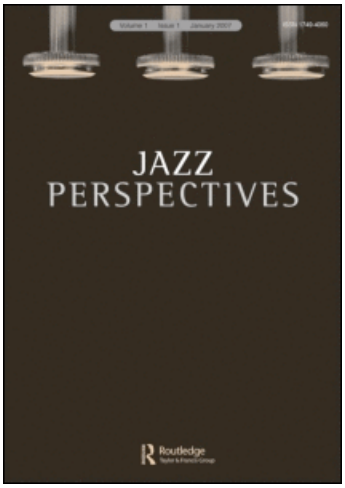

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Free Jazz in the Classroom: An Ecological Approach to Music Education

David Borgo

Abandon Knowledge About Knowledge All Ye Who Enter Here.

Bruno Latour[1]

Conventional Western educational practice hinges on the notion that knowledge—or at least knowledge worth having—is primarily conceptual and hence can be abstracted from the situations in which it is learned and used. I recently came across a helpful illustration of this general tendency while watching Monty Python reruns. The sketch involved a caricature of a British talk show called "How to Do It." John Cleese served as the show's host:

> Well, last week we showed you how to become a gynecologist. And this week on "How to Do It" we're going to show you how to play the flute, how to split an atom, how to construct a box girder bridge, how to irrigate the Sahara Desert and make vast new areas of land cultivatable, but first, here's Jackie to tell you all how to rid the world of all known diseases.

After Eric Idle solves the global health crisis in a sentence or two, John Cleese explains "how to play the flute": "Well here we are. *(Picking up a flute.)* You blow there and you move your fingers up and down here." Turning again to the camera, he concludes the show with a teaser for the next installment:

> Well, next week we'll be showing you how black and white people can live together in peace and harmony, and Alan will be over in Moscow showing us how to reconcile the Russians and the Chinese. So, until next week, cheerio.[2]

Certainly no music educator—or cultural studies researcher, for that matter—would subscribe fully to the show's pedagogical orientation. Nevertheless, the humor works because the viewer realizes that the show presents a gross exaggeration of the dominant educational philosophy in the West, which has notoriously underappreciated the physical, psychological, and social dimensions of the learning experience. But a small revolution is currently well underway in several different academic circles, involving a conceptual shift from knowledge as *stored artifact* to knowledge as *constructed*

[1] Bruno Latour, *Science in Action* (Cambridge, MA: Harvard University Press, 1987), 7.
[2] *Monty Python's Flying Circus*, "Whicker's World" (episode 28), recorded on 28 January 1972, first transmitted on 26 October, 1972 (BBC).

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capability-in-action.[3] From this perspective, what people perceive, how they conceive of their activity, and what they physically do all develop together. Learning, in other words, cannot be conceived of simply as transmitting or receiving factual knowledge, rather it must be viewed as a process that involves becoming a different person with respect to possibilities for interacting with other people and the environment. Ultimately, learning is not a matter of what one knows, but who one becomes. And improvisation, I argue, plays a defining role in this new paradigm.[4]

With an intellectual history in what are known as "systems" or "ecological" theories, this emerging pedagogical orientation insists that "knowledge" can never be abstracted from the dynamic complexities involved in learning and applying it.[5] In other words, knowledge, when viewed from an ecological perspective, is "co-constituted" by the knower, the environment in which knowing occurs, and the activity in which the learner is participating. In the technical lingo increasingly shared by researchers in psychology, education, and cognitive science, knowledge is "embodied," "situated," and "distributed": "embodied" in the sense that mind is not only rendered possible by our bodily sensations and actions but is in fact coextensive with them; "situated" in the general sense that all knowledge is in part a product of the activity, context, and culture in which it is developed; and "distributed" because knowledge as action rather than artifact exists not simply in the mind of the individual, but rather as something shared between individuals in a physical and social setting.

Among the various music disciplines, ethnomusicology has been a beacon for this type of approach for decades, due to its primary focus on ethnographic studies that emphasize apprenticeship in order to reveal the indivisible character of learning and practice.[6] The jazz community has also traditionally valued a type of learning that might easily be called embodied, situated, and distributed. Numerous performers have stressed the full integration of aural, physical, and intellectual aspects of the music, as well as the notion that learning and development can only occur within a supportive community.[7] The Association for the Advancement of Creative Musicians (AACM) founded by Muhal Richard Abrams and others in Chicago, and the Creative Music Studio (CMS) founded by Karl Berger in Woodstock, New York, are only two of the better-known examples of this general pedagogical

[3] This conceptual shift can be observed in disciplines as diverse as systems theory, ecological psychology, creativity studies, cognitive science, education, artificial intelligence, and robotics.

[4] For a helpful introduction to this pedagogical orientation, see R. Keith Sawyer, "Improvised Lessons: Collaborative Discussion in the Constructivist Classroom," *Teaching Education* 15, no. 2 (2004): 189–201.

[5] For a very readable introduction to systems science, see Ervin Laszlo, *The System View of the World: A Holistic Vision for Our Time* (Cresskill, NJ: Hampton Press, 1996).

[6] For an ethnomusicological perspective on situated cognition, see Lyle Davidson and Bruce Torff, "Situated Cognition in Music." *The World of Music* 34, no. 3 (1992): 120–139.

[7] For a detailed ethnographic account of the process of learning and playing jazz, see Paul Berliner, *Thinking in Jazz: The Infinite Art of Improvisation* (Chicago: University of Chicago Press, 1994).

orientation.[8] In the traditional music academy, however, the study of improvisation has often been shoehorned into conventional pedagogy and curricula or simply not addressed at all.[9]

In his book *The Wisdom of the Impulse*, Tom Nunn laments that "[Improvisation] may be acknowledged—in a way akin to chicken soup as a cure for a cold (it can't hurt)—but it is not taken seriously. It may be presented in some extramusical way, such as notation, analysis, etc., but as an expression of composition, it goes unrecognized."[10] Even more pessimistically, Jonty Stockdale writes: "The ability to improvise freely is a common skill applied whether in conversation, role-play, movement, dance, or the playing of games, and yet it is an ability that is seemingly suppressed through the conventions of music training."[11]

This lack of innovation within the pedagogy of improvisation partly results from the fact that our academic approaches to music education have not always adequately addressed the role that the body and social interactions play in learning and cognition. Even arguments for music as a "different" kind of intelligence rarely propose true alternatives to the educational status quo.[12] In an excellent article that addresses these and other issues, Wayne Bowman worries that:

> We find ourselves advocating music study for reasons that fit with prevailing ideological assumptions about the nature of knowledge and the aims of schooling, but on which we are ill-equipped to deliver, and that neglect what may be most distinctive about music: its roots in experience and agency, the bodily and the social. Our most revered justifications of music education are built upon deeply flawed notions about mind, cognition, and intelligence.[13]

In this article, I wish to confront some habits of thought and conventional wisdom in the pedagogy of jazz and improvised music. Although I will focus considerable attention on the ways in which freer forms of improvisation can, and should, be integrated into our music curriculums and pedagogical practices, my broader

[8] For more on the A.A.C.M., see George Lewis, *Power Stronger than Itself: The Association for the Advancement of Creative Musicians* (Chicago: University of Chicago Press, forthcoming). For more on the Creative Music Studios, see Robert Sweet, *Music Universe, Music Mind: Revisiting the Creative Music Studio, Woodstock, New York* (Ann Arbor, MI: Arborville Publishing, 1996).

[9] Despite this and subsequent generalizations, I am aware that many music educators have developed innovative pedagogical strategies, but they still tend to be the exception that proves the rule.

[10] Tom Nunn, *Wisdom of the Impulse: On the Nature of Musical Free Improvisation* (San Francisco, CA: self-published, 1998), 179. In this quote, Nunn is additionally making the broader claim that improvisation is an expression of composition, and that our strong division between the two is untenable, a view that I share.

[11] Jonty Stockdale, "Reading Around Free Improvisation," *The Source: Challenging Jazz Criticism* 1 (2004): 112.

[12] Howard Gardner, *Frames of Mind: The Theory of Multiple Intelligences* (New York: Basic Books, 1983). Although Gardner's widely influential theory categorizes multiple types of intelligence, including a musical one, it still treats the notion of intelligence as the exclusive provenance of an individual. And though he acknowledges the role that the environment and context can play in the application of intelligence, he does not highlight the ways in which they can shape its ontological existence.

[13] Wayne Bowman, "Cognition and the Body: Perspectives from Music Education," in *Knowing Bodies, Moving Minds: Towards Embodied Teaching and Learning*, ed. Liora Bresler (Norwell, MA: Kluwer Academic Publishers, 2004), 33.

arguments, and the theoretical orientation from which they stem, have important implications for the ways we teach more conventional or "straight ahead" practices as well. In addition to my own experiences performing with and coaching improvising groups, I draw on interviews with celebrated musician/educators Anthony Davis, Mark Dresser, Lisle Ellis, and Bertram Turetzky, and on emerging and already established theories in the study of education and cognition. It is my hope that by scrutinizing our pedagogical orientation and practices, we can produce better teachers and learners, more useful learning environments, and more responsible and responsive musical practices.

The Map Is Not the Territory

> *There are no wrong intervals if played in succession*
> *There are no wrong chords, only wrong progressions*
> *There are no wrong notes, only wrong connections*
> *There are no wrong tones, only wrong inflections*
>
> Eddie Harris[14]

> *The score was never meant to imprison the performer's imagination.*
>
> Larry Soloman[15]

> *It don't mean a thing if it ain't got that swing.*
>
> Duke Ellington[16]

Although examples of ecological or systems thinking can be found going back centuries if not millennia, its modern origins are often dated to the first Macy Conferences held in New York City in 1946, which brought together pioneering cyberneticists, mathematicians, engineers, and neuroscientists organized by the dynamic leadership of Norbert Weiner and John von Neumann, and humanities and social science researchers clustered around Gregory Bateson and Margaret Mead.[17] Many of the central tenets of systems thought explored during these conferences were adopted from biology, including ideas of feedback and homeostasis, but the then-nascent field of cognitive science eventually organized instead around a notion of mind that identified cognition with computation, and the brain as the hardware on which it runs. This view, often called *cognitivism*, has had a pronounced impact on how we have conceived of thought and education in the modern era, but it is gradually being replaced by a view of the mind and

[14] Liner notes to Eddie Harris Quartet, *There Was a Time (Echo of Harlem)*, Alfa/Enja R2 79663, 1990, compact disc.
[15] Soloman in Nunn, *Wisdom*, 180.
[16] Duke Ellington and Irving Mills, "It Don't Mean a Thing (If It Ain't Got That Swing)" (New York: Mills Music, 1932).
[17] For an excellent overview of the cybernetics revolution and related issues of embodiment, see N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999).

consciousness that acknowledges the important role that the body, emotions, and social factors play in how we think.[18]

Often called *embodied* or *enactive* cognition, this view holds that human conceptual, sensory, and motor processes have coevolved with each other and with their environment such that they are inextricably linked. Summarizing this position, Fritjof Capra explains: "The human nervous system does not process any information (in the sense of discrete elements existing ready-made in the outside world, to be picked up by the cognitive system), but interacts with the environment by continually modulating its structure."[19] Similarly, Francisco Varela and his co-authors in *The Embodied Mind: Cognitive Science and Human Experience* write: "Cognition is not the representation of a pregiven world by a pregiven mind but is rather the enactment of a world and a mind on the basis of a history of the variety of actions that a being in the world performs."[20] In short, *all* knowledge depends on our bodies, our language, and our social history.[21] Consequently, researchers with this contemporary orientation insist on biological, psychological, and cultural dimensions for all human cognition. Referencing the well-known phrase by semiotician Alfred Korzybski, William Clancey writes: "Knowledge is not a thing or set of descriptions or collection of facts and rules. We model knowledge by such descriptions. But the map is not the territory."[22]

Yet improvisation instruction in the music academy has frequently operated under the notion that "conveying the map" (to paraphrase Korzybski and Clancey) is all that music educators are able to offer. In other words, the process of learning "what" and "how" to improvise is conceived of as occurring prior to, and separate from, actually "doing" it. Jazz programs also tend to stress individual facility through the absorption and imitation of pre-existing language and style, such that little time may be left for, and little emphasis placed on, important matters of self-expression and collective experimentation.

In his essay on pedagogy for *The Cambridge Companion to Jazz*, pianist and musicologist David Ake underscores the ways in which freer approaches to jazz do not conform to standard conservatory values or the soloist-centered approach of much jazz education. Far from being a simple matter of collegial disagreement, this

[18] In interesting ways, as our day-to-day experience with computers continues to shift away from isolated desktop machines towards portable and even wearable devices that are continually connected to an unimaginably large web of information and users, our notions of cognition are also shifting from ideas of individual-centered information processing towards models that acknowledge the distributed nature of cognition and the inseparability of our knowledge and actions.

[19] Fritjof Capra, *The Web of Life: A New Scientific Understanding of Living Systems* (New York: Anchor Books, 1996), 68.

[20] Francisco J. Varela, Evan Thompson, and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience* (Cambridge, MA: MIT Press, 1991), 9.

[21] For compelling research on the ways in which our thinking and learning is deeply ensconced in metaphor, see George Lakoff and Mark Johnson, *Metaphors We Live By* (Chicago: University of Chicago Press, 1980) and Gilles Fauconnier and Mark Turner, *The Way We Think: Conceptual Blending and the Mind's Hidden Complexities* (New York: Basic Books, 2002).

[22] William J. Clancey, "A Tutorial on Situated Learning," in *Proceedings of the International Conference on Computers and Education* (Taiwan), ed. J. Self (Charlottesville, VA: AACE, 1995), 49. See also Alfred Korzybski, *Science and Sanity* (Laxeville, CT: International Non-Aristotelian Library, 1948), 58.

pedagogical disparity extends well into our institutional policies and structures. "With lessons, assignments, and practice spaces geared towards the development of individual skills," Ake muses, "little if any time or space remains for the development of the very different musical tools necessary to improvise successful collective jazz."[23] During his argument, Ake asks several tough questions: "What does an aspiring jazz player need to know in order to be considered a 'good musician'? How does a teacher best go about conveying that information, and how does one test a student's knowledge and understanding of these principles?"[24] Yet implicit in these and other similar questions, I suggest, are conceptions of knowledge and education that must be confronted head on, or we will always remain at the mercy of the presiding educational philosophy that values abstract intellectual concerns as the real determinant of educational worth.[25] By conceiving of musical "knowledge" as individual, abstract, relatively fixed, and unaffected by the activity through which it is acquired and used, music programs have devalued the experiential, exploratory, and collective qualities that make for compelling improvisation and, more generally, that inform the development of musical ears, memory, instincts, sensitivity, and, ultimately, creativity.

During a recent interview, Bertram Turetzky exclaimed: "The academics talk about scales and this and that strategy—and I've read all the books—but that is not the way the masters taught!"[26] Turetzky, an emeritus professor at the University of California San Diego (UCSD) who literally wrote the book on the contemporary contrabass, favors a more embodied approach.[27] When working with students, his goal is "to hook up the fingers to the ears." For one exercise, he asks students to sing a passage from a fixed starting point—at first simply a few notes—and then to reproduce the passage on their instrument. Turetzky finds that even many advanced players cannot perform this exercise well at first. He remarks: "If you can't do it, you are depending on scales. It is not visceral. It is not integral to your being. It doesn't express anything except the tricks that you have learned."[28]

Turetzky is referring to a disjuncture between inscribed and incorporated forms of knowledge. Many music programs place undue emphasis on the normalized, abstract, and detached mode of inscription, rather than the more visceral and personal mode of incorporation. We have all undoubtedly encountered musicians who have

[23] David Ake, "Learning Jazz, Teaching Jazz," in *The Cambridge Companion to Jazz*, ed. Mervyn Cooke and David Horn (Cambridge, England: Cambridge University Press, 2002), 268.
[24] Ibid., 264.
[25] In a relevant study, Jean Lave (*Cognition in Practice: Mind, Mathematics, and Culture in Everyday Life*, Cambridge, England: Cambridge University Press, 1988) looked at adults of various backgrounds using arithmetic while grocery shopping. In making purchase decisions, they employed a flexible real-time arithmetic in order to select better prices per unit weight, continually taking into account the constraints imposed by the layout of the stores, the capacities of their home refrigerators, and the dietary requirements of their family members. These skills with situated arithmetic, however, were rarely reflected in their performance on grade-school math problems.
[26] Bertram Turetzky, interview by the author, San Diego, CA, 1 February 2005.
[27] Bertram Turetzky, *The Contemporary Contrabass* (Berkeley, CA: University of California Press, 1974).
[28] Turetzky, interview by the author.

developed prodigious technique in tandem with their ability to read the most complex musical figurations yet are loathe to even consider the possibility of playing music (as expression) without music (as notation) in front of them or previously memorized.[29] Although jazz musicians certainly benefit from the use of musical inscription as a mnemonic or as an occasional performance aid, to use it as a starting point and as a continual centerpiece of the learning experience, as many institutionalized jazz programs do, tends to devalue the embodied and experiential qualities of improvisation. Far from a simple matter of disposition, if one learns to play music through the predominant use of inscribed forms of knowledge, making the necessary connections between ear, mind, and hand to become a fluent and creative improviser may always remain difficult.

Mark Dresser, the contrabassist with Anthony Braxton's longest performing quartet and an internationally recognized performer in his own right, was a student of Turetzky and now that Turetzky has retired, Dresser continues his legacy as a professor at UCSD. During our interview, Dresser remarked: "You find in jazz schools there are some very skilled people, but the music ends up being variations on the same theme, because the notation ends up leading the way that everything is formed."[30] Dresser's comments underscore the fact that Western notation, when used to convey aspects of jazz and improvised music, tends to place undue emphasis on notes, chords, and harmonic progressions since these are most easily represented. The rhythmic, timbral, expressive, and interactive nuances of the music do not translate as easily to paper.

Notation has remained central to many programs that teach improvised music not only for its perceived convenience—it translates well to blackboards and textbooks and can facilitate complex, hierarchical performances easily—but also because it allows instructors to believe that they have an "objective" means with which to evaluate the progress and understanding of students. Without a doubt, the academic conventions of individual assessment through written exams and assignments, and the value placed on inscribed forms of knowledge in general, represent the most significant hurdles to adopting fully these new educational perspectives and objectives.[31] Altering our approaches to teaching improvisation will also involve much more than simply rewriting our syllabi, since learning—according to the new paradigm—is situated in physical and social spaces as well.

Although little known in the West during his lifetime, the work of Russian psychologist Lev Vygotsky (1896–1934) has posthumously provided a common

[29] For a detailed treatment of the nineteenth-century disappearance of improvisation from Western concert music practice see Angeles Sancho-Velasquez, "The Legacy of Genius: Improvisation, Romantic Imagination, and the Western Musical Canon," Ph.D. diss, University of California, Los Angeles, 2001.
[30] Mark Dresser, interview by the author, San Diego, CA, 26 January 2005.
[31] I have grown fond of the notion of post-literate orality, first forwarded by Walter Ong (*Orality and Literacy: The Technologizing of the Word*, 2nd ed., New York: Routledge, 2002), to describe the current educational and musical moment in which learners have a base of literacy, but their primary means of learning have shifted back to oralilty-focused formats and media.

theme that runs through much of the new educational paradigm.[32] Vygotsky proposed that activities of the mind, including creativity, cannot be separated from overt behavior, from the external materials being used, or from the social context in which the activities occur. For example, many young children are unable to name what they are drawing until the activity is completed. Their minds produce stimuli while they interact with the physical materials (e.g., crayon and paper), and they react to the resulting visual stimuli and to the responses of others, creating a cycle of action and reaction. Over time, these experiences can form the basis for more abstract planning and cognitive reasoning about art, but the art in the mind cannot exist without mediating tools and a foundation of lived, social experience.

In contrast to the work of the Swiss developmental psychologist Jean Piaget (1896–1980), whose theories of childhood development tacitly reflected the ideology of individualism, Vygotsky emphasized a sociocultural approach in which the intellectual development of children is seen as a function of communities. His writings take for granted that the personal and the social are not self-contained but have a shared existence. For instance, children develop language alongside the need to communicate with others. Vygotsky also proposed that all of the higher mental processes, including problem solving and consciousness, are of social origin; they originate as relationships between individuals and are constructed through a subject's continuing interactions with a social and physical world. Our inner speech and self-awareness that define thought and consciousness emerge *after* communication; they are the end product of socialization, not its beginning. According to Vygotsky, the interpersonal comes before the intrapersonal, and the latter cannot be fully illuminated without acknowledging the former.

Exploring free jazz in a classroom setting, I argue, provides an opportunity for instructors to highlight to students, and to explore for themselves, the interpersonal dimension of improvisation. Yet these more open improvisational practices, and the more dynamic pedagogical approaches that they require, are still thought by many to be ill-suited to the music academy. In a panel discussion on free jazz held at the 2000 International Association of Jazz Educators (IAJE) Convention—one of the few of its kind in the history of that organization—three jazz pedagogy experts held a frank discussion of their experiences exploring freer forms of improvisation in the academy.[33] The panelists included Ed Sarath, a flugelhorn player and head of Jazz and Contemporary Improvisation Studies at the University of Michigan, Graham Collier, the former artistic director of the Jazz Course at the Royal Academy of Music in London, and Allan Chase, a saxophonist and Chair of the Jazz Studies and Improvisation Department at the New England Conservatory of Music. Chase argued that educators tend to avoid engaging with freer forms of improvisation in a hands-on way because: (1) they are unfamiliar with most of it (many had an initial negative

[32] See Lev Vygotsky, *Mind in Society* (Cambridge, MA: Harvard University Press, 1978).

[33] Allan Chase, Graham Collier, and Ed Sarath, "The Shape of Jazz to Come?" (panel discussion at the International Association of Jazz Educators Convention, 2000), http://www.jazzcontinuum.com/jc_rtcl1.html (accessed August 20, 2006).

experience with the avant-garde and have stayed away ever since); and (2) they are concerned with how to assess progress, and how to measure results. The first concern is of course a self-fulfilling prophecy if freer forms of jazz and improvisation are not allowed a place in the academic classroom. Regarding the second concern, Chase pointed out that it is equally difficult to assess the progress of composition students, or to grade an abstract painting, or even to measure the quality of a bebop solo beyond the point where someone masters playing changes in the basic sense. In all of these situations, he asserted that "there are things you can teach, ways you can critique a piece of work. There are suggestions you can make and there is a dialog you can have with the students."[34]

During the same panel, Ed Sarath described his evolving approach to directing the Creative Arts Orchestra at the University of Michigan. He recalled that at first he tried to balance composed parts or sections featuring more traditional soloing with free "interludes" in order to frame the "riskier" parts of performance. But the students wanted to do more collective free improvising. After some soul searching, Sarath decided to program entire concerts of completely improvised performance as well:

> Where I used to sit in the audience and be just terrified as to what was going to happen, and making a list of who I hoped hadn't come to the concert, in recent years I've become a little bit more comfortable with this completely improvised format. And at the December concert, it was just amazing what happened. It's almost like some external force overtakes the ensemble and guides the orchestration, creative decisions, formal sections, etc. But there's no middle ground to this kind of thing.… We can extend the boundaries of bad beyond belief! In the other direction I have to say that when it works it becomes one of the most profound things I have been involved in. Something takes over the group. We've all experienced this in smaller group situations but there are 25 people up there. No conductor. No format at all and you have to tune in to whatever that force is that is going to orchestrate the thing, deal with formal proportions, deal with transitions. It's an amazing thing and it's terrifying. It still is.[35]

Rather than insisting on a prescribed plan and a tightly controlled environment for learning, instructors adopting this contemporary orientation must focus on creative ways to facilitate learning in a dynamic context that is shaped and negotiated by all of the participants. Instead of creating a situation in which there is a predetermined outcome, instructors must be comfortable presenting unpredictable situations and exploring open-ended possibilities. Rather than simply imparting problem-solving skills in the abstract, they must encourage students to develop problem-finding approaches and create a context in which everyone feels comfortable exploring new ideas and experimenting together. The notion of teachers as "experts" and "gate keepers" must ultimately give way to the more engaged and interactive role of mentors or facilitators.

[34] Ibid.
[35] Ibid.

Lisle Ellis, an improvising contrabassist who has performed with avant-garde legends from Paul Bley to John Zorn, emphasized to me that:

> A good teacher is always teaching a lesson that the teacher needs to learn. I work with students on things that I am interested in and [that] I am trying to discover myself how to do. It keeps me from going into a rote thing. And also they can see me make mistakes. I think that is a really good thing to impart to young people: let them see you fail and let them see you deal with it. And no matter how many times you fail, you still get up and go back at it.[36]

Ellis studied at the Creative Music Studios in Woodstock with both Karl Berger and Cecil Taylor. Although he found each of their pedagogical approaches useful, the contrast he drew between them offers a possible response to arguments that reductionism and rigor are one and the same. Berger, a German vibraphonist and "world music" pioneer, worked to "demystify the music" in his classes. He focused on the basic building blocks of music—rhythm and pitch perception—that can help budding artists to engage with a whole world of music.[37] Taylor, on the other hand, offered little in the way of specific technical advice to his students, preferring instead to "musicify the mystery." By playing with Taylor, Ellis discovered a way of exploring music through the music itself, without verbal discussion and without stopping to "rehearse" in any conventional manner.[38] Taylor is well known for his insistence on teaching his music to fellow musicians by ear, for always bringing something new to sessions for his musicians to learn, and for his penchant to disregard any of the music that was prepared ahead of time once the moment of performance arrives, a practice that has unsettled more than a few of his bandmates. As Ellis puts it: "You want to be an improviser? Let's improvise!" Paraphrasing Duke Ellington, Ellis explained: "The music never stops, you just get on board.… This is an old idea. Everyone says this is new music, but this is some kind of ancient thing going on."[39]

Describing his educational philosophy to me, pianist, composer, and UCSD professor Anthony Davis stressed that "playing with [students] is very important. I try to drop bombs on them. See what they do with it; stuff that engages them and challenges them in an immediate way when you play. That's the best way to do it."[40] Davis's pedagogical perspective is an outgrowth of what he learned from his own mentors, who included such distinguished artists as Jimmy Heath, Wadada Leo Smith, Anthony Braxton, Leroy Jenkins, and Ed Blackwell. Davis finds that in a group setting people naturally assume different roles, so he consciously tries to make the students reverse or change these roles: "Have someone play up front, and someone who is more aggressive, have them play a supporting role." For Davis, "teaching

[36] Lisle Ellis, interview by the author, San Diego, CA, 25 February 2005.
[37] For instance, Berger's system called "gamala taki" helps musicians to break down complicated rhythms into patterns of threes ("ga-ma-la) and two's ("ta-ki").
[38] Ellis, interview by the author.The idea of "rehearsing" is of course derived from the notion of "re-hearing" something, and is anathema to the practice of many improvisers.
[39] Ibid.
[40] Anthony Davis, interview by the author, San Diego, CA, 2 March 2005.

improvisation *is* an improvisation. I try to respond to the group dynamic, the direction, what makes them comfortable, what makes them uncomfortable.''

Davis's awareness of how social roles play out in the classroom is a tacit acknowledgment of the situated nature of knowledge and learning. To be clear, the notion of situated cognition is not simply a recommendation that teaching be ''relevant,'' nor does it refer to the obvious claim that learning always happens ''in a location,'' or the common oversimplification that people learn best by ''trying something out.'' Rather, learning is situated because a person's actions and understandings are indelibly shaped not only by the physical and social specifics of a given learning environment, but also by his or her perceived ''place'' in a social process. From this perspective, all musical encounters—both those deemed public and private—are inherently social, since other listeners are always either present or imagined.

When practicing alone, for example, other listeners are always within earshot (or imagined to be so) as sounds leak through walls and rooms, ultimately affecting what and how one plays. More importantly, our conceptualizations of music are continually shaped in complex ways by social factors. For instance, as we learn to play a musical instrument we develop a relationship between our physical actions and our perception of resulting sounds over time, but those same perceptions and actions are also shaped within a social matrix in which sounds may be deemed desirable or not, and actions may be encouraged or not, depending on specific cultural and individual factors. This may help to explain, although certainly not to excuse, the fact that in the not-so-distant past many musicians were strongly discouraged, and even prohibited, from playing jazz while they were pursuing institutional music studies. The jazz community, too, is not beyond reproach in this regard. Anthony Braxton, for one, finds it ironic that many of the politically and spiritually aware musicians of the 1960s could also function as ''chauvinist[s] and oppressor[s].''[41] The notion that all musical practices are profoundly situated in social spaces should ideally serve to increase our awareness of the racial and cultural dimensions of our music classrooms and help us to remain ever attentive to sexist attitudes and gender-based power inequities as well.[42]

Although some may still dutifully accept the idea that musical structures can be captured fully in the pages of a score, many, if not most, of the essential elements of any musical performance are in fact spread across the minds of the individual

[41] Braxton in Eric Porter, *What Is This Thing Called Jazz?: African American Musicians as Artists, Critics, and Activists* (Berkeley, CA: University of California Press, 2002), 265.

[42] For more on these issues, see George Lewis, ''Teaching Improvised Music: An Ethnographic Memoir,'' in *Arcana: Musicians on Music*, ed. John Zorn (New York: Granary Books, 2000), 78–109, and ''Getting to Know Y'all: Improvised Music, Interculturalism, and the Racial Imagination,'' *Critical Studies in Improvisation* 1, no. 1 (2004): n. p., and Sherrie Tucker, ''Big Ears: Listening for Gender in Jazz Studies,'' *Current Musicology* 71–73 (2001–2): 375–408, and ''Bordering on Community: Improvising Women Improvising Women-in-Jazz,'' in *The Other Side of Nowhere: Jazz, Improvisation, and Communities in Dialog*, ed. Daniel Fischlin and Ajay Heble (Middletown, CT: Wesleyan University Press, 2004), 244–67.

participants, not simply their music stands. The theory of distributed cognition offers considerable support for this position and for the intrinsically social nature of cognition and consciousness. In place of the Cartesian view that envisioned "mind" as separate from and dominant over "body" (I think, therefore I am), the theory of distributed cognition upholds the embodied view that mind is *in* the body and the body is *in* the mind, and further maintains that mind extends *beyond* the physical body. An example may help to clarify this position. Gregory Bateson, a leading figure at the Macy conferences and an early proponent of systems thinking, frequently made this point with a Zen-like simplicity: "Is a blind man's cane part of him?" The question aimed to spark a mind-shift. Although it may be convenient to conceive of human boundaries as defined by their epidermal surfaces, in Bateson's example the cane provides essential information to the man about his environment in a way that makes them, from a systems perspective, inseparable. In order to grasp Bateson's point we must envision a blind man *actively engaging* with his environment through his cane as surrogate "eyes." A stoic subject who did not move an inch would not provoke our epiphany that his cane is, in fact, part of his sensorimotor apparatus and therefore his cognitive being. According to this emerging perspective in cognitive science, learning and problem solving are best approached as occurring in a distributed fashion across both physical and social settings.[43]

With its emphasis on interacting physically with instruments and sound and interacting socially with other performers and listeners, music may provide one of the best sites for investigating distributed cognition. During performances, musicians communicate and coordinate their sounds and intentions in very subtle ways. For instance, qualities like ensemble timing, phrasing, blend, intonation, and groove, are all examples of musical interactions and negotiations—in short, cognition—occurring in a distributed fashion.

In mainstream jazz, for instance, group members often balance their riskier improvised explorations with an awareness that they must also help to secure the cohesion of the entire ensemble (e.g., by emphasizing specific harmonic or rhythmic figures or by articulating certain sections of the song form to help "lock in" the group when needed). At times, groups may even need to recover collectively from moments in which the timing or phrasing of a performance got temporarily derailed, all without making it apparent to an audience.[44] Far from simply offering a form of negative feedback, however, distributed cognition also inspires individuals to play things that they might not have been able to play alone, a product of positive feedback. It enables ensembles to impart a specific musical and emotional character

[43] For a seminal text on distributed cognition, see Edwin Hutchins, *Cognition in the Wild* (Cambridge, MA: MIT Press, 1995). Hutchins details the ways in which the cognitive demands of successful navigation are distributed among the various crewmembers and the tools and physical layout of a ship's bridge.

[44] See the detailed analysis of Jaki Byard's trio performing "Bass-Ment Blues" in Ingrid Monson, *Sayin' Something: Jazz Improvisation and Interaction* (Chicago: University of Chicago Press, 1996), 152–71. For a related discussion of interactional synchrony in orchestral performance, see R. Keith Sawyer, *Group Creativity: Music, Theater, Collaboration* (Mahwah, NJ: Lawrence Erlbaum Associates, 2003), 176–8.

to a given performance, a product of the musicians' sensitivities and the inherent complexities of their interactions.

Although distributed cognition undoubtedly plays a role in all group musicking, freer forms of improvisation simply extend the process most fully into the realm of musical "content"; the distributed sense of sonic and social unfolding becomes the essence of the musical experience, its *raison d'etre*.[45] Exploring this very notion, Jared Burrows writes:

> A group improvisation is a complex social phenomenon. During a performance, there is a subtle, web-like interplay of individual psychological needs and intentions, technical tasks and difficulties associated with playing musical instruments, awareness of the audience (if the performance is public) and, most centrally, conscious and unconscious reactions to sound stimuli. Cognitive distributions in this context occur between musician and instrument, between or among two or more musicians, and between dialectical relationships among mediational artifacts, stimulus, response, and action.… As each new element is added, it becomes subsumed in the overall tapestry of aural stimuli, and these stimuli form the basis for further thought and action. Because all members of the group both react and contribute to the same set of stimuli, their cognition is linked in a profound fashion. Once certain sound-actions have been brought into play, the players construct a kind of group meaning from those actions.[46]

Many psychological approaches to studying improvised musical creativity have wrongly separated the mind from the body and individuals from their social and physical environment.[47] Ignoring the embodied, situated, and distibuted nature of cognition, these studies take what might be called an "information-processing" approach to perception. Such studies generally detail how improvisers must extract and represent features of their sonic surroundings and then diligently work in a "problem-solving" manner to create more abstract and complex representations that ultimately are restructured and reproduced through musical action. It may come as no surprise that these studies frequently highlight the inherent shortcomings that insufficient time and unreliable memory can create in improvising situations. Most of this work ultimately concludes that jazz offers something of an "imperfect art," to borrow Ted Gioia's unfortunate phrase.[48]

[45] For more on musicking, see Christopher Small, *Musicking: The Meanings of Performance and Listening* (Middletown, CT: Wesleyan University Press, 1998).

[46] Jared Burrows, "Musical Archetypes and Collective Consciousness: Cognitive Distribution and Free Improvisation," *Critical Studies in Improvisation* 1, no. 1 (2004): n. p.

[47] For psychological perspectives on improvisation, see Philip N. Johnson-Laird, "Freedom and Constraint in Creativity," in *The Nature of Creativity: Contemporary Psychological Perspectives*, ed. Robert J. Sternberg (Cambridge, England: Cambridge University Press, 1988), 202–219, John Sloboda, *The Musical Mind: The Cognitive Psychology of Music* (Oxford, England: Oxford University Press, 1985), and Jeff Pressing, "Psychological Contraints on Improvisational Expertise and Communication," in *In the Course of Performance*, ed. Bruno Nettl (Chicago: University of Chicago Press, 1998), 47–69.

[48] Ted Gioia, *The Imperfect Art: Reflections of Jazz and Modern Culture* (Oxford, England: Oxford University Press, 1988). Although sympathetic and sensitive to the aesthetics of improvised music, Gioia's treatment is still beholden to many conventional notions of "knowledge" and "beauty."

In his recent book, *Ways of Listening: An Ecological Approach to the Perception of Musical Meaning*, Eric Clarke emphasizes several significant problems with this information-processing model of perception. His argument is worth quoting at length:

> First, it relies very heavily on the idea of mental representations, both as a final state that the system achieves, and as intermediary stages along the way.… Rather than making use of the structure that is already out there in the environment, the outside world is needlessly and endlessly internalized and duplicated (literally "re-presented"). Second, the standard information-processing account tends to be disembodied and abstract.… Perception is treated as a kind of disinterested contemplation, with no connection to action—which bears little relationship to the essentially exploratory and orienting function of perception in the life of an organism. And finally, perception is characterized as working primarily from the bottom up (despite the incorporation of "top-down" processes), with more complex levels constructed from the outputs of lower-level, more primitive processes. Direct experience suggests that this is wrong: if you hear a burst of music from someone's radio, for instance, it is more likely that you will be able to say what style of music it is (opera, hip-hop, Country and Western) than to identify specific pitch intervals, or its key, meter, and instrumentation. In other words, people [including musicians] seem to be aware of supposedly "high-level" features [meaning "broader" features, not "better" ones] much more directly and immediately than the lower-level features that a standard information-processing account suggests they need to process first.[49]

In contrast to the information-processing account, an ecological approach emphasizes the structure already inherent in the environment and views perception as a type of "resonating" or "tuning" to environmental information.[50] In other words, perception need not involve representing and computing objective knowledge about the world out of a chaotic inflow of sensations since the environment is already highly structured and humans, their organs of perception, and the way in which the brain orients them have all evolved such that the whole system of input and output already "resonates" to this external information.

The process of resonating to one's environment, according to Clarke, is the result of long-term adaptation, via a tangled web of biological and cultural evolution, and the more immediate personal/social process of perceptual learning. For instance, the human auditory system has evolved in specific ways (e.g., the logarithmic frequency distribution demonstrated over much of the basilar membrane) that favor speech and other forms of auditory communication.[51] Human beings have also, in Clarke's words, "exploited natural opportunities for music making, including the acoustical characteristics of existing materials and the action-possibilities of the human body, and they have adapted themselves to those opportunities through tool making of one

[49] Eric F. Clarke, *Ways of Listening: An Ecological Approach to the Perception of Musical Meaning* (Oxford, England: Oxford University Press, 2005), 15–16.
[50] A seminal work in the field of ecological psychology and a primary source for Clarke's argument is J. J. Gibson, *The Ecological Approach to Visual Perception* (Mahwah, NJ: Lawrence Erlbaum Associates, 1979).
[51] Clarke, *Ways of Listening*, 21.

sort or another—from drilled bones, through catgut and wooden boxes to notation systems, voltage-controlled oscillators and iPods."[52] More immediately, individuals continually engage in perceptual learning, which, according to Clarke's ecological perspective, involves a process of "progressive differentiation" in which "perceivers become increasingly sensitive to distinctions within the stimulus information that were always there but previously undetected."[53] Clarke repeatedly stresses that this process of "resonating" with one's environment should not be thought of as "passive," since our perception-action coordination is essentially exploratory. We continually seek out sources of stimulation in order to learn more about the environment.

Recent work in cognitive science supports this ecological perspective by demonstrating empirically that many cognitive tasks are greatly simplified by our propensities to: (1) anticipate experiences and perceptions (only the differences from expectation need to be processed); (2) use information already in the world (so that mental representations are often not required); and (3) distribute the demands of real-world cognition among several individuals.[54]

To make this ecological perspective more tangible, imagine that you are craving a glass of milk. You go to the refrigerator hoping that there is enough left in the carton to quench your thirst. How do you gauge the remaining quantity of milk? Many people will grab the carton and gently shake it up and down to determine how full it is. Ultimately, this is not a measurement of its mass (a property of the object itself), nor of its weight (a property of the relation between the object and gravity), but rather of its heft (the perceived resistance of an object in motion), a measurement that can only be made relative to an organism's perception-action coordination. To slightly caricature this situation, an information-processing approach imagines that we calculate the amount of remaining milk based on extracting abstract information about the weight of the carton and the velocity of our shaking motions and combining these with our previously stored mental representations about the mass of milk. An ecological approach focuses instead on the perceptual learning that occurs through our embodied history of interactions with lifting objects in general, and liquid-filled containers in particular.

For an example in the sonic domain, imagine that you just heard the sound of leaves rustling and sticks breaking behind you. An information processing perspective imagines that you "picked up" the sounds from your environment in an objective fashion and that you are now cognitively processing them by calculating the shape, mass, density, and texture of the sounding objects, as well as of the object or objects

[52] Ibid., 21–22.

[53] Ibid., 22.

[54] See Varela, et al., *The Embodied Mind*, and Hutchins, *Cognition*. Neuroscientific research also supports this ecological perspective by demonstrating the ways in which perception is intimately connected with action. For more on this topic, see Vijay Iyer, "Embodied Mind, Situated Cognition, and Expressive Microtiming in African-American Music," *Music Perception* 19, no. 3 (2002): 385. The brain's ability to dramatically adapt to changes in its structure or the environment—referred to as its "plasticity"—is also increasingly being recognized as a fundamental and defining feature of its function.

that provoked the disturbance, since all of these factors and more (e.g., the atmospheric conditions of the surrounding air or any obstructions between you and the sounding objects, etc.) have an effect on the resulting sounds and their perception. An ecological perspective on this event, however, acknowledges that the sounds emitted are directly related to the physical properties of the objects and spaces involved, but humans (and many other organisms) do not have to do complex processing to "decode" this information. In fact, as a result of "resonating" to our environment our initial (and often most profound) response to any acoustic disturbance, including music, tends to be of a more emotional or physical nature. For example, your primary response to the situation described above would most likely be to feel fear or to be startled. And for evidence of the ecological aspects of musical meaning, witness the inseparability of music and dance in many cultures around the world, as well as in many corners of our own culture.

Conventional jazz education, in my opinion, appears stuck in an information-processing mode. It frequently proceeds with the assumption that students must first master the ability to abstract lower-level features such as intervals, chords, and basic rhythmic structures before they can contend with global features such as melodic contours, harmonic tendencies, complex rhythms, or expressive gestures. According to this logic, only after the pyramid of processing has been completed, should students expect to achieve the less talked about (and rather more nebulous) goal of improvising, to have conscious or unconscious experiences of a truly musical kind. This conventional approach does offer a clearly structured route from simple to complex properties (about which I will say more later). However, if as Clarke suggests, people are aware of so-called "high-level" features of music more directly and immediately than the "low-level" features stressed by information-processing approaches to perception, then we may wish to encourage our young musicians and budding improvisers to engage with their musical environment in ways that resonate more immediately with these "high-level" features as well.

In Derek Bailey's important book, *Improvisation: Its Nature and Practice in Music*, English drummer John Stevens described how he would try to create a situation with students in which they did not rely on him to set the improvisation up. Everyone had to respect the playing space and upon arrival be prepared to immediately start playing with purpose and interacting with whomever was already present. Describing Stevens's instructional philosophy, Bailey writes: "The aim of teaching is usually to show people how to do something. What Stevens aims at, it seems to me, is to instill in the people he works with enough confidence to try and attempt what they want to do *before* they know how to do it."[55]

Freer approaches to improvisation tend to deemphasize the musical dimensions that are most easily represented by notation—quantized pitches and metered rhythms—in favor of subtle temporal, timbral, and expressive concerns. In this more

[55] Derek Bailey, *Improvisation: Its Nature and Practice in Music* (Cambridge, MA: Da Capo Press, 1992), 121.

open environment, students can explore the "high-level" aspects of musical gesture, interaction, and form in ways that may help them to avoid always reducing music to its component parts, and ultimately may benefit their ongoing development as artists.

Even in more traditional musical settings, the information-processing approach tends to ignore the ways in which musical qualities are always heard in context. In tonal music, for instance, intervals and chords are not simply heard in the abstract; rather, they are subject to tendencies established through historical conventions and they are always heard based on what has already occurred and what we anticipate might happen next. The notion that each chord of a standard jazz song maps in some near isomorphic fashion to a specific scale, a pedagogical approach perhaps most associated with the publications of Jamey Aebersold, also ignores this ecological approach to musical experience.[56] For example, a blues in the key of F is better thought of in that key throughout, with changing emphasis, than as changing key and scale each time a new chord arrives. Similarly, if students are asked to conform to the ii7-V7-I progressions within a Tin Pan Alley tune but are unaware of their relationship to one another and to the tune's underlying key center(s), they will most likely produce rigid and disjointed improvisations as they focus their attention exclusively on moment-to-moment note choices rather than on melodic contour, rhythmic development, or large-scale harmonic, gestural, and formal considerations. It is worth noting as well, that for many of our most esteemed jazz improvisers who specialize(d) in playing Tin Pan Alley song forms, ii7-V7-I progressions were nearly ubiquitous in the popular music that infused their childhood and young adult years, a type of immersion that, according to an ecological perspective, plays an immeasurable role in how one hears and interacts with one's musical surroundings.

Perceptual learning, according to the ecological perspective sketched out by Clarke, proceeds in "passive" and "directed" ways (although "passive" is a bit misleading since activity is always involved).[57] A considerable amount of musical learning, from our earliest years onward, occurs through unsupervised investigation. For instance, a child discovers the loudness and pitch contours of a xylophone through more-or-less unregulated experiments. During this seemingly undirected activity a profound process of self-tuning is occurring; the child is picking up environmental information through a cycle of action and perception. This exploratory orientation towards one's environment, and the way in which learning occurs through a feedback cycle of action and perception, differs little from how mature musicians hone their skills. Directed perceptual learning, in Clarke's formulation, describes a situation in which others model a behavior, either through demonstration or by offering verbal instruction or emotional support in ways that encourage the learner to try out certain actions or to pay attention to specific aspects of the resulting sounds.

[56] Jamey Aebersold Jazz, Inc., P.O. Box 1244, New Albany, IN 47151-1244, U.S.A. (www.jazzbooks.com).
[57] Clarke, *Ways of Listening*, 22–24.

Many of our conventional approaches to music education already exploit these aspects of perceptual learning. Ear training courses, for instance, are explicitly designed to assist students in improving their skills at differentiating aspects of the sound environment that were always present but previously undetected. Instructors encourage students in "directed" ways to seek out the "quality" of the sound being scrutinized, and the students gain greater awareness of music theory through a cycle of perception/action, in which they explore how their actions (e.g., "sing the middle note") and perceptions (through repeated and concentrated listening) combine to help them consolidate new perceptual awareness/ability. Private instruction, hands-on workshop settings, and the coaching of ensembles all provide additional opportunities in a standard music curriculum for instructors to mentor students in directed ways.[58]

In my opinion, we only err when we place the cart of music theory before the horse of musical experience—or, more accurately, when we conceptualize them as entirely distinct from one another. According to an ecological view, one's ability to hear and therefore use any theoretical construct (e.g., specific scales, chords, rhythms, intervals, etc.) will always depend on that individual's perceptual capacities and experiences. From a pedagogical vantage point, we cannot presume that simply knowing about aspects of music theory will in any way assist students in becoming better musicians. We should also avoid presuming that by dictating which music theories are important, we are helping them to engage most fully with their own musical horizons. Our theoretical abstractions of music are in some ways analogous to the mass and weight of our milk carton—i.e., information that is not terribly useful when one has a pressing thirst.[59]

I am suggesting here a middle way in which the conventional categories of music theory (e.g., intervals, scales, chords, etc.) are viewed neither as "out there" (i.e., independent of our perceptual and cognitive capacities) nor "in here" (i.e., independent of our surrounding biological and cultural world). According to an ecological theory of music, perception involves neither recovery nor projection of external musical constructs; rather, it involves the constant orienting of an organism to its environment through a cycle of perception/action. From this perspective, encouraging improvisation, broadly speaking, would seem to be a critical component of not only a musical education, but of any education.

[58] This approach might also be described using current educational terminology as "scaffolding." Vygotsky's notion of a zone of proximal development (*Mind in Society*) and Jean Lave and Etienne Wenger's idea of legitimate peripheral participation (*Situated Learning: Legitimate Peripheral Participation*, Cambridge, England: Cambridge University Press, 1991) are other ways in which educators talk of the importance of apprenticeship in learning.

[59] I do not want to deny here the important ways in which theoretical abstractions allow for abstract manipulations of their own. For a cogent critique of too strong a reading of situated cognition, see Carl Bereiter, "Situated Cognition and How to Overcome It," in *Situated Cognition: Social, Semiotic, and Psychological Perspectives*, ed. D. Kirshner and J. A. Whitson (Mahwah, NJ: Erlbaum Publishers, 1997), 281–300.

According to this emerging pedagogical paradigm, it is impossible to separate the learner, the material to be learned, and the context in which learning occurs. These new theories also seek to displace the conventional notion that direct causal influences from either genes, environment, or culture *make* individuals "intelligent" with the more systemic view in which individuals, environments, and socio-cultural relationships can all be transformed through "intelligent transactions." As the psychologists Sasha Barab and Jonathan Plucker have recently suggested, "a learner's ultimate understanding of any object, issue, concept, process, or practice, as well as her ability to act competently with respect to using these, can be attributed to, and is distributed across, the physical, temporal, and spatial occurrences through which her competencies have emerged."[60] Barab and Plucker also propose replacing our standard notion of "talent" with the idea of "talented transactions." According to this insightful conceptual shift, such "talented transactions" involve "a set of functional relations distributed across person and context, and through which the person-in-situation appears knowledgeably skillful."[61] This move has a special resonance for music education, because it downplays a notion of "talent" as a specialized endowment of a chosen few, and replaces this entrenched view with "talented transactions" that are within the reach of all learners.[62]

To embrace this new pedagogical perspective does not involve throwing out all of the methods and techniques that educators have found useful in the past. The theories of embodied, situated, and distributed cognition acknowledge the value of descriptive models of knowledge, but insist that these models alone are incapable of capturing the full flexibility of how perception, action, and memory are related. Human conceptualization has properties relating to physical and social coordination that cannot be captured by decontextualized models. As William Clancey explains, "knowledge is a capacity to behave adaptively within an environment; it cannot be reduced to (or replaced by) representations of behavior or the environment."[63]

Although we commonly talk about information and knowledge as things, they are in fact relationships. Both depend for their existence on being *perceived* by living creatures in ways that ensure their dynamic and polysemic nature. In her book, *How We Became Posthuman*, Katherine Hayles questions the emerging postmodern ideology in which the body's materiality has been subsumed, and at times replaced, by the logical or semiotic structures that it encodes. To put this more simply, Hayles is concerned with how information "lost its body." She suggests that work in both

[60] Sasha Barab and Jonathan Plucker, "Smart People or Smart Contexts? Cognition, Ability, and Talent Development in an Age of Situated Approaches to Knowing and Learning," *Educational Psychologist* 37, no. 3 (2002): 170. A related concept here is J. J. Gibson's notion of "environmental affordances" ("The Theory of Affordances," in *Perceiving, Acting, and Knowing: Toward an Ecological Psychology*, ed. R. E. Shaw and J. Bransford, Mahwah, NJ: Lawrence Erlbaum Associates, 1977), 67–82.

[61] Ibid., 174.

[62] For an example of an ethnomusicological study that highlights the social dimensions of competence and talent, see Benjamin Brinner, *Knowing Music, Making Music: Javanese Gamelan and the Theory of Musical Competence and Interaction* (Chicago: University of Chicago Press, 1995).

[63] William Clancey, *Situated Cognition: On Human Knowledge and Computer Representations* (Cambridge, England: Cambridge University Press, 1997), 4.

the humanities and the physical sciences has reduced the body to either its play of discourse systems (e.g., Foucault), or to that which can be encoded into a computer (Hans Moravec, et al.). Hayles reminds us though that "even if one is successful in reducing some area of embodied knowledge to analytical categories and explicit procedures, one has in the process changed the kind of knowledge it is, for the fluid, contextual interconnections that define the open horizons of embodied interactions would have solidified into discrete entities and sequential instructions."[64] The map, it seems, is not the territory.

Harnessing Complexity

How, then, can these practices be nurtured, particularly within the rather serious and sedate halls of the music academy? According to Allan Chase, the success of introducing freer forms of collective improvisation in the classroom depends on the attitude projected by the instructor and on how (s)he frames the creative moment. During the IAJE panel discussion mentioned earlier, Chase advised instructors not to be apologetic, not to say "Hang in there with me, because it's going to be weird." Instead, Chase suggested that

> It's very important to center yourself and say, "We're going to create a beautiful work of art" and present it that way to the students. Or: "We're going to go somewhere we've never gone before. Let's do it. Let's listen to each other and be sensitive and play like an ensemble and here's a new idea of how to do that." Give a structure, a way to guide it, a way to end it, so it doesn't go on for the rest of the day. Then talk about it a little bit and do it again. Just like rehearsing any other music.[65]

Several writers have made a compelling distinction between a *problem-solving* and a *problem-finding* approach to art. Artists adopting problem-solving techniques begin with a relatively detailed plan and work to accomplish it successfully. Those employing a problem-finding approach, by contrast, search for interesting problems as the work unfolds in an improvisatory manner. Problem-finding approaches are especially important when improvising with a group in more open settings, since it is often impossible to determine the meaning of an action until other performers have responded to it and each performer may have a rather different interpretation of what is going on and where the performance might be going at any given time. According to creativity researcher Keith Sawyer, "the key question about intersubjectivity in group creativity is not how performers come to share identical representations, but rather, how a coherent interaction can proceed even when they do not."[66] According to Sawyer, this interactive creativity is possible because individuals shape a

[64] Hayles, *How We Became Posthuman*, 202.
[65] Chase, et al., "The Shape of Jazz to Come?" Chase's comment does raise certain thorny issues about the difficulty, or even desirability, of arriving at a consensus regarding what constitutes a "beautiful work of art." And, as noted earlier, the idea of rehearsing, literally to "re-hear" something, is anathema to the practice of many improvisers.
[66] Sawyer, *Group Creativity*, 9.

performance on both denotative and metapragmatic levels; they simultaneously enact the details of a performance and they negotiate their interactions together. Even if a singular meaning to a given performance will always remain elusive, participants can still shape the ways in which their various interactions unfold.

In the opinion of Anthony Davis, many beginning jazz improvisers are stuck in a problem-solving mode: "They have been taught right and wrong—these are the notes, these are the chords, these are the arpeggios that work on a given chord. This chord happens on the fifth bar [in a blues]."[67] Through extensive listening, practicing, and, most importantly, playing with musicians who are more experienced, Davis finds that young jazz players can move from "a dependence on *articulating* the form" to "*using* the form, realizing that [the tune structure] is the beginning of something and you have to create something else." "They have to do more than just *keep* time," Davis continues, "they have to *articulate* time." Even as students become more proficient, Davis reminds them that, "you have to get beyond your mannerisms to really come up with a musical idea as opposed to a catalog of what you do."[68]

In more open improvising settings, Davis stresses that students must learn the difference between *listening* and *following*: "In order to listen, you don't necessarily follow, you respond. You try to construct something that coexists or works well with something else—not necessarily this tail-wagging-the-dog thing where you just follow someone." For Davis, "Listening is knowing what someone is doing and using it in a constructive way, as opposed to mimicry [following], just trying to demonstrate that you are quote-unquote listening." The very notion that everything could be heard, processed, and immediately responded to during complex moments of improvised music is, by itself, far too facile. Trombonist/composer/scholar George Lewis describes a type of "multi-dominance" in improvised music by which individuals articulate their own perspectives yet remain aware of the group dynamic, ensuring that others are able to do so as well.[69]

Although the notion of music as a conceptual abstraction may be a mainstay of modernist discourse—one that has been challenged recently by many scholars—improvisers seem to understand the inseparability of art and experience on an intuitive level.[70] Mark Dresser described his working process to me as a cycle of moving between recording his improvising (either alone or in a group setting), and then analyzing those moments that strike him as interesting or filled with potential for future improvisations. This allows him to capture what he intuitively does and affords him a process of "rigorously looking at one's instrumental sounds, one's vocabulary, in a way that you could make a lexicon out of it, try to measure it, much

[67] Davis, interview by the author.
[68] Ibid.
[69] George Lewis, "Too Many Notes: Computers, Complexity and Culture in Voyager," *Leonardo Music Journal* 10 (2000): 33–39.
[70] For a compelling argument against the autonomy of music and the resultant "work" concept, see Lydia Goehr, "*Werktreue*: Confirmation and Challenge in Contemporary Movements," in *The Imaginary Museum of Musical Works: An Essay in the Philosophy of Music* (Oxford, England: Oxford University Press, 1992), 243–286.

in the way you would look at parameters of electronic music.''[71] Dresser stresses, however, that it is the process of personal involvement, ''using one's analytical abilities to analyze one's intuition or one's hearing,'' that is most important.[72]

In his course titled ''Sound and Time,'' Dresser asks his students to undergo a self-reflexive process: to create a personal lexicon of extended techniques, sounds, and approaches. As one assignment, he asks them to make a short transcription of a recording of ambient sounds, perhaps thirty seconds captured ''in the field.'' He then instructs them to create a time line and to locate and describe the sounds they are hearing. The point of the exercise, Dresser explains, is ''to investigate how you listen and how you organize how you hear.'' The students are then asked to use their transcriptions as the foundation for a new composition, one tailored to the specific instruments and, more importantly, for the specific musicians in the class. The compositions are to be designed as vehicles for structured group improvisation and are meant to make use of the personal vocabularies of each of the other class members. In this way, the assignment affords a feedback cycle between the acoustic environment, each individual's perception of that environment, and the combined group's technical abilities and creativity. Drummer Gerry Hemingway, who took over Dresser's class at the New School in New York City, has adopted this same strategy but also asks the students first to improvise in the style of their environmental recordings—both as individuals and in groups—before committing them to paper. Dresser now recommends this practice to his students as well. For him, ''the bottom line is musicianship. The ability to perceive pitch and time can never be too fine. The more we teach our musicians to develop ears and skills, the better equipped they will be to work in an ever-changing situation.''

There is an inherent danger, however, if we maintain a pedagogic focus on the individual as the primary locus for knowledge and learning, as has been the educational norm in the past. Only if ensemble music is conceived of as the simple addition of parts can skills be taught to individuals in isolation and summed together for performance. If music is in fact a whole that is greater than the sum of its parts, then the skills necessary to perform/improvise cannot be developed in isolation; rather, these skills must be honed in a distributed fashion with other musicians and listeners. Dresser commented to me on the importance of performing in front of an audience: ''I believe in the magic of performance to bring out people's best thing, best qualities. I've seen that happen time and time again. All of a sudden at the performance people transcend the rehearsal process because there is that dynamic with an audience.''[73]

Certain exercises employed by improvising actors may be useful for improvising musicians as well.[74] For instance, dramatist Keith Johnstone believes that ''humans are too skilled in suppressing action. All the improvisation teacher has to do is to

[71] Dresser, interview by the author.
[72] Ibid.
[73] Ibid.
[74] For more on the ideas discussed in this paragraph, see Sawyer, *Group Creativity*.

reverse this skill and he creates very gifted improvisers. Bad improvisers block action, often with a high degree of skill. Good improvisers develop action.''[75] Instead of denying or rejecting what has been previously introduced into the dramatic frame, improvising actors are taught that they should accept the actions/words of others as dramatic ''offers'' and, in turn, add something to the dramatic frame (i.e., present a complimentary ''offer,'' or ''revoice'' an existing ''offer''). The inherent challenge is to avoid circumscribing or over-directing the group flow. This does not, however, preclude the possibility of swiftly changing dramatic or musical directions, as the case may be. In most instances, care should be taken to do this in a way that keeps previous developments available for future moments of reference or expansion. Improvising actors call this practice ''shelving.'' Of course, it can be a tricky proposition to evaluate exactly when ''revoicing'' or ''shelving'' the ''offers'' of others has been successful. The inherent complexity, polyphony, and polysemy of music can make this even more challenging. At heart, however, these exercises in improvised theater—and similar ones adopted by musicians—are designed to improve one's ability to listen and remember, so that the ongoing group development will be stimulated rather than curtailed.

Bertram Turetzky described to me several strategies he employs when improvising with others:

> One way when I play free music, I try not to think of anything. I respond or I initiate. And whatever my intuitions tell me, I go with them.… Other times in free music, I play with people perhaps I don't know. And I say, well, the last one started soft and slow and got faster and then went back.… So all of a sudden I start banging things and doing all kinds of stuff.… For some people, I think you have to be very rational. And you perhaps have to have an idea of where you think it could go, and be the quarterback.

Turetzky acknowledged, however, that establishing a proper group rapport is often difficult: ''It can be a problem if someone has a big ego and wants to make everything 'compositional.'" When he perceives that the group flow is in jeopardy, he often adopts a third strategy: ''If there are three of four people, maybe I'll stop a little bit and let them see what they want to do. If there is a mess, let them sort it out. Let them start something and maybe I can support them.''

Compositional schemes can help to organize improvised music, either prior to, or in the moment of, performance, but deciding how or how much to structure performances can be tricky, and at times contentious. John Zorn's *Cobra* is one of the best-known ''compositions'' for free improvisation, although his own description of it as a ''game piece'' is perhaps more fitting. In making a distinction between his work and conventional notions of composition, Zorn remarked:

> In my case, when you talk about my work, my scores exist for improvisers. There are no sounds written out. It doesn't exist on a time line where you move from one

[75] Keith Johnstone, *Impro: Improvisation and the Theater* (London: Faber and Faber, 1979), 95. For a related treatment regarding jazz improvisation, see Kenny Werner, *Effortless Mastery: Liberating the Master Musician Within* (New Albany, IN: Jamey Aebersold Jazz, 1996).

> point to the next. My pieces are written as a series of roles, structures, relationships among players, different roles that the players can take to get different events in the music to happen. And my concern as a composer is only dealing in the abstract with these roles like the roles of a sports game like football or basketball. You have the roles, then you pick the players to play the game and they do it. And the game is different according to who is playing, [and] how well they are able to play.[76]

Other strategies for structuring group improvisations in performance include the Soundpainting system, devised by Walter Thompson, and Conduction, an approach pioneered and championed by Butch Morris.[77] Both involve their own language of conducted signs and gestures that can organize and inspire groups of musicians, as well as facilitate multi- or inter-media projects.

With their attentions already engaged in complex ways during performance, others worry that highly involved schemes for structuring improvisation can hinder rather than assist the natural development of the music. For instance, performer/scholar Tom Nunn writes:

> When improvisation plans are complicated—no matter how clear or well explained they might be—the attention of the improviser is constantly divided between the plan and the musical moment, having to remember, or look at a score, a graphic, or even a conductor. What often happens is that both the plan and the music suffer from this divided attention.[78]

During our discussion, Mark Dresser acknowledged that: ''Composition is often about control. You have to build [improvisation] in. I've built pieces that have been little prisons, too. You're looking at something really specific.'' But he added that

> It's a trip to find the balance. You try to find combinations where you have real focus and condensation, and points of real expansion. For me, it is all about being a complete musician. All of those things are interesting. At different points in the evening I try to have all of those things. Its funny, though, when you get in the composer's head it's really hard to let go of trying to control it or to create this kind of balance.[79]

Even compositional strategies that have the sole intent of facilitating group improvisation during performance can backfire. In referring to Butch Morris's extensive system of conducted gestures designed to help organize improvised performances, Dresser commented: ''I've seen the Conduction thing be a disaster with people who just don't like to be controlled.'' Without pre-conceived strategies, however, there is an ever-present danger that improvised music will fail on its own. This danger may also increase with the size of the group. Philip Alperson has observed that ''as the number of designing intelligences increases, the greater is the

[76] Zorn in John Corbett, ''Ephemera Underscored: Writing Around Free Improvisation,'' in *Jazz Among the Discourses*, ed. Krin Gabbard (Durham, NC: Duke University Press, 1994), 233.
[77] For more on Soundpainting, see http://soundpainting.com/. For more on Conduction, see http://www.conduction.us/butchmorris.html.
[78] Nunn, *Wisdom*, 162.
[79] Dresser, interview by the author.

difficulty in coordinating all the parts; the twin dangers of cacophony and opacity lurk around the corner.''[80]

This makes those moments when group improvisation is deemed successful all the more powerful. Lisle Ellis confided to me that he felt that ''a lot of improvised music'' was not ''very good music. But man, when it hits, it's extraordinary! That's what I've spent my life doing—waiting for those moments when it really lines up—to find a way to have some consistency in it. Some days I think I really know how to do that and other days I think I don't have a clue.'' In a telling aside that highlights the almost paradoxical qualities of harnessing creativity, Ellis playfully remarked, ''I've got to write more stuff down! I've got to write less stuff down!''[81]

It can be particularly challenging when discussing creativity to avoid thinking in terms of simple dichotomies while at the same time remaining leery of equally facile truisms. For instance, viewing ''improvisation'' and ''composition'' as somehow antithetical ignores the ways in which they both involve creativity at the shortest and longest timescales. ''Improvisers'' draw on a lifetime of practice and experience while they perform in the moment, and ''composers'' must heed their moments of inspiration even as they record a document intended to be realized at a much later date. Yet simply equating the two ignores the very different set of skills, experiences, and expectations on which they rely. Referencing his time spent as a young man in classes with Muhal Richard Abrams at the AACM school, George Lewis writes: ''Improvisation and composition were discussed as two necessary and interacting parts of the total music-making experience, rather than essentialized as utterly different, diametrically opposed creative processes, or hierarchized with one discipline framed as being more important than the other.''[82] Toward the end of our talk together, Mark Dresser recounted a telling moment during his first tour with Anthony Braxton's quartet that also resonates with this issue:

> The only time that Braxton criticized the quartet, he said, ''Well, you guys are playing the music correctly, but you're just playing it correctly.'' The criticism was [that] you are being too dutiful; you're not taking a chance. That was the day that the format of the music actually changed, from being a *solo-based* music to an *ensemble* music. All of a sudden, the nature of the music became different. That moment articulated when the group came into its own.[83]

In contemporary science literature, a distinction is often made between *complicated* systems and *complex* ones. Complicated systems tend to involve a top-down model of organization that requires a strict hierarchy and the unerring execution of many sequential operations (e.g., an assembly line). Modern concert music in the West has arguably become an impressive showcase for complicated systems, at least in part because the division of labor in the modern orchestra, along with the organizational

[80] Philip Alperson, ''On Musical Improvisation,'' *Journal of Aesthetics and Art Criticism* 43, no. 1 (1984): 22.
[81] Ellis, interview by the author.
[82] Lewis, *Teaching*, 86.
[83] Dresser, interview by the author.

tool of music notation, allows a single individual (the composer) to dictate many aspects (though certainly not all) of a musical performance.[84] Complex systems, by contrast, tend to involve bottom-up or "self-organizing" dynamics that rely on extensive communication throughout a network of highly interconnected parts (e.g., the Internet and the World Wide Web).[85]

The dynamics of complex systems are extremely hard to predict, but not entirely random. They can exhibit regularities, but these regularities are difficult to describe briefly and impossible to describe over time with absolute precision. In short, complex systems can produce "emergent" behaviors; they offer the possibility for surprise.[86] It seems particularly apt that jazz music, and its improvisational progeny, has famously been described as the "sound of surprise."[87] Similar to what we are now learning about the dynamics of complex systems, jazz musicians must strike an uneasy and ever-changing balance between the exploration of new ideas and the exploitation of strategies, devices, and practices that have already been integrated into the system. They seek persistent disequilibrium, by avoiding constancy, but also restless change. By conflating the role of performer and composer, downplaying the adherence to well-established instrumental roles in the ensemble, and frequently dispensing with most if not all notions of hierarchy in performance, free jazz may offer an especially appropriate and fruitful avenue for exploring the dynamics of complex systems.

Two of the hottest current topics for organizational design are jazz music and the science of complexity. Both domains emphasize adaptation, perpetual novelty, the value of variety and experimentation, and the potential of decentralized and overlapping authority in ways that are increasingly being viewed as beneficial for economic and political discourse. Robert Axelrod and Michael Cohen see in the move from the industrial revolution to the information revolution a powerful shift from emphasizing discipline in organizations to emphasizing their flexible, adaptive, and dispersed nature.[88] And Karl Weick, in a special issue of the journal *Organization Science* devoted to exploring "the jazz metaphor," finds that the music's emphasis on

[84] This description is most applicable to the compositional approach frequently described as "modernism." Many "post-modern" composers have explored alternate methods of notating or organizing music that add both complexity and uncertainty to performances.

[85] For more on complexity, see M. Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Chaos and Order* (New York: Simon and Schuster, 1993). For more on the science of networks, see Albert-László Barabási, *Linked: The New Science of Networks* (New York: Perseus, 2002), and Duncan Watts, *Six Degrees: The Science of a Connected Age* (New York: W. W. Norton, 2003).

[86] For a compelling "futurist" account of the ongoing switch from an engineering to a co-evolutionary perspective across several disciplines, see Kevin Kelly, *Out of Control: The New Biology of Machines, Social Systems, and the Economic World* (New York: Perseus Books, 1995).

[87] Whitney Balliett, *The Sound of Surprise* (New York: Dutton, 1959). In an intriguing meeting of metaphors, John L. Casti described the new paradigm of complexity research as "the science of surprise" (*Complexification: Explaining a Paradoxical World Through the Science of Surprise*, New York: Harper Collins, 1994). For an intriguing application of the psychology of expectation to music studies, see David Huron, *Sweet Anticipation: Music and the Psychology of Expectation* (Cambridge, MA: MIT Press, 2006).

[88] Robert Axelrod and Michael D. Cohen, *Harnesing Complexity: Organizational Implications of a Scientific Frontier* (New York: Basic Books, 2000).

pitting acquired skills and pre-composed materials against unanticipated ideas or unprogrammed opportunities, options, or hazards can offset conventional organizational tendencies towards control, formalization, and routine.[89] In a response to the heavy reliance by journal contributors on the idiomatic models of swing and bebop as the source of their jazz metaphors, Michael Zack outlined ways in which free jazz might propel discourse even further into the realm of emergent, spontaneous, and mutually constructed organizational structures.[90]

By fostering more open forms of improvisation in our jazz classrooms, and by acknowledging the embodied, situated, and distributed aspects of learning in our institutions, we may be able to provide effective and efficient ways to handle complex organizational problems, to improve communication outside of traditional structures, and to inject local knowledge into the system—all qualities that are increasingly be viewed as desirable in the modern academy. Perhaps in a way similar to democracy, which along with jazz music has been a powerful symbol of liberation and resistance to oppression on a global scale, improvising music teaches us to value not only cooperation, but also compromise and change. In politics, as in music, a notion of the "common good" is bound to mean different things to different individuals and groups, such that the democratic experience is one of not getting everything you want. In a similar way, the value of improvising music does not lie in the outcome of a single performance. Instead, this value emerges over time through continued musical and social interactions. The act of improvising music together does not necessarily produce optimal outcomes, but the commitment to improvise music together does.

Improvisation in general, and its more open forms in particular, has suffered in the academy for at least two broad reasons. Many instructors still hold the view that improvisation is purely intuitive, therefore it either does not require instruction, or it simply cannot be taught. According to this argument, improvisers are best left to develop "on their own," since they won't benefit from, and might even be harmed by, a "formal" music education. A different, though no less damaging view, imagines that all student improvisers are "blank slates" onto which must be poured the amassed total of jazz theory and tradition, an approach that the reader should, by now, recognize as both impossible and fundamentally misguided (especially if our goal is to produce creative artists rather than musicians skilled at regurgitation).

In this article, I have suggested that a pedagogical approach that views musical creativity from an ecological perspective can help to overcome the tendency to separate musical "materials" (the tools and theory of music) from musical "behaviors" (the application of those materials in context). Broadly speaking, these new theories represent a pedagogical commitment to develop more useful learning environments, as well as a theoretical commitment to avoid the philosophical stance

[89] Karl Weick, "Improvisation as a Mindset for Organizational Analysis," *Organization Science* 9, no. 5 (1998): 543–555.
[90] Michael Zack, "Jazz Improvisation and Organizing: Once More from the Top," *Organizational Science* 11, no.2 (2000): 227–234.

of dualism: to conceptualize knowing and doing, knower and known, mind and body, intelligence and skill, learned and acquired, content and context, and subjective and objective, as interrelated and inherently inseparable aspects of a complex whole.

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I would like to thank the editors, the two anonymous readers, Andy Fry, David Ake, and Suzi Borgo for their invaluable assistance. Although the term ''free jazz'' is not accepted by all, or even most, of the music's practitioners, I have retained it here simply for its familiarity to many jazz educators and historians. The notion that this music is deserving of more attention in the academy can be illustrated by the simple fact that, despite its nearly fifty years of development in both the United States and abroad, it is often still described in terms of what it doesn't have—what it has been ''freed'' from, rather than in terms of what it offers—very different, yet no less valuable, musical approaches and aestethics.

Abstract

A pronounced shift is occurring in fields concerned with contemporary education, psychology, and cognition, such that learning cannot simply be conceived of as transmitting and receiving factual information. When viewed from an ecological perspective, all knowledge is ''co-instituted'' in which the learner is participating: it is embodied, situated, and distributed. Yet conventional jazz pedagogy frequently treats musical ''knowledge'' as individual, abstract, relatively fixed, and unaffected by the activity through which it is acquired and used to the detriment of more experiential, exploratory, and collective approaches to improvisation. Drawing on interviews with celebrated improvisers and pedagogues, this article confronts the conventional wisdom of jazz pedagogy and argues for more responsible and responsive educational practices.