Conversations: David Dunn, Nick Miller, Emily Thompson

By Steven M. Miller

Conducted in person, over the phone, and via email during fall & winter 2005–2006, these three conversations reflect a wide range of professional activities, each with a particular set of concerns and area of focus. My interest was in delving into the broad field of sound studies, and finding out what some of the leading practitioners in areas as diverse as academia, industry, arts, and sciences are doing, thinking, and talking about. What stands out to me as a link among the three is the passion, dedication, and deep concern for the acoustic environment in all its myriad forms. These are three individuals who truly turn their ideas into action. Brief excerpts from these conversations were first published online at http://www.arts-electric.org.

A Conversation with David Dunn, October 2005

Sound, Science, Music, Evolution, and Environment

David Dunn

David Dunn has a long history in the worlds of acoustic ecology, contemporary composition, and leading edge thinking. He is the author of *Music, Language, and Environment* (a CDROM of selected scores, writings, sounds, and images), *Skydrift* (a book documenting a large environmental sound project), and *Why Do Whales and Children Sing?:A Guide to Hearing in Nature*. He is the editor of *Harry Partch: An Anthology of Critical Perspectives* and *Eigenwelt der Apparate-welt: Pioneers of Electronic Art*.

Your work over the last couple of decades has involved sound making, listening, and the soundscape in a variety of public spaces, including urban, rural, and national park/wilderness settings. Increasingly, it seems, this work has shifted from primarily artistic to largely scientific in purpose. Can you briefly describe some of the recent projects on which you've been working?

I've been studying the role of sound communication in the ecology of piñon pine and its primary invertebrate pest, the piñon bark beetle (Ips confusus). My research indicates that a sonic attraction effect may be a significant factor in the dynamics of bark beetle infestation. Not only do the beetles emit sounds that may be a mode of communication, but the trees themselves, when under drought-induced stress, emit ultrasonic signals that the beetles may hear and may be attracted to. Unlike all of the prior bioacoustic research relative to bark beetles, I've been making extensive field recordings within the interior of the trees using my own custom designed transducers in order to study the relationships of the beetle sounds and tree sounds to the extent and geographic distribution of the beetle infestation in the piñon forests.

This work is, in a very real way, a synthesis, or perhaps a dialog between art and science. One of my interests has been in reframing a lot of the activity in which musicians have been engaged over the last half-century, particularly in the experimental American tradition but also some aspects of European music. I've always had the sense, for a very long time, that there's some deeper significance to this activity. We really don't know what it is we're engaged in.

In terms of sound making…?

In terms of sound making, music composition, and the whole activity—what we consider to be music in the experimental guise but also music in general. In some ways that's a silly statement, because we know perfectly well what it is—or at least most people think they do—and there's an overt aspect to that which is its entertainment purpose and its deeper cultural resonance in terms of ways in which music informs us collectively, and how we're engaged with that: the kinds of buttons it pushes in terms of emotional and physiological associations. But I've had this sense that there's another level, a kind of unconscious project that's at work. A lot of my work has been about reframing or re-examining—both historically and analytically; looking at what some of that activity might mean in the light of what I think may be its larger purpose.

So when I say that there's a scientific aspect to it, it isn't so much that I want to be a scientist. Although, it's funny, because in recent years I've come back full circle from my childhood and adolescence where I was very interested in science and natural history—an older notion of what science consists of, an older historical frame more like 19th century and early 20th century natural sciences and natural history—that whole Anglo-Saxon natural history tradition. It was always something I was really interested in and I've come back to appreciate that. I've come back to a sort of deeper appreciation of what science represents and the necessity to embrace it in the form of a kind of healing between the divergent cultures of art and science.

So there's an overt aspect to that. A lot of what I'm doing with the bark beetle work is, in many ways, scientific, and it's been funded as such: to go out and make these recordings and to formulate a hypothesis about what the nature of the bioacoustic activity of the beetles is. And that's been pretty interesting because it's meant that I've had to learn an awful lot very quickly. But there's a hidden agenda: I've been trying to make the case for what I think is an opportunity, and now a historical necessity, for artists to contribute towards scientific thinking. The entomologist and theorist of evolutionary biology E.O. Wilson talks about consilience and the role of art in relationship to science and the necessity for the two cultures to reconnect. Neither can be complete without the presence of the other. He talks about that through the notion of interpretation. Artists are the best at presenting the facts of nature as revealed by science, interpreting those and disseminating them to a broader public. It's an absolute dire necessity we now have to reach a larger audience in terms of what science is telling us. Artists are the visually and aurally literate of the culture. They are the trained filmmakers, photographers, sound artists, and interpreters at that level. That has also been the traditional relationship. Science does its thing and art enters as a kind of back-end function to interpret this and disseminate it to the world. I think that is only one important role.

However, there's another role that we're just beginning to be more aware of. It's a kind of front-end relationship between art and science that has the potential for artists to participate in hypothesis generation. What artists often do is to reframe how we experience the world and thereby ask questions that transcend the specialization and narrowness of current scientific training.

Your feeling, then, is that artists are not only good at interpreting answers but also at posing questions, and that those questions often are inherently cross disciplinary? The questions are not so narrowly focused as most advanced science is; they tend to be either themselves broader or have broader implications?

Yes, and the questions that artists ask are often synthetic in nature and as a result they're often the kinds of questions that are the most pithy, or relevant at this point historically—particularly in relation to ecological thinking which is by its nature a synthetic approach. So I think that there's a real potential there. But it's very difficult for scientists to be open to that notion, and with good reason. If you look around at a great deal of what constitutes the art world now—even as an artist I'm suspicious, if not appalled. So someone outside the discipline is going to think, "You've got to be kidding!"

"Why would I take this seriously?"

Yes, exactly. I think that's a really valid concern. But when the scientific world is open enough to allow that kind of relationship, interesting things can and do happen at the level of framing these synthetic questions and framing appropriate hypotheses. But, I do think there's a point at which one can be deluded into thinking one's really doing hard-core science. I think what I'm talking about requires a very different level of education for artists, which is to be much more grounded in terms of scientific theory and an understanding of what science is and does. You have to understand what the limits are of the questions you are asking. Then you can understand at what point it's appropriate to hand over your participation to really serious scientific research.

Do you think that, with the broad access to and adoption of technological tools, in terms of computing, etc., by artists, that essentially—whether consciously or not—we've been preparing ourselves for that role, or at least getting ourselves in a headspace where we don't see it as such an odd role to play?

I think that's actually the appropriate next question. That's the arena where this re-synthesis and new dialog between art and science has occurred just naturally. They've drifted together out of a commonality of tools. As a result, that's exactly the domain where artists are often really useful: the creative application of technology. It's a unique training by the nature of the kinds of things that artists concern themselves with, but now that's taken on a deeper resonance because of the way in which these technologies are used.

How has your work—particularly the work that you've done over the last 20–30 years dealing with sound making and the soundscape in public and natural spaces—how has that contributed to your understanding of humans' roles in the acoustic environment? What are our responsibilities there, whether as artists or just person-on-the-street walking through the acoustic environment? What's our role?

Well, I think the role should define the responsibility, but it hasn't. We really need to ask, "what is music about, what is this activity?" In terms of its evolutionary significance, Stephen Pinker, for instance, as a theorist of cognition, believes that music has no evolutionary meaning.

It's basically the appendix of the aural evolutionary body…?

He actually calls it auditory cheesecake. And yet, he thinks it's one of the great human mysteries because every culture we know or have known of had some form of music. There's obviously something significant about this, but on an evolutionary level he thinks there's no real imperative; it's just something that exists and is a rather extraordinary mystery because of that. I don't think that's true. I think that there really is a direct evolutionary imperative. Music is the vehicle through which we explore our auditory structural coupling to the external world.

In a sense it's a way of 'pinging' our environment; it's a way of understanding our relationship to what's making sounds around us.

Well, it's one way of understanding it, through sound. Music is one of the most profound means we have for growing the capacity to perceive the world through sound.

That's interesting, because one of the things that I've often told my music students is that musician/composers are the 'Research & Development' team for human consciousness. Artists of all kinds are, but specifically for musicians part of our job is not simply to make weird sounds but, as in true research and development, it's also about trying to come to an understanding that we can report back to everyone else.

Often the impetus to do that occurs in a very unconscious or subconscious manner. We think we're doing one thing when we're really doing another. It's what Buckminster Fuller called the principle of precession. We're motivated by, "Well, I want to learn to play electric guitar to attract girls"—and there's all these things that are driving us in some manner, and secondarily the more important things are sort of dragged along. We're evolving these capacities as we go.

In a sense it's parallel to the idea of play in childhood development. It's a fantastic way for them to explore their capabilities and relationship to their world, and to gain a better understanding of that relationship.

In that sense, the 'R&D' goes on in many ways. Possibly the most potent and important role for music is something we're evolving towards. Along the way we're trying to fit it to all these circumstances and it *fits* all of them—you know, selling laundry detergent, or as an alarm clock, or…

Or as sonic wallpaper in a supermarket…

…I mean, you name it—music is used for it. The superabundance of that is so large that it almost becomes absurd. It's so large that we really can't pin it down.

But, ironically, not only is it in superabundance, but it also exists in a superabundance of inattention, because mostly we don't notice it when it's fulfilling those roles. Not only don't we notice it's fulfilling those roles, we don't even notice it in those roles often—usually when it's most successfully done.

There are a lot of applications where the success of music is determined by how it resides at an unconscious level, or 'below the radar' on purpose…

To 'grease our skids' for various aims.

Film music is a good example of that. The less aware of it you are, the more successful it generally is.

In another interview with you that I read recently, you characterized your musical interests as "less in the expressive side of music behavior and more in the questions that are raised by the mere existence of musical phenomena". So my question in response to that statement is, what are some of these questions and what are some of the implications of them for musically active people (musicians, composers, etc.)?

Well, what I was referring to in that statement is something that a lot of musicians find threatening. "You mean, music is something other than what I've been dedicating my life to?" And that's not what I'm saying. In fact it's just the opposite. My argument is that all these things we hold precious as traditional musical values are a subset of something larger.

Placing them in a context.

Yes, placing them in a context, and I'm just saying that I happen to be more interested in the broader context, in the process of framing these things, than I am in participating in that traditional role.

Right. You're more interested in the context in which sound behavior happens than any particular emotional lever that sounds produce.

As a composer, I find it really boring to be engaged in that level. That's fine if other people are…if that excites them, then 'go for it'. Obviously there's a need for that and there's a lot of cultural reinforcement for that. That's what gets people careers and success and all the things we associate with musicians and all that stuff. It's just, personally, I have no particular interest in developing that. As a kid I spent hours and hours developing the neurological mapping necessary to play an acoustic instrument. That has a lot of value. And then when people want to turn that into something where they're being expressive about their life…again, I just don't think that it's necessarily what they think it is. They're engaged in an activity with a whole lot of assumptions, most of which are culturally reinforced, and much of which is not actually true.

Pine tree on the side of a cliff.

At least not beyond that surface level.

For instance, when one talks about music expressing emotion and ideas, I certainly accept that music can express emotion. But, if one examines that a little deeper, just what do we mean by 'emotion' and what are we referring to in terms of the traditional musical notions of that? There are now even psychological arguments that the deep physiological states that we experience as emotion are themselves cultural constructs. They are just so powerful that we assume they must have universal traits when they may actually be behaviors that we learn.

Larry Polansky's way of framing this question of what music communicates is to say, if all the claims people make for being able to express specific ideas through music, then music, in the absence of words, would be capable of telling someone what to go shopping for at the market. Music can't do that.

Yes, but that's different than emotional expression. That's specific semantic content, which operates on a certain level of consciousness that emotions don't.

Yes, but I'm not so sure, in terms of the claims that people make. Film music is a specific example of this. I think film music functions at the level of, "OK, here we've got the minor chords, and we're supposed to feel sad," and I don't think that the responses an audience has to it are innate to the musical expression. I think it's entire-

ly due to cultural reinforcement. In that sense, it's a set of semiotic codes. You know, we grow up with exposure to this and constant reinforcement. By the time we're a certain age we've got it pretty well down that the minor chords represent sad feelings. I don't think it really has much to do with authentic emotion. At that point, I don't even think we're necessarily experiencing emotion. I think we're experiencing a semiotic referred state, and like Pavlov's dog we're salivating in response to the stimulus we've been taught to respond to.

We're participating in the agreement that that's what it means…

And that's a cultural construct.

Right.

And in that sense it has semantic reference.

Or at least potentially does.

Functionally it ends up having it. If we're to talk about the authenticity of emotions—well yes, music expresses emotions as states of physiological response that are biologically hard-wired and that most of the time we don't have names for. A typical response to some of the most profound experimental music of the late 20th Century is a kind of 'fight or flight' response. It's triggered in the audience because of a sense of being overwhelmed. So much electronic music has this apocalyptic overwhelm and you get audiences sometimes freaking out and the composer wondering what happened.

Because that's how they're wired.

Yeah, it's biologically wired. Again, we think we're doing one thing when in fact we're doing another.

Or doing both, but not aware that we're doing the other.

Yeah, yeah.

In that same interview I referred to, you described music as, "a conservation strategy, a way of making sense of the world." How, if at all, does this articulate with the traditional roles—at least in the modern Western world—of composers, musicians, sound artists, etc.?

Um, I'll sort of slide into that, I guess. I think music is in many ways an atavism and a conserving strategy. It's a way of keeping alive a modality of communication that we share with other forms of life.

In that sense a non-linguistic form of communication?

Absolutely! I think [Noam] Chomsky is right when he says that human language is a species-specific adaptation. I accept that. But I don't think music is. I think we've evolved it in very ornate and uniquely human ways. The evolution of music is one of the ways in which we define what it means to be human. We keep redefining it as we keep redefining our humanity. What we have probably valued most, with this notion of an expressive modality of communication, is actually something that I think we share with other forms of life. One of my favorite thinkers, Gregory Bateson, took over John Lilly's dolphin communication lab in Hawaii for a couple of years. He came away from that experience with a fairly profound understanding of the differences between human and animal communication, what the distinct aspects were, and how they are similar. He came away with a conviction that dolphin communication, as an extraordinarily rich and complex form of communication, had very little in common with human language. The only thing he could relate it to, in terms of human experience, was music. Much more is being communicated by the complexity of this modality of communication than we have usually dared to imagine and that is something that musicians can relate to and talk about.

Or at least talk around…

Sure, sure! A great example of this is current research in the Canary Islands, where tour boats were jamming whale communications adjacent to the islands. The researcher who was looking into this was traveling in Western Africa and heard traditional West African drumming. He realized that there was something about this that was similar to the whale communication. He brought a master drummer to listen to the whales through hydrophones. What this master drummer heard, he understood to be a social hierarchy that was very similar to the way that a social hierarchy exists in West African drumming. That tradition is very well defined in terms of how you participate. This understanding allowed researchers to assign channels of relationship between passing boats such that aspects of the whale social hierarchy could be maintained.

At one and the same time, it's that basic *and* that profound… maybe because it's so basic it's so profound. So how does music, however we might define it then, fit into the overall world of the acoustic environment? And more importantly, what role do you think that composers, musicians, and sound artists have in helping us to better understand the acoustic environment? Part of the background to that question is that so many of the first generation of acoustic ecology researchers were composers. That doesn't seem to be coincidental to me.

Well, I think it was, and remains, a natural relationship, because that's what composers do. Composers are specialists in a manner of systemic thinking and residing at the edge of chaos. The really cool stuff exists at that edge between too much disorganization and too much order. I think we're not only trained to sense that edge but it's something that we are biologically wired to perceive.

Our senses are essentially 'difference detectors' so if there's undifferentiated 'constant difference', i.e. perceptual noise, it's perceptually the same as no difference at all.

If things are too ordered they're boring and if they're too chaotic they're boring. There's this happy medium that you can actually plot mathematically. It's this point where there's this interplay between redundancy of information and novelty. This is also what we mean by a musical structure. That's what composers do. Another way to frame that historically is that we evolved music out of a survival necessity: how do we listen to the soundscape we're embedded in and discern the details of it necessary for survival? For instance, the frequency range of hearing in most organisms—the frequencies that we can hear, coincide pretty well with the sounds of the things that we need to eat, and the things that eat us. That's pretty much where the bracket occurs.

So, if it's sonically outside our perception, that's ok because those typically tend to be the things we don't need to worry about anyway?

Yes. In terms of biological evolution, it doesn't make sense to invest much of our biological energetics towards things that we don't

need to perceive—things that are more or less outside the domain of relevance. The easy term I use for that is environmental hearing. The way in which we heard the soundscape was heavily invested with survival relevance. It's tied to hearing meaning in the world around us. We had to in order to survive. You can see the evolution of music move away from that as we become less concerned with the necessities of survival in the natural world and gain more control of the environment.

By the time of the ancient Greeks we move into this concern for music as pattern recognition and number theory as an underlying driving force of Greek culture. This concern with pattern recognition through number theory evolves and passes through a number of other stages into what I call spectral hearing. By the time of [Jean-Philippe] Rameau we have this obsession with hearing the vertical relationship of harmonic pattern and that becomes formalized in the physics of Fourier. In other words it's a refinement of what we perceive in the natural world, and a greater attention to human concerns rather than the natural world as external to us. It's less about the urgency of hearing the soundscape as meaningful as it is these other levels of cultural concern.

By the time we reach the 19th century, and [Hermann von] Helmholtz, we start to investigate the details of aural perception in a scientific way. We begin to dwell on our perception more, and use technical instrumentation to perceive the world. We now listen to the world through our instrumentation. It takes on another level of resonance by the time of John Cage. We redefine the nature of the environment, and how we hear it into a new kind of soundscape. We start to apply these aestheticized modalities of hearing that we've passed through to now listen to the natural world. We begin to hear the soundscape as a musical form. That's largely what Cage was all about. He kept saying that, "the music I love the most is just listening to the world around me." That's applying an aestheticized perception to the physical world. While composers were probably the first to do that, it's become a predominant way in which we listen to our environment. When you put that in conjunction with this technologically based way of perceiving the world, we come back full circle—or full spiral—back to a recapitulation of hearing the soundscape as meaningful; only now it's meaningful in a scientific sense. In the fields of bioacoustics, scientific sonification, acoustic ecology, bio-musicology—many of the most important participants in these fields are musicians. I think there's a historical necessity for it. We've come back to, in a very literal way, listening to the environment as meaningful and communicative. We now listen to the clues of the world around us, because it's in peril and we are therefore in peril. Unless we learn to focus our ears towards the sonic messages that the earth is telling us, we may not survive the next century or two. So when I talked earlier about my interest in framing the context in which this all has meaning—that's the context I was referring to.

But essentially what's going on behind the scenes is this dual role of development and training.

And sensitizing…

We're relearning to orient our ears to our acoustic surroundings again.

And with full necessity to do so! For me, all that other stuff about musical expressivity and its being a carrier of emotional expression, ceases to be as important as the focus upon that function, and in many ways constitutes a distraction from it.

In a sense, at best it is window dressing; at worst it's distracting our attention from this larger purpose?

I wouldn't maybe go that far. I think it's more than window dressing. I think it always has been more than window dressing and, in fact—in the attempt to express ourselves and create social bonds and cohesion in the way that music expresses and performs that function—we are evolving new ways of hearing. I would say that, in some sense, every musical composition, every musical expression, in some way participates in the expansion of the boundary of perception; how we hear the world, how we relate through sound to our world. Every piece of music does that even though that may not be what is driving the individual that made it. I personally want to listen to a musical composition for its content about how it changes the way I may listen to the world. The most important aspect is whether it informs me about new ways to perceive things.

I talk about how one of my central interests as a musician and composer is to pose the question, 'what does music contribute to the concept of mind?' And I choose the term 'mind' for very specific reasons. We use the word 'perception', or 'cognition', or 'consciousness', or others—there's this nimbus of these terms—and we're referring to something, but for the most part they're all so general that they're interchangeable. Different disciplines want to parse all of these terms in different ways.

Sure, and locate them in different places.

Yes, and locate them in different places. For the most part it's completely arbitrary. I prefer to use the term mind, which is in some sense the most fundamental definition for these things. Gregory Bateson poses a cybernetic concept of mind. Mind arises from as little as two components in a circuit and an exchange of information in the form of difference. These circuits of relationship are the most fundamental and simple level at which I understand these things. It's also a convenient point for understanding the concept of emergent properties—this idea that complexity arises from the interaction of very simple elements. How things come together gives rise to things that are greater than the sum of the parts.

Essentially, a difference in scale from the very simple to the most complex is a more of a quantitative difference than a qualitative difference, but at the higher end of the complexity scale there are more possibilities for emergent behavior because of the interactions of these simple units?

That's a pretty fair way of putting it. So, in that light the difference between cognition and perception that you're posing—cognition implies this kind of stable structure of mind at a certain level of complexity, and perception is the vehicle through which structural coupling takes place between mind and environment.

Which leads me to the obvious question, responding to that and your mention of emergent properties. Tell me about the current project you're working on in terms of the sonification of chaotic attractors and other types of dynamical functions. Where does that fit into, or articulate with, what we've just been talking about?

There are a couple of levels. First of all, in recent years—I've made an overt shift from framing my work within linguistic metaphors and concepts into framing what I do in terms of complexity science models. More specifically I've been collaborating with the physicist James P. Crutchfield on something called *The Theater of Pattern Formation*, visualizations and sonifications of non-linear dynamics. It's a particularly compelling project for me as a composer because the mathematics produces such rich sonic structures.

Doesn't that depend on the skill of the person doing the sonification? The chaotic functions themselves have no inherent sound but for someone like you who's interested in them, you have ways of turning them into particularly rich sounds. I just want to point out, to someone coming to this interview from a non-science background, that the richness is not inherent in the data.

It's a very good example of the interpretive function between art and science and the richness of potential collaboration. I'm interested in exploring these things not only because of the sounds that they make but also because it's a way of rationalizing some important historical activity. I think a great deal of the activity we were engaged in as composers and sound artists during the 60's and 70's—David Tudor, Sal Martirano, Richard Maxfield and many others who were doing experimental work—was based upon these dynamical principles but we had no idea that that was what we were working with.

The vocabulary either had not developed or hadn't penetrated the sound art world.

It was all intuitive, and interestingly enough, the analog synthesizers that we were playing around with at the time really are forms of analog computers. We were playing with those at the same time that the chaos guys were using analog computers from the aerospace industry. Digital computers weren't fast enough to do the visualizations they were playing with. We were all using the same kinds of tools, on one level mathematically rationalized and on another level entirely intuitive sonic play.

And, not insignificantly, on one level with industrially designed, very expensive tools, and on the other completely home-brew things soldered together by a bunch of composers in their garages.

Yes, but using very similar circuits. They were all forms of analog computers. So, part of my playing around with this stuff shines light upon a particular domain of musical research that's gone on and gives it a more rational perspective. This is very similar to the way in which these unconscious processes, that I referred to earlier, unfold. You can also see them in the history of science. When Poincaré and other mathematicians were doing what they did at the beginning of the 20th century, it was also largely an intuitive process. They really weren't particularly interested in practical applications. They were playing around in an imaginative and theoretical manner. But now their ideas have come to full fruition in current physics.

They've essentially become very potent metaphors for understanding all kinds of phenomena in the world—sonic, visual, evolutionary, geological, etc., etc.

And it's precisely that intuition which is behind my intellectual interest. A lot of the same dynamical properties of these ordinary differential equations that define these chaotic attractors, and produce beautiful geometric objects and sonifications, underlie a lot of the natural world in terms of pattern formation. Turbulence flow, cloud formation, the circadian rhythms of our bodies—more and more we're coming to realize that the underlying structures of all kinds of different natural phenomena can be described by the same mathematics. As someone interested in the sound communication of non-human living things, my interest in complexity theory and playing around with these equations and their sonification is a form of play that might shed light on the generative processes at work in complex natural soundscapes.

What you're working on is developing models that help to explain what's out there, which then will help us to better perceive what is going on in the world?

It is to expand our capacity to aurally structurally couple with the external world. The connections are quite overt and reinforced by experiences I've had doing soundscape recording. One of the best examples of that is the experience I had in the Atchafalaya Swamps of Louisiana. I heard extraordinary spatial phase transitions in the soundscape occurring over many hours. When you sit all night long in a place with such biodiversity, you get exposed to some extraordinary things that I think may only be explained by these kinds of non-linear dynamical processes.

Right, and would it be out of place to say that—tying in another part of our conversation—those are also emergent properties, in the sense of emergent properties of mind in the acoustic ecology of the place?

Well I think that's where it gets really intriguing. At what point are we willing to redefine our understanding of the intelligence of the non-human world? Ultimately, I think that's the most fundamental question. And in light of that, for all the scientific insight we have and for which I have respect, I think almost all of it is going to look foolish in another hundred years, specifically with regard to how we understand this property of mind and the richness of solutions for how the non-human world thinks.

In other words, what will likely end up looking foolish is artificial demarcations based on 'human vs. non-human'.

It defines everything about how we relate to the natural environment, and to other living things, and how we place ourselves in relationship to them.

And, therefore, our responsibilities to them.

Absolutely! There are all these very profound questions about human-animal relationships, about how we relate to the non-human world. Fundamentally what is at work is the potential for a revolution—a more pervasive and radical redefinition of what it means to be human, and the nature of how we organize the societies we live in. The more we come to erase that boundary—this arbitrary definition of human mind over non-human mind—there is the potential to change everything. In many ways it's one of those issues where it isn't so much about our willingness to embrace the philosophical truth. It has less to do with the truth that's revealed to us than with the discomfort engendered by the reorganization required from that truth. We may never get to the point where we create a human society that is in tune with what we actually understand the nature of non-human mind to be, because it's too big a leap—it's too big a demand: the redefinition of everything that's human.

I'm not sure which spiritual tradition this comes from, but the phrase "looking into the face of god" comes to mind. I mean, that's essentially how big that realization is. It's that awesome a proposition.

And if we really do come to that point where we can no longer arbitrarily separate ourselves, meaning that we don't have dominion, all bets are off. It means we have to restructure and redefine almost every aspect of the societies we have created. At what point can we or will we be willing to do that?

A Conversation with Nicholas Miller, November 2005

Nicholas (Nick) Miller is an acoustician and noise control consultant. He co-founded the consulting firm Harris Miller Miller & Hanson, Inc. in 1981. http://hmmh.com

Your work over the last couple of decades has engaged with noise issues in primarily public spaces, encompassing urban, rural, and national park/wilderness spaces. What are some of the most important impacts and effects of noise on people in these settings? What are the primary sources of noise problems? What are some of the historical approaches to dealing with them?

In terms of effects, interference can lead to an emotional negative reaction, termed annoyance, though experiencing interference does not always result in annoyance. Interference can be with speech/conversation, listening/contemplation, or relaxation. It varies widely by individual, though one can always derive average responses which we have done in national parks.

Sources vary widely. In major urban areas they can be honking horns, car alarms, car stereos, highway or street traffic either in general or specific vehicles such as loud trucks or motorcycles or buses, parties/rowdy people, sirens, trash pick-up trucks, back-up alarms, barking dogs, etc. In suburban areas it's more likely to be lawn mowers, dogs, go-carts, motorbikes, student parties. Highway traffic noise affects mainly those living within several hundred to about 1000 to 1500 feet of the roadway. Aircraft operations often affect people living within 3 miles or more of the airport, depending on number of operations per day and night. In national parks, remote areas with little local sources of noise, small aircraft, tour aircraft, and even high altitude jets can cause interference and annoyance. ATV's are likely a problem in some areas, though we have not been involved with these sources; I know, however that some states are concerned about the noise and other effects of Off Highway Vehicles. Jet skis and high-powered watercraft can cause adverse reactions along and around waterways. Snowmobiles have been problematic in rural areas and some parks (Yellowstone). Generally speaking, it's hard to find any place where some sort of human-produced sounds are not heard regularly – within minutes, not within hours of listening.

Nicholas Miller

The well-developed approaches are really for sources that are the subject of government oversight—aircraft, highway traffic and rail/rapid transit systems. Each of these sources is regularly affected by government actions that require documentation of environmental effects. New or expanded runways, widened highways, expanded or improved track beds and rail alignments are all actions that can require noise and environmental analyses. For general design of public spaces and management of national parks, the jury is still out (or hasn't even been selected). That is to say, the major transportation modes all have documented methods for determining "impact" based on quantitative values (decibels of one form or another). This goes for the military services as well—Army, Navy/Marines and Air Force. But public spaces and parks are more likely to be designed or managed to provide specific opportunities to the public/visitors and these opportunities, such as rest, contemplation, conversation or even performances, have not been much studied in terms of what soundscapes are appropriate, and certainly not quantified; hence no approach, historical or recent has yet emerged.

How aware is the general public of noise issues? How is this level of awareness (or lack thereof) manifest in public debate on noise issues?

Those living near airports and along major transportation routes are well aware of noise issues. However, whether or not they know whom to complain to may have a major effect on actions they do or don't take. Also, people's reaction to noise varies widely—some may be little bothered by sounds and levels that seriously annoy others. I think the Internet has made it possible for widely distributed interest groups to link up and find common ground. Google searches can turn up all sorts of activities and information. In the US, "Airport Noise Report" is the newsletter that everyone in aviation reads to find out what's happening. The site http://www.nonoise.org is sort of a clearinghouse for all sorts of information about noise issues. Interest groups range from those focused on specific sources of noise (airports, highways, parks) to the aesthetics of the sound environment.

Part of the mission of the National Park Service (NPS), in managing public lands, is to preserve, restore, and/or protect natural resources for future generations. Included among these resources, both implicitly and explicitly, is the natural soundscape. In terms of national parks/wilderness spaces, what are the main obstacles, in your opinion, to effectively managing these soundscapes? What strategies are likely to be most effective in overcoming these obstacles?

I would say that for NPS the main difficulties are in formulating a consistent, well-developed process across so many different park units. They are, however, making progress in staff awareness and I have a sense that the NPS Natural Sounds Office in Ft. Collins, CO is making progress in spreading the word among park managers. The unanswered critical question is, however, how much human produced sound is acceptable in park settings.

The issue is really not to get too involved in the metrics at first, because in the park system there are not only the visitor reactions, but the other side of it is opportunities for visitors because visitor reactions may not correlate with the opportunities that the parks are trying to provide. Parks have their own management perspectives, and part of it is mandated by Congress—when it sets up a park—as to what its purpose is. The park management then tries to fulfill that purpose, and do so while managing the park for certain experiences and for preservation as well. So, as I've understood it, and I think I'm quite correct because I've talked to them a lot about this, in managing a park it really is a synthesis of a whole bunch of objectives that they're trying to meet. Not solely the visitor's experience, but the visitor's experience plus a lot of other things. For example, what soundscape is appropriate for a Civil War battlefield? Or visually, a visitor might enjoy the rolling hills but not realize that, back then, they really didn't have those types of fences, or something like that. And so the park management is aware of that and is always trying, to the extent they can, to adjust the park to fulfill its purpose and what they think is appropriate.

In terms of acoustics, or the soundscape, the point is that the park management really needs to 'get out there' and decide, through a synthesis, what parts of their parks sound the way they should. If there's quantitative data available that certainly helps, but they also have to make some judgments based on their experiences as to what's appropriate. And that, I think, should happen before anything else,

Continued on page 20

Sound Garden: New York City, July 2007

Installations by members of the New York Society for Acoustic Ecology (NYSAE) brought acoustic awareness to CitySol, an arts festival held July 12–15, 2007 along the Hudson River in New York City, in which all works were solar, wind, water, or people powered.

SlapHappy, by Andrea Callard and David Watson

N., by Andrea Polli

Conversation, continued from p. 19

before thinking about metrics. Park management personnel do get rotated somewhat, but once they've been in a park for a while, they know what they're trying to achieve in different areas of the park. You know there's front country, there's back country, etc. There are parts of the backcountry where it's acceptable to have moderately frequent interaction with other hikers, and other parts where you're supposed to rarely see anyone, and they should have a sense of what soundscape goes along with that purpose. And so once they've decided that, for example, a given site's soundscape is what it should be, they can then bring in the acousticians and technical folks who will give you all the metrics they can think of that apply to that park and you can begin to narrow it down as to what some of the values of those metrics should be. One of the interesting things about it is that, in many ways, it's not the numbers that matter; it's what it sounds like. But the only way you can, over a long period of time and objectively, determine whether you are meeting your objectives is by some kind of metric because the staff personnel will change, or it may be hard—you know a manager can't sit out there for three days and decide if it has gotten worse.

As with any of these things, if you've got an issue, or even if a park is the way it should be, to keep it that way will mean you're probably going to have to constrain somebody. And those constraints, as we've found in the problems that we've worked on, those constraints are what cause the big problems. You know, you're telling snowmobilers "you can't use your snowmobiles there", or you're telling air tours they can't fly there, and it immediately raises conflicts. So how does one approach those issues in a way—if they're a federal agency they have to go through a public process, and if they're making changes they have to go through an environmental study process—they have to justify these changes in an orderly way.

In many cases, it seems that the various interests in the parks are at cross-purposes.

Yes, that's true. It's ironically true even within the park service mission. As you can easily imagine, to provide access and yet conduct preservation at the same time is difficult. And they get quite experienced at this, they're used to living with this kind of double mission, but the acoustic side was, as of ten or fifteen years ago, kind of a totally new thing as to how to grapple with that. And they're getting there, but the whole issue of choosing indicators, that's what they call them, I might call it a metric but they're really indicators—in terms of decibels or in terms of percent of time audible, for example—they're really indicators as to whether things are getting better or worse. They need those as part of their management approach over time.

In particular, you have been working to develop metrics for quantifying noise levels as well as methods for correlating these with park visitors' qualitative responses to their experiences of noise. How successful has this work been in terms of being able to use objective/quantitative data to understand and/or predict visitors' subjective/qualitative experiences? What are the current limitations of this work, and what is its long-term promise for developing into a set of fundamental tools for parks managers?

The dose-response work we did for the NPS, correlating the visitor's responses with the quantitative data, has not found application within the park system. It is regarded as too limited in number of samples, too much dependent on one short time period in too few locations and for only one type of noise (tour aircraft) to be broadly applicable. I see that work as only providing a sense for how visitors react to tour aircraft—not as applicable to developing guidelines for limitations. I should note again that visitor enjoyment is only part of the NPS mission—as you state above, their mission is to preserve resources, so NPS management must judge what it means to preserve or restore park soundscapes.

What techniques do you foresee gaining wider application within the park system in the future?

Well, I think that they'll end up with the things we've just been talking about, that include management judgment, and then public interaction, and politics. If you look for example at the history of snowmobiles in Yellowstone over the last five or eight years, you can see in microcosm there all of the conflicts that can come about—the

Oceanic, by Andrea Williams

Gnomon, by Brett Ian Balogh

suits and counter-suits as management goes in one direction. We were involved in helping quantify the audibility of snowmobiles under different circumstances, and different types of snow machines, for instance those carrying multiple people, how audible they would be over what areas of the park. So park management made some decisions and then they were changed by the politics and the administration had them go back and try again. As I read it, it's starting to work itself out in that they limited the total number of snowmobiles, and it was quite a high number relative to history, but they also required that that anybody going on a snowmobile in Yellowstone had to be part of a guided group. They also required 'latest technology' which is the [somewhat quieter] four-stroke engines. And for whatever reason, I haven't seen any research but the parks people might have an opinion, but for whatever reason the total number of snowmobiles dropped quite a bit. It just sort of happened. I just read about it in a couple of news reports, and haven't talked to any of the parks people about it, but that was kind of an interesting outcome.

So in this case if you go back in the history of it you'll see the efforts to make some quantitative judgments based on a rational approach, then politics get involved, and people are fearful that their business is going to be destroyed by limiting snowmobiles, and snowmobile users get upset, and lawsuits happen, and counter-suits…not to be facetious but I have heard the park service people say, "Well, we gotten sued by both sides so we must be almost there."

How would you describe the relationship of your work to the growing field of Acoustic Ecology?

My limited experience has been that those who are interested in "Acoustic Ecology" have differing opinions of what those words mean. However, no matter the definitions, I sense that what our work has to contribute is an understanding of how to collect and interpret quantitative data that could be used to further the pursuit or understanding of Acoustic Ecology. I think our/my background comes from the technical, engineering side of acoustics, while Acoustic Ecology attracts biologists, general environmentalists and those interested in the aesthetics and values of natural areas—but this depends again upon the definition of Acoustic Ecology.

In what ways do you see this quantitative understanding translating into the active work of soundscape design? Is there much work being done within the park system in terms of proactive design, as opposed to remediation of problem areas? Have you been involved in this end of the soundscape design process yourself?

As far as the national parks are concerned, I would say that the real design of the areas, well it has not really gotten to that stage while we've been working for them. It may yet, but it hasn't really. We were looking at individual problems as they came up, the air tours, the snowmobiles, the watercraft, etc. The rest of the question I don't think I can really answer in terms of the parks because I don't know where they are going with that. I believe they are trying to do that, they are trying to understand what the sources are and, again, the real tough question is, "How much is too much?" This is one that they're just going to have to work through by trial and error. So, as far as parks and soundscape design, I think that that's the desired end, the desired direction, in the sense of balancing the desire to preserve the natural sound environment with the need to permit access and different types of activity. That's what it's all about. I'm not sure, they may get there, but I think the encouraging part is that they do have an office [the Natural Sounds Office in Colorado] now that's working to that end.

There's a lot of attention given to soundscapes in Europe, especially in relation to impacts on places where people live—trying to understand the good things and the bad things about the soundscapes and how can they be modified to be more good than bad.

My understanding is that the European Commission has put in place some very strict noise control measures in a number of the urban areas and doing actually quite a bit of research and proactive work in that regard.

That's true. The European Commission has set up what is called the European Noise Directive. That is a process they've set up whereby the more heavily populated urban areas are supposed to go about mapping the sounds in their areas and looking for ways, eventually, to mitigate it or to alter the land use to be more compatible in terms

of noise. And they are doing a lot of research on it, too, and I think it kind of speaks to a couple of things about Europe; one is that they are, I believe, in much closer proximity to each other than in this country, the density is much greater and people are primarily city dwellers, and that's where you get the greatest amount of noise. If you've been to a European city, the sound of small motorbikes is a pretty common sound. But it also speaks to the European tendency to have a heavier focus at the government level on quality of life than we do in this country. We're very localized here.

So yeah, they're doing a lot. And actually we [HMMH, Inc.] are trying to help build awareness in the design and planning process in this country of the value of including soundscape design as part of the whole design package when they work on urban or suburban spaces, or even parks. But the soundscape and acoustics, for basically the past thirty years of my career, has been an 'after the fact' feature in the sense of 'OK, we have this noise problem, what do we do now that we've built this road?' It tends to be more band-aid sort of fixes, going back and putting up sound barriers and that sort of thing. Whereas what we're trying to encourage is thinking about the soundscape design right at the design stage. We see it in the cities in this kind of 'New Urbanism' and the focus on re-use of urban areas rather than continuing to sprawl, in thinking about what sort of uses you want, and where you want the roads laid out. A lot of people in other areas of design are starting to talk about 'smart growth'; you know, you don't just let things happen, there's a whole bunch of things you want to pay attention to when planning re-use of areas or even new subdivisions.

What you just said reminds me of an interview with Murray Schafer in a recent (July–August 2005) issue of Utne magazine. The issue has a focus, several articles, on Acoustic Ecology and 'quiet.' In the interview Schafer makes that same point, that part of his whole message and that of organizations like the World Forum for Acoustic Ecology, is to get beyond noise control and get the concept of soundscape design as a proactive discipline more firmly embedded, if you will, in the consciousness of developers, city planners, etc.

Yeah, and what we're trying to bring to that is what I alluded to with the quantitative aspect. If we can sit down with the planners, and architects, and engineers who are planning a new re-use of a city space and they can tell us things like traffic patterns, where they want the roads, what kind of traffic it will be – even if it's transit or rail – we can use our models and our database to construct basically a virtual soundscape. We can take recordings and put them together, mix them, in accordance with a lot of quantitative analysis so that they will sound the way this future space could sound. We're working on developing a process for soundscape design that lets people listen through headphones to a virtual soundscape so that they can make judgments. Because, as Murray Schafer was alluding to and what I was talking about, decibels alone don't really tell you what it's going to sound like, but those are the tools that can let you predict what will happen, and then using our expertise and recordings, and mixing techniques, we can put them together in the proper relationship so that you can actually listen.

Essentially a simulation system, or a mock-up system, to get an idea of what you'll be hearing once your plan comes to fruition?

Right! It's the analog of all these visual renderings and even 3-D graphic representations people use to get an idea of what it will look like. Well, we say, "Why don't we put in what it will sound like, too?" And so then people can really decide if that's what they want.

How widely disseminated within the field of noise control are the ideas, concepts, and writings on acoustic ecology by such people as Murray Schafer, Hildegard Westerkamp, Barry Truax, etc.? Is there much awareness of the body of literature out there?

I would say 'No'. I think I can say without too much immodesty, I think we're the first acoustician professionals that are trying to put this forward as a useful cross-fertilization to understand the way these folks have been thinking about sound and acoustics and bring it together with our knowledge of how you predict it, how you mitigate it, and all those technical things, to come up with good acoustic design for spaces. So, no, I would say there really isn't much awareness and we're trying to build that.

The World Forum for Acoustic Ecology along with its affiliated organizations is, along those same lines, working to develop that understanding a bit more within the professional and industrial fields.

Well that's good! You know I've been aware of Murray's book [*The Tuning of the World*, 1977 Knopf] for not that long now, all things considered, about seven or eight years and I was really amazed to find out that people had been thinking about these things in sort of semi-qualitative ways…because we started in the '70s, too, but we were on a different track. There's a third group out there, too, which is the universities that have their own take on acoustic ecology, so there's different people in quite different fields thinking about acoustics in very different ways. I think there's some overlap. I think there's some interest in universities about being able to judge the health of an ecosystem by its acoustics. Perhaps you've run across that?

In fact a friend and former colleague of mine, David Dunn, has done quite extensive work in bioacoustic research here in Northern New Mexico, and is currently working on a project related to the bark beetle infestation problem we're having in the pine forests, and how they're decimating the drought-weakened forests. He's been doing a lot of research, some of it funded by various agencies and organizations, essentially focused on acoustic monitoring of bark beetle movement and trying to get a handle on this. He's really done some amazing work. There are all kinds of takes on this idea of using acoustics to understand the environment and what's happening out there.

From our perspective, in the acoustics and noise and vibration control consulting business, our expertise developed from an engineering background. The first people who worked with federal agencies, once the environmental and noise control laws were passed in the early 1970's, we're basically scientists and engineers. Development of the land use and noise compatibility guidelines and recommendations came from quantitative analysis of people's annoyance reactions to noise – the well-known "Schultz Curve" that related percent of people "highly annoyed" to sound exposure level, and from quantitative data on what sound levels interfered with speech communication. I guess the agencies faced essentially the same problem currently faced by the national parks – reactions to sound / noise are so variable and subjective, that it's hard to develop defensible regulations without resort to numbers.

In any case, that's what was done and I think it has significantly limited the exposure of the public to the really egregious sound levels. But in the process I think we've forgotten that we have an alternate way to judge the suitability of a soundscape for a given location or activity – our ears. In situations where there are choices, where the whole process is not driven by regulations, we need to devise ways to let the decision-makers and the affected public hear what a space will sound like as part of the design process, just as they judge the appearance of a space with models, graphics or renderings before it is finally built. It's fascinating, and perhaps symptomatic of our need to quantify, that we forget that what really matters is what a place sounds like, what we hear or will hear when we listen, when we use our ears.

A Conversation with Emily Thompson, January 2006

Emily Thompson is an aural historian based at Princeton University. Her book *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America*, 1900–1933, published by MIT Press in 2002, details significant and profound changes in the sonic environment and the listening habits of Americans over the period 1900–1933.

Your work is primarily as a sound historian. What drew you into this work and what's your own background?

I would say that first and foremost, I am a student of American history. I study the early twentieth century, and I focus on the role of technology in American culture, with an emphasis on technologies that relate to sound and listening. I came to these subjects by a rather circuitous route. As a young person I had always been interested in music, but I grew up in a family of engineers, not artists, so when the time came to go to college, it seemed more prudent to study engineering than music. I thought that, after graduation, I might be able to get a job designing stereos or concert halls or something like that. While in school, I worked in the recording studios at the Eastman School of Music in Rochester NY, and I also did some radio production one summer at WQED-FM, in Pittsburgh. When I finished college, I wasn't able to find the kind of job I had hoped for. I looked into graduate studies in acoustics, but at the time—the mid-1980s—funding for graduate study was seemingly all related to military applications, which I was not interested in pursuing. Ultimately, I did get a very good engineering job, at Bell Labs in New Jersey, where I designed some integrated circuitry for a video teleconferencing system. After about a year at Bell Labs, however, I realized that this was not the kind of work I wanted to be doing five or ten years down the road. At the same time, I discovered that the field of History of Science and Technology existed. I had never encountered it in college. My undergraduate curriculum had been very narrowly technical, and I was increasingly feeling that my education was incomplete. I wanted to expose myself more liberally to the humanities, and so History of Science and Technology seemed like the perfect bridge to take me from where I was to where I wanted to go. I applied to graduate schools, and in my application essay, I described how I was interested in studying the history of acoustics to explore how concert hall design had changed over time. I knew absolutely nothing about the subject at that point, except that I wanted to learn about it. I was fortunate enough to be accepted into Princeton's graduate program, and while the transition from engineer to historian was difficult, it always felt right. The very first research paper that I wrote as a graduate student was about Wallace Sabine and the design of Symphony Hall in Boston in 1900. That paper ultimately grew into my doctoral dissertation, which subsequently became my book, *The Soundscape of Modernity*.

Your book, The *Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900–1933* (The MIT Press, 2002), details significant and profound changes in both the sonic environment and the listening habits of Americans, predominantly New Yorkers, over the period 1900–1933. Could you briefly summarize some of the inter-relationships that you explore among the changes in architectural acoustics, electronic media, listening habits, noise abatement, public policy, and the sonic environment during this period?

Well, the hardest part of that question is your call to be brief, but let me try: Simply put, America circa 1930 sounded very different from the way it had sounded just thirty years before. Additionally, people listened to those new sounds in distinctly new ways. The sounds themselves were increasingly the result of technological mediations. Scientists first discovered new ways to manipulate traditional building materials to control the behavior of sound in rooms. Later, new materials were developed to achieve even greater degrees of control. Finally, new electroacoustic technologies effected even greater results by transforming sound energy into easily manipulable electrical signals.

Accompanying these changes in the nature of sound were new trends in the culture of listening. The fundamental compulsion to control sound stimulated auditors to listen more critically, to determine whether this control had been achieved. The need for control stemmed in part from new worries about noise, as traditionally bothersome noises like animals and peddlers were drowned out by the technological crescendo of the modern city. The desire for control was also driven by a preoccupation with efficiency, which demanded the elimination of all things unnecessary, including unnecessary sounds. Finally, control was a means to exercise choice in a market filled with aural commodities. It allowed consumers to identify what constituted "good sound," and to evaluate whether or not particular products achieved it.

Perhaps the most significant result of these physical and cultural changes was a reformulation of the relationship between sound and space. Indeed, as the new soundscape took shape, sound was gradually dissociated from space until the traditional relationship virtually ceased to exist. By 1930, "good sound" was defined as sound that was clear and direct, signal-like in clarity and free of any spatial characteristics, particularly, free of reverberation—the lingering over time of residual sound that had always been a direct result of the architecture surrounding that sound. Previously, reverberation had constituted the acoustic signature of a place. It indicated the unique architectural character of the specific site in which a particular sound was heard. Now, such residual sound was redefined as noise—unnecessary and unwanted—and it was eliminated through technological interventions.

Reverberation can also be characterized as aurally defining space through time, so I argue that the modern, non-reverberant sound can also be seen as transforming the traditional relationship between space and time. In this way, the story of the rise of the modern soundscape parallels stories of other transformations of traditional space-time relationships, transformations long considered to be constitutive of "Modernity-with-a-capital-M": the Cubist art of Pablo Picasso; the relativistic physics of Albert Einstein; the stream-of-consciousness prose of James Joyce. Modern artists, physicists and writers were fully conscious of the revolutionary character of their work. Modern acousticians were just as aware, but until now few historians have thought to place sound meters and acoustical tile ceilings alongside E = mc2 and *Ulysses* in the pantheon of quintessentially modern artifacts. In my book, I attempt to do exactly that.

What can an understanding of this pivotal era contribute to our understanding of our contemporary soundscape?

Well, I should confess up front that, as a historian, my primary motivation is to understand the past on its own terms, to recover its internal meanings in a way that ideally takes us out of our own era and back to an earlier way of life. Nonetheless, any successful history—like any good book—should speak to the lives of its readers as well as its subjects, and I do hope that my book accomplishes this.

For readers who haven't previously thought much about sound, either historically or in their own lives, I hope my book can begin to teach them how to listen to a culture and to understand what those sounds have to say. For readers who already possess that kind of sonic awareness, the book can provide a new or expanded perspective from which to consider their own soundscapes. Not just the sounds themselves, but our attitudes toward them.

In fact, when I think about contemporary soundscapes, I'm not convinced that the actual sounds we hear today are significantly different from those heard circa 1930. Are there any sounds as unprecedentedly new to us as was the roar of an internal combustion engine, the crackle and hiss of radio static, or the tremulous whine of a Theremin to those who lived in the early twentieth century?

But even if the sounds themselves are basically unchanged since then, our attitude toward them is very different, and this raises an important question for students of contemporary culture. Circa 1930, the modern sound—clear, direct, and non-reverberant—was considered ideal for virtually any circumstance. It was considered the "one best sound" in an era in which people held great faith in the idea that there was "one best solution" to virtually any problem. Our own post-modern culture is much more skeptical of such claims, and is more eager to embrace a diversity of solutions. Similarly, our post-modern soundscape seems no longer to be about one best sound, but is instead all about choice. Whether it's an acoustically configurable concert hall or a 60 GB iPod with tens of thousands of songs loaded onto its hard drive, we want to be able to pick and choose, even if that means sacrificing some idea of sound "quality." Why is choice so important to us today? I've lived through this change, and my historical awareness has highlighted it for me, but I'm not sure I know the answer to this question. I think I'll leave it for a future historian to answer.

Perhaps a historical understanding of the changes and evolution of urban noise and modes of response to it – whether they be personal, cultural, legal, or what have you – can set the stage for more informed public sector decision-making about the public impacts of the sonic environment. Have you seen any evidence of really effective public sector initiatives for dealing with urban acoustic environments? What forms have these initiatives taken, or might they take?

My investigation of campaigns for noise abatement, as they were characterized in the early twentieth century, shows that these efforts were initiated by individuals who quite simply were bothered by noise. I wouldn't say 'the average man or woman,' because these were socio-economically elite men and women, but they nonetheless believed that they were speaking out from their positions of power to work to improve circumstances for the urban poor, the sick, children, and others who did not hold such power themselves. These noise abaters did enjoy success in mobilizing efforts and resources to investigate, document, and begin to understand the problem of urban noise. They weren't, however, as successful in solving the problem, in getting rid of the noises they identified. In the 1920s, the project for noise abatement was taken over by technical experts, acoustical engineers who possessed powerful new ways to investigate and document the noise problem. They also had some new techniques for eliminating certain kinds of noise, but the task of quieting the modern city was enormous and complex, and here again, success was limited. Noise abatement was a social and a legal problem as much as a technological problem, and the engineers met with only limited success when they attempted to move outside their sphere of technical expertise. In the 1930s, with the onset of the Depression, concern over noise faded away as people had bigger problems to worry about.

The next significant example of grass roots concern over noise would probably be encountered in the late 1960s and early 1970s. At this time, the problem was characterized as 'noise pollution.' It was part of a larger environmental movement in which people were concerned about chemical pollution, litter, and all sorts of other things. In the early 20th century the concern was about the impact of noise on productivity and efficiency, whereas it became a very different kind of problem—an ecological problem—in the 1970s. Additionally, attitudes toward science and technology had changed dramatically in American culture, and I think this also affected how the problem of noise was reconceived. The countercultural movement generally behind the environmental activism of the 1970s was profoundly suspicious of the authority of science and technology. This presented a more difficult social negotiation between the people who were being bothered by noise and the technical experts who might be brought in to help solve the problem. My sense is that the general public did not turn to the technical experts as they did in the 1920s, but that they instead attempted to generate their own solutions. I haven't studied this period to the extent that I have studied the earlier one, but I believe this is where the origins of acoustic ecology are located. Is that correct?

Yes, that's largely correct. We typically trace the origins of the acoustic ecology field to work done by R. Murray Schafer and a group of graduate students at Simon Fraser University in Vancouver, Canada beginning in the early 1970s. Schafer, a composer and educator, published a number of influential pamphlets on noise, listening, and sound. What eventually became the World Soundscape Project later resulted in recordings, books, and articles published by Schafer and some of his former researchers such as Barry Truax and Hildegard Westerkamp.

I don't feel confident that I can offer any specific advice to people who are dealing with problems of noise today, but I think awareness of the historical nature of the problem might help them find a way to best mobilize the resources that make sense for today.

Within your field of sound history, how much of an awareness is there of the work of the Acoustical Ecologists whose writings make up a good part of the literature on soundscape studies?

Sound history is a new kind of history, but I'm not sure I'm ready to call it a "field" at this time. As far as I know, there are no official programs or degrees dedicated to it yet at any universities. Rather, a growing number of historians are choosing to consider the sonic aspects of the past in their work. Scholars in other fields are similarly exploring sonic phenomena and experiences in new ways, and some have begun to talk of a new interdisciplinary field of "Sound Studies," which includes not only historical scholarship but also work in anthropology, ethnomusicology, sociology, communications, and other disciplines. This "field" exists, to date, in terms of interdisciplinary conferences devoted to sound and listening; special sessions at scholarly meetings; and books of essays or special issues of journals that focus on the new scholarship on sound.

I think the works of Schafer and Truax are certainly a starting point for many of these scholars, including myself. For me, these works not only help me to think about sound, but they also serve as invaluable primary sources, historical sources from their own era. Schafer in particular really documents that moment in the early 1970s that we were discussing before, when sound and noise returned to the public consciousness, but in a way that was very different from its early twentieth-century counterpart.

One thing in particular that you very well might be aware of is a thing that Schafer and some others did in the early 1970s – a document that they published entitled 'Five Village Soundscapes.' It's a very interesting study of five European villages, circa the early seventies. They attempted to quantify aspects of the sonic environment around and in these villages – everything from sound pressure level readings, to spectrum plots of the types of sounds that are prevalent in the villages, to 'sound counts' where they actually counted the significant number of contributing events to, say, the traffic noise in the heart of a village. They also did some very interesting sound surveys with the people who live in the

villages and tried to get a sense – both a contemporary and historical sense – of how these people heard and related to their sonic environment; what the important sound marks and components of their sound environment were, and how those things had changed – for better or for worse. It's a really interesting multi-disciplinary study – from a quantified, scientific approach to the more social scientific aspect of the interviews and surveys, to some very beautiful descriptive writing – all centered on these five villages. My understanding is that relatively recently, several European-based soundscape researchers have gone and essentially retraced those steps in order to do an update on the project, thirty years later.

That will all be wonderful primary research for a future historian to draw on! It sounds very similar to my own investigation of the past, except for the fact that I have to interrogate the dead, and am thus forced to turn to historical documents and artifacts, since I can't speak directly to my subjects or investigate directly their environment. The urban noise abatement campaigns circa 1930 did compile similar kinds of data and descriptions, but with less concern for documenting change over time. I wish those early twentieth-century investigators had been more like acoustic ecologists—it would have made my job much easier!

Nonetheless, historians have to be careful not to import their own scientific understanding of how the world works back into the past, into a time when people didn't have that knowledge, and necessarily understood things in different ways. My own technical expertise—having worked in sound engineering and having studied physics and engineering as an undergrad – was clearly helpful in allowing me to get at certain issues and questions about the sonic environment and people's responses to it in the past, but I had to use this expertise with caution, as it can sometimes obscure more than it reveals.

Part of your book focuses on urban noise and modern music, in particular Jazz, the Futurists, Antheil, Varèse, etc. What do you think composers, musicians, and sound artists have to contribute to our understanding of and interaction with our sonic environment?

They contribute so much; it's hard to know where to start. First, musicians, composers, and sound artists enjoy the privilege of calling attention to sounds, of forcing us to listen, to hear something new, or to hear something old in a new way. Most of our listening is not executed in what might be called an "aesthetic" or fully attentive mode. When we listen this way, we listen more carefully and are open to—indeed expect —new experiences. Musicians demand that of us simply by doing what they do, and I think this is tremendously important.

Musicians further possess the unique power to turn noise into music, and by doing so they can take a culture's sonic dross and turn it into gold. The so-called noise musicians of the early twentieth century taught people new ways to hear the noise of the modern world. They aestheticized the urban soundscape, and for some listeners, this constructive approach was a far more successful way to "deal with" noise than were the many destructive attempts to eliminate or abate those same noises.

Finally, for sound historians like myself, music constitutes a wonderfully rich resource for understanding sonic cultures of the past. Musicians' intentions, as well as listeners' responses—both pro and con—provide valuable clues for understanding how people listened, and what they heard, in a sound world that no longer exists.

What is the significance to the general public of gaining an understanding of their relationship(s) to the sonic environment, i.e. why should they be interested, what's at stake for them, particularly in urban settings?

I suspect the primary pragmatic issue for most people in urban settings is—again—the problem of noise, and I hope my work helps people understand that that noise, by its very subjectivity, is as much about power and politics as it is about sound. Whether people are complainants or defendants, the noise at stake is often really a sonic index for fraught social relationships or unbalanced power equations, and the sooner that people are aware of this fact, the better equipped they will be to press their claims, or defend their rights, in support of the sonic environment they desire.

Can you recommend the work of any other writers and researchers in your field that might be helpful to people in the acoustic ecology field?

Scholarship in sound studies has flourished in the past 5–10 years, so now one could easily fill a shelf with a really nice collection of books that could be read with benefit by anyone interested in thinking about sound, history, and culture. My own shelves include about a dozen books specifically in history, and many more in other disciplines. The primarily historical titles include: Alain Corbin, *Village Bells: Sound and Meaning in the 19th-Century French Countryside*; James Johnson, *Listening in Paris: A Cultural History*; Douglas Kahn, *Noise Water Meat: A History of Sound in the Arts*; John Picker, *Victorian Soundscapes*; Richard Rath, *How Early America Sounded*; Bruce Smith, *The Acoustic World of Early Modern England*; Mark Smith, *Listening to Nineteenth-Century America*; Jonathan Sterne, *The Audible Past: Cultural Origins of Sound Reproduction*; Susan Douglas, *Listening In: Radio and the American Imagination*, and Trevor Pinch and Frank Trocco, *Analog Days: The Invention and Impact of the Moog Synthesizer*. Three edited volumes that can also serve as useful introductions include Veit Erlmann, ed., *Hearing Cultures: Essays on Sound, Listening, and Modernity*; Mark Smith, ed., *Hearing History: A Reader*; and Michael Bull and Les Back, eds, *The Auditory Culture Reader*.

What do you think this increase in attention to sound within the academic community signals in terms of more widespread cultural interest in the sonic environment?

Perhaps—returning to a point we discussed earlier—it's a response to the abundance of recorded sound that digital media technologies have recently made available. The world has been stockpiling recordings ever since Edison invented the phonograph over a century ago. Now, with compression algorithms and the Internet, we have new and powerful means to make all that sonic material available to very many people with very little effort. Just as the sonic culture of the early twentieth century was shaped by new technologies of control, our own sonic culture may be influenced by these new technologies of access and choice. We have so much sonic material at our fingertips today; perhaps we feel the need for a better map of the sound world, including our sonic past. With such a map, we will hopefully be better equipped to navigate a path through all the sounds that surround us, and to chart a course toward the best possible sonic future.

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