, ‘things fall apart,’ but an even more ominous slogan: ‘things come alive.’”<sup>49</sup>

### Seeing and Hearing Neba Solo

The least appealing quality of the literature on cognitive neuroscience is its inability to deal with questions of power, politics, prestige, and aesthetics. Explaining one or two musical patterns from the complex textures of Neba Solo’s music provides a glimpse into the organization of his music but can neither explain the dynamics of a larger performance event nor address the history and power relationships in which it is embedded.<sup>50</sup> My use of the term *perceptual agency* to describe what the psychology of perception literature calls attention or cognitive control has deliberately deployed *agency* to index well-known debates in anthropology, ethnomusicology, and social theory about the relationship of individuals and groups to the dynamics of power in which they live. Perceptual agency from this perspective is what people choose to do with musical sounds given the sensory inputs, the manifold cognitive processing possibilities of the brain, and the sociocultural contexts in which they listen and perform.

The perceptual agency required in the creation of interlocking bala parts occurs for Neba Solo in a broader array of social and cultural practices that come with living in southeastern Mali. For those spending long days herding cattle or hoeing fields, the bala continues to provide one of the principle means of self-entertainment in agricultural and herding villages. Neba Solo has described playing the bala alone and in groups for long hours, driven by the joy and challenge of exploring the possibilities of the instrument, including those puzzling multistable musical patterns that sound in a variety of ways. There is a joy in repetition and its sensory satisfaction for many who persist in music that borders on the obsessive. Neba Solo describes the instrument as his “first wife.”<sup>51</sup>

Neba Solo (b. 1969), whose given name is Souleymane Traoré, was raised

49. Mitchell, *What Do Pictures Want?* p. 335.

50. I have been working ethnographically with Neba Solo since 2002. The politics and full contextualization of this work will be the subject of a longer work.

51. Neba Solo, interview with author, Sikasso, Mali, Feb. 2005.

in the village of Neba, which is twenty-five miles northeast of Sikasso in southeastern Mali. Sikasso is Mali's second largest city (fig. 4). The Kenedougou region (as the area around Sikasso is known) is one of Mali's richest agricultural areas (known for cotton, rice, millet, corn, vegetables, and fruit) and has the country's highest annual rainfall (fifty-five inches per year). The landscape is savannah—rolling hills with shrubs and widely spaced trees. Agricultural labor is done by hand and is backbreaking. As a child, Neba Solo herded cattle and learned to be a farmer as well as a musician. He was not sent to school but became literate as an adult through taking a course



FIGURE 4. Map of Mali.

on how to write Bamanankan (Bambara), one of three languages that he speaks (Senufo, Bamanankan, and French).

His father, Zano Traoré, was a well-respected village musician who very early on recognized his son's extraordinary talent. As a child Neba Solo learned all the instruments used in the Kenedougou region including the bara drums (small and large), the tchatchara, the karinyan, the bala, and the kamelngoni. As a teenager he and his older brother Ousmane formed a group that played for all sorts of celebrations, festivals, dances, naming ceremonies, funerals, weddings, and other social events at villages throughout the Kenedougou region. Souleymane's reputation quickly spread by word of mouth and soon people were asking each other whether they had heard the Solo (short for Souleymane) from Neba. Soon everyone was calling him Neba Solo. Although his music sounds traditional (to Western ears) by virtue of its acoustic instrumentation, it actually represents Souleymane Traoré's professionalization of traditional Senufo music.<sup>52</sup>

When he was eighteen years old (in 1987), Neba Solo listened to Alpha Blondy's reggae recording of *Jersuaalem* as he walked through the streets of Bamako. He was particularly enchanted by the bass line and decided to build a bala with added bass notes when he returned home. His father and other Senufo were at first skeptical of the changes he wanted to make to the instrument. In order to proceed with his ideas, by Senufo tradition, Solo had to secure his father's permission. They came to an agreement: his father allowed him a period of time in which to develop his ideas and make a recording. If the results pleased his father, Zano Traoré would give his blessing to his son's musical direction. Solo added three bass notes to the traditional seventeen keys and also experimented with various tunings. First and foremost, he wanted to expand the role of the bass line in his music. In the end his new version of a traditional Senufo tune with an expanded texture and new tuning earned the approval of both his father and local audiences.<sup>53</sup>

The new style reconfigured the musical ensemble. Instead of three balas—one for bass, one for treble, and one for accompaniment—Solo used two balas. The accompaniment parts were shared between the two instruments in the following manner. His brother Siaka Traoré on the treble bala generally improvises melodies with his right hand while playing accompaniment parts with the left hand. Neba Solo on the bass bala usually improvises bass lines with his left hand and plays accompaniment parts with his right hand. The interplay between the two brothers creates a rich contrapuntal texture between interlocking multistable parts. What is particu-

52. Neba Solo, interview with author, 12 Jan. 2005, Sikasso, Mali.

53. Neba Solo and Yacouba Traoré, interview with author, 12 Jan. 2005, Sikasso, Mali.

larly remarkable in performance is their rich variety of modulating from one configuration of parts to another (frequently at a faster tempo). This new contemporary sound for the bala modernized an instrument that had been dismissed by urban dwellers as a primarily village instrument that was unsuitable for modern (professionalized urban) music. Indeed, to understand the respect in which Neba Solo is now held, one needs to know that when he first came to Sikasso many dismissed him as a player of the *fali gala kala* (“donkey harness”). When the group was scheduled to play at the anniversary of Radio Kene in Sikasso, the director of the station took one look at the balas and bara drums (signs of the village) and asked the performers to leave the stage. They began to play offstage and won over both the audience and the director, who now takes credit for bringing them to Sikasso.<sup>54</sup> In this sense, Neba Solo has become a figure of particular pride for the people of Kenedougou, who live in the dozens of small villages surrounding Sikasso.

### Neba Solo in Performance

Neba Solo’s compositions, like those of many Malian singers and instrumentalists, comment on contemporary social and public health issues, such as vaccination, AIDS, female excision, protecting the environment, and political corruption. He views part of his mission as a performer and composer as sensitizing people to important ethical and political issues of the day, as well as alerting them about what they should do to keep themselves healthy. Neba Solo’s composition “Yiri” is both an homage to trees and a call for environmental responsibility. The lyrics open with a poetic image:

The leaf that falls from a tree does not decompose the day it falls into  
the water.

The well will get deeper as it quenches our thirst.

Those who plant orchards we salute you for thinking of the future.

For the person who plants trees nourishes and saves many souls.<sup>55</sup>

The song recounts the richness of the gifts of trees from shea butter, to medicine, to food, and urges people to honor and respect them as living beings and to refrain from burning them in the countryside, which will ultimately cause deforestation and desertification.<sup>56</sup> Neba Solo’s social message is personalized by testifying to all the things that he has received as the

54. Neba Solo, interview with author, 16 Feb. 2006, Sikasso, Mali.

55. My English version of the lyrics is based on Yacouba Traoré’s translation to French from Bamanankan.

56. In Mali it is not uncommon to see fires alongside the road in the dry season. In some cases people set fires to chase game from the brush; more problematically, some people set them for fun.

result of trees—for the bala itself is made of wood. He and his band members are especially proud that the Senufo only use the wood of trees that have died naturally, often many years before it is used to make bala keys.

The accompaniment patterns to “Yiri” illustrate the ensemble’s style. The song opens with an accompaniment part played on the treble bala (musical example 7), which interlocks with a second accompaniment part played by Neba Solo on the bass bala (musical example 8).<sup>57</sup> The interlocking parts of two balas thus create a texture that is doubly interlocking: the product of two, two-handed parts. A performance of “Yiri” in a concert in Sanders Theatre at Harvard University on 10 November 2005 illustrates the parts in a larger performative context. Although the two interlocking bala patterns will form the central point of departure for the first section of the composition, the performance begins with an extended introduction in which we hear Siaka Traoré (Neba Solo’s younger brother) play the treble accompaniment as a background for Neba Solo’s solo on the bass balafon. Neba Solo cues the beginning of the song by playing a melody in octaves, which signals the band to enter. After the band begins, Neba Solo begins playing the bass accompaniment part (that you heard in musical example 4), which accompanies the song. It should be noted that Neba Solo’s ability to sing and play the bala at the same time is considered especially remarkable (musical example 9).<sup>58</sup>

A final aspect of the performance style of Neba Solo’s group to consider is the extraordinary dancing of Bocary and Ibrahim Dembele, two brothers from Denderesso, a village located seven miles southwest of Neba. They are an integral part of the group’s performances, and their dance style represents a professionalization of traditional Senufo dance steps. Although innovations in the steps are their own, they both credit Neba Solo for choreographing the way they are combined with the music.<sup>59</sup> The various steps become more complex and dazzling as the music changes sections and increases in tempo. Through their tight synchronization (which is not typical in village dancing) the dancers make visible the intricacy of Neba Solo’s music and the accelerating energy of the group’s performances. The virtuosic sections of dancing are usually accompanied by bala improvisations traded between Neba Solo and his brother Siaka.

In a video recording of the final section of the song “Tchekisse,” played

57. Musical examples 7 and 8 are my own performances.

58. Neba Solo Group, Sanders Theatre, Harvard University, 10 Nov. 2005. Personnel: Neba Solo, bass bala; Siaka Traoré, treble bala; Yacouba Traoré, karinyan; Lamissa Traoré, tchatchara; Mahamadou Traoré, drum set; Zatien Gonsogo, low bara drum; Oumar Coulibaly, high bara drum; Idrissa Dembele, traditional violin; Bocary Dembele, dancer; Ibrahim Dembele, dancer. For additional information and musical examples, see [www.nebasolo.net](http://www.nebasolo.net)

59. Bocary and Ibrahim Dembele, interview with author, 18 Apr. 2005, Sikasso, Mali.

at the Sanders Theatre performance, we first hear Neba Solo sing the word *tegere* (“clap your hands”). When the band reenters at a vastly increased tempo the dancers launch into their most intricate sequence of steps, and we hear the audience become animated. As Bocary and Ibrahim Dembele dance, the two *balas* take turns improvising. Siaka Traoré (on the right) begins. Neba Solo (on the left) follows substantially later. He cues the transitions that lead to a return of the song (video example 1).

### Conclusions

The vividness of performance in its full dimensions—auditory, visual, and embodied—reminds us that no account of musical processes focusing solely on analyzing its microcomponents will ever succeed at fully explaining why such an event can be so moving. Although much can be gained by thinking about auditory perception, a cognitive approach to musical materials can also be overly specific and culturally decontextualizing. It is difficult to write about the perceptual details of listening, after all, without drifting into universalizing linguistic registers that, on the one hand, speak abstractly of the body or the ear and, on the other, become personal and introspective by relying on one’s own perceptual experience.

Nevertheless, it is also true that the path of musicians from many different cultures often begins with the sheer delight of hearing musical ideas, and, through the attempt to create and mimic them, we can discover the perceptual complexities and possibilities that make music of all types so endlessly fascinating. The effort and challenge of mastering these perceptual and physical complexities creates mental as well as emotional and bodily satisfaction. In the exceptional musician (who lives in a context in which she or he can develop), the obsessiveness of practicing and discovering often becomes a way of life.

My focus on perceptual agency in this essay has been an attempt to connect these microprocesses of musical contemplation and experience with larger contexts of social and cultural life. I have done so by noting the conspicuous overlaps between poststructural social and cultural theories that have been influential during the last thirty years and the emerging new cognitive science that is just as interested in the emergent, contingent, and phenomenological aspects of human experience. In this I disagree with Howes, who has suggested that a cultural perspective on the senses needs to “recover perception from the laboratory.”<sup>60</sup> There are simply too many points of potentially productive dialogue between science and the humanities (and social sciences) to ignore. As recent discoveries suggesting that emotion not

60. Howes, “Introduction,” p. 4.

only does not impede reason but is *necessary* for rational decision making become more well known, the traditional concerns of the humanities and cognitive neuroscience have never been closer.<sup>61</sup> I do not believe that an interdisciplinary dialogue with science undermines our traditional expertise in textual analysis, history, philosophical understanding, religion, ethnography, or the analysis of power, ideology, and its cultural symbolics.

As I reread Mitchell's works while preparing for this essay, I realized how deeply our intellectual interests have overlapped, even before the point in time when I actually began reading him. I ascribe this to a common position shared by scholars of the visual and musical arts that comes from knowing deeply that the sensory aspects of our subject matter are crucial to its modes of understanding, and yet so difficult to translate into language-centered modes of scholarly communication. The theoretical tradition that has taken language, semiotics, and pragmatics as a model of complex relationality has been extremely helpful in beginning to bridge the divide between code and context, formalism and interpretation, and aesthetics and politics. It was not for nothing that my first book, *Saying Something*, explored the possibilities and limitations of assessing the overlaps between music, language, and poststructuralism.

Nevertheless, my own sensory musical knowledge—the outcome of a lifetime of practicing various instruments and listening—has led to the conviction that there is something deeply relational about music that is neither, as Mitchell has observed, “reducible to language, to the ‘sign,’ or to discourse” nor explainable by a romanticized view of sensation as unmediated and direct. Rather, the education of one's perception that accompanies musical training and experience and that can take a variety of directions (rhythmic, timbral, melodic, harmonic, contrapuntal), according to the particular demands of the instrument, genre, and culture in question, must surely be recognized for the sensory mastery and knowledge that it is. That mastery, in whatever stylistic tradition it occurs, develops a capacity for perceptual agency (and agencies) that is truly human and truly remarkable.

In a nutshell, sensory knowledge and practice is produced and constructed by our capacity as a species for sensory perception in its aural, visual, tactile, olfactory, and gustatory modalities and its complex interplay with our minds, emotions, capacity for language, movement, and sociocultural context. I look forward to the work of the next generation of musical and visual scholars that will surely develop more multimedia genres of scholarly presentation and undoubtedly get much closer to presenting hearing and seeing as the “complex individuals occupying multiple subject positions” that they surely are.

61. See Jonah Lehrer, “Hearts and Minds,” *Boston Globe*, 29 Apr. 2007, pp. E1, E3.