Media or Instruments? Yes.*

By Jonathan Sterne

To fans of contemporary music it is old news to say that the technologies of sound recording are musical instruments. This simple fact is a defining feature of much contemporary musical creation. Paul Miller (aka "DJ Spooky That Subliminal Kid") writes that "samples are given meaning only when re-presented in the assemblage of the mix. In this way, the DJ acts as the cybernetic inheritor of the improvisational tradition of jazz, where various motifs would be used and recycled by the various musicians of the genre. In this case, however, the records become the notes" (Miller 2004:349-50). DJing represents a sensibility about making music. And this sensibility has evolved over time. DJ culture itself evolved over the course of the 1970s not as a response to poverty but out of an emergent, new set of attitudes toward record players, records and parties: "'man, you playing the clarinet isn't gonna be like, BAM! KAH! Ba-BOOM-BOOM KAH! Everybody in the party [saying] "Oooohhhh!' […] It evolved from whatever the culture is. But it's just an adaptation of whatever else was going on at the time. . ." (Prince Paul, quoted in Schloss 2004:28-29). The recombinant music culture we see today evolved, then, not as a result of technological progress or technological necessity, but rather from a set of embedded sensibilities about

sound reproduction technologies. The sound of sound reproduction has become just one more musical color.

Today, the most striking feature of hybrid performance-and-studio creative techniques is their banality. They are everywhere in musical practice: witness the high art of avant-garde composers like Morton Subotnik, the experiments of successful DJs and sampler artists, the recently-elevated prestige of the "producer" in commercial music (and what is a producer but virtuoso listener, who stands in for an imagined future audience?), or simply the explosion of small artist-based studios in basements, bedrooms, and left-over industrial spaces.

It takes only a passing glance at contemporary musical practice for one to conclude that the boundary between musical instruments and media of transmission or reproduction has long been ruptured. Beyond sampler artists, turntablists and laptop DJs, one can look also toward bands like Massive Attack, who have completely eschewed the use of pre-existing samples and instead record hours of bands "jamming" in the studio and find little grooves or even individual sounds that they could cut, splice, process, and organize into their haunting soundscapes. Their recording process essentially creates a studio performance in order to destroy it, not to represent it. One needn't stay in the present for this to be the case: we can look back to Brian Eno's oft-cited "The Studio as Compositional Tool" essay (1983) or even the ambitions of early synthesizer owners to create truly portable analog studios in the late 1960s and early 1970s

(see Pinch, 2002). Before them, we can find stories of sound hunters in the 1950s and 1960s, who saw their tape recorders as both representational technologies that could create aural family albums *and* as musical instruments (see Bijsterveld, 2004). As I will argue in a moment, this intermixture among recording, reproduction, and musical production goes all the way back in the history of sound recording. In fact, one can reasonably argue that it *predates* the successful invention of sound recording in 1877.

But why point to a practice that nearly every working musician now comprehends at both an intellectual and practical level? Isn't it simply obvious that we are now in a period where the media of reproduction and the instruments of musical production are almost by definition cross-bred to the point of unrecognizability? The answer lies in the habits of description we scholars have developed over the same period that the musicians were creating hybrids. For while Lev Theremin rewired radios, or even earlier when the Berliner Gramophone company invented the rather amusing genre of "artistic whistling" to promote the mimetic power of their machines while compensating for their limited frequency response, the philosophers of sound reproduction have insisted on a rigid distinction between medium of reproduction and musical instrument. This division points to the space between *practical logic* and *theoretical logic*, to borrow a dichotomy from sociologist Pierre Bourdieu. Bourdieu's point was that people may have practical understandings of actions they take without being able to formally articulate those understandings. Conversely, scholars who attempt to

describe social action according to a perfectly self-consistent theoretical logic will miss out on the practical, embodied philosophy of those people they study (Bourdieu 1990:80-97; 1998:127-140). This is exactly the problem I wish to attack today: scholars have imposed a distinction between *instrument* and *medium* in their theoretical logic while musicians and engineers have long since bridged it. It is time to catch up with the people we study.

To make a gross generalization, scholars have traditionally described technologies of sound recording, amplification, and transmission as media of one sort or another. This choice has shaped the questions asked of them. Almost every theoretical account of recording, for instance, touches upon questions of fidelity, authenticity, and aura. Invoking the ghost of Walter Benjamin (1968:217-252), writers who consider the cultural significance of sound recording ask questions about the relationships between originals and copies, or how "effects" of authenticity are created. Recording and transmission are generally considered under the category of *representation*; R. Murray Schaefer and Barry Truax's concept of schizophonia defines technologies that supposedly separate sounds from their "sources" (Schafer 1994; Truax 1984). The problem with this approach is that it compares all technologically-based communication with face to face communication, and the face to face or "live" encounter always wins. For his part, Schafer makes crystal clear his hostility to modern, large-scale societies in his book on the modern soundscape. If, however, you prefer a positive social vision that includes diverse, cosmopolitan societies made up of thousands and

millions of people, then we need a way to talk about technologically-based communication that does not treat it as an inferior alternative to live communication. This is why instruments and the context of music are so interesting for the philosophy of communication. Only the most strident purist would claim that music which uses instruments is inferior to music which uses only the human voice and body. We are quite comfortable with human-technical interaction in musical communication. Musical instruments are communication technologies that have been largely left free of this logic of representation in academic discourse.

Unfortunately, the academic discourse on instruments has its own foibles. The field of organology is largely an exercise in formal classification. The Sachs-Hornbostel system allows for intricate intellectual maneuvering, to be sure, but at the end of the day it gets us exactly as far as 18th-century natural history. Like the natural historians, the organologists put all the instruments in their proper place, but they do not explain their genesis, function or meaning (Hornbostel 1961; Kartomi 1990; Sachs 1940). Recently, a group of scholars who we might call the "new organologists" have begun offering deeper, richer cultural analyses of instruments. Almost all of these studies force us to rethink the distinction between instrument and reproduction device. Steve Waksman's book on the electric guitar (1999) clearly shows that the amplifier and studio were as much crucial parts of the instrument as the pickups and strings. Tricia Rose's now-classic study of rap music (1994) discusses the degree to which the hip hop sound came from abusing

studio equipment to make it do things it didn't normally do. Paul Théberge, in his study of keyboards, synthesizers and MIDI anticipates the point of this paper in his claim that with digital keyboards, the distinction between instrument and recording/reproduction device was elided (1997). Though I disagree with Théberge's periodization, his point is spot-on.

Below, I will borrow a bit from my book *The Audible Past*, especially the chapter entitled "The Social Genesis of Sound Fidelity" (Sterne 2003:215-286) and combine that material with a few other examples to demonstrate the degree to which recording and reproduction devices have resembled instruments from the very beginning. I will briefly consider three different sites: the studio, the turntable, and the human ear. I make this move in order to argue that many salient features of the digital age are in fact part of much longer musical trajectories: especially the collapse between medium and instrument and the plasticity of sound itself.

Recording is perhaps the most obvious example. There is no historical point at which recording is *not* a studio art. Musicians had to learn to "play" the studio as an instrument. Like instruments, reproduction technologies all have: 1) a specific range of sounds and timbres endemic to them; and 2) people had to learn techniques to "play" them.

From the very beginning, recorded sound was a studio art. From before the technology was commercially available, users were aware of the special conditions of sound production accompanying reproduction. In the midst of

experimentation, Chichester Alexander Bell wrote of the physical contortions necessary to get one's mouth close enough to the mouthpiece to get a good recording: “With the mouth in such a position, not only is it very difficult to talk in a natural manner, but it is obvious that sound waves within the mouth-piece must interfere with each other” (Bell 1882). Even a cramped loft studio was better than the best spontaneous conditions. Eldridge Johnson, commenting on his work with the gramophone, remembered: “We had no place for the singer to record except in a loft that you got to with a ladder. I would scurry around and get some poor devil to come and sing for a dollar in real money and then I'd push him up the ladder and try to get a record” (quoted in *Talking Machine World*, September 1910:47). The studio was a necessary framing device for the performance of both performer and apparatus: the room isolated the performer from the outside world, while crude soundproofing and physical separation optimized the room to the needs of the […] machine and ensured the unity and distinctness of the sound event being produced for reproduction. As Steve Jones (1993) points out, sound engineers quickly learned to prefer studio recording to on-location recording because the studio allowed them to control the acoustic environment much better—and thereby to control the actual sound of the recording.

But not only was the studio a necessary framing device, it created a scenario where it became possible to “play” the recording device like an instrument. Like those created for sound recording, the sound events broadcast by

radio were primarily not existing ones but manufactured ones. An early account of the broadcasting of opera emphasizes the qualities of studio work: the smallness of the room, the abstraction of the music and the singing from the rest of the operatic performance, and the special training of the singers. The singers had to abandon all visual aspects of their performance—facial expressions, movements, costume—and modify its tactile and somatic elements. As a result, the issue of "maximum tonal effect" became paramount: "This was accomplished by introducing a shifting process, each singer having a fixed position from which he moved forward, backward, and sidewise according to a prearranged scheme, precisely like a football line that opens and shuts and moves by a code of signals" (LeMassena 1922).

The title of LeMassena's article, from which the above quotation was taken, eliminates any doubts about the author's view of the difference between live performance and performance for reproduction: "How Opera Is Broadcasted: Difficulties That Must Be Overcome in Order to Obtain the Best Results; How Singers Must Be Especially Drilled and Grouped, and How the Opera Must Be Revised, Interpreted, and Visualized to Make Up for the Lack of Action, Costumes, and Scenery; Artists Are Put in a Musical Straitjacket; Moving, Whispering, Even Deep Breathing a Crime." Clearly, the author had the standard disdain for studio music shared by some performing artists of the time. But analysis can disentangle the description of the event from its aesthetic evaluation. Although you or I might like studio music much more than this author does, his

description of the recorded operatic performance is essentially correct. The physical placement of performers during the recording process is different from that during live performance, as is the entire presentation of the opera. This is the salient point for all reproduced music: it is not just eavesdropping on live performance; it is a studio art.

A less judgmental title for LeMassena's article might be "how to play the radio studio like an instrument." Today, after decades of hip hop, dub and avant-garde recombination, we are accustomed to this formation of the studio in many areas of musical practice. We are used to the idea of a musical performance *for* and *through* the studio. But this model, in modified form, goes all the way back. Before digital, there was tape. Brian Eno's classic "Recording Studio as Compositional Tool" (1983) describes tape, and not digital technology, as the enabling condition of "cut and mix" recording. But even in the 19th century's cylinder age, it is possible to find accounts of amateur recordists (in the 1890s, there were almost no "professional recording artists" in the current sense of the phrase), who, wishing to sing along with themselves, recorded multiple passes across a wax cylinder.

Connected with the idea that the studio reproduces a "live" performance in some form or another is the related concept of "sound fidelity" in reproduction apparatus. Ask any audiophile, and you will hear a recounting of debates about systems that "flatter" music vs. systems that reproduce the full frequency spectrum with clinical accuracy. While the modern turntablism movement has

fully established the phonograph as a musical instrument, this too goes all the way back. Consider this ca. 1896 attack on the gramophone, which played flat discs, by a partisan of the phonograph, which played wax cylinders. Listen to how the author talks about the sonic dimension of playback devices *as if* they are musical instruments:

> A wax record [as used by the phonograph or graphophone] is reproduced by a small ball tracing a groove in the velvety surface of a wax cylinder. A rubber record [as used by the gramophone] is reproduced by the scratching of a carpet tack or some similar device, in the granulated groove eaten by acid on the rubber disc. The one must be and is pleasing to the ear. The other sounds first like escaping steam. You listen more attentively hoping for better things and you are next reminded of the rumbling of a horse-less carriage. Finally, when the attempt to reproduce a voice is begun, you are forcibly compelled to liken the noise from the Gramophone to the braying of a wild ass.
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> . . . Its blasty, whang-doodle noises are not desired by citizens of culture. There is one Gramophone in use, however, in the coal mines at Carbondale. It is properly used by the miners there.
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> . . . Wax records are not intended to be so loud as to blow off the side of a man's face; but wax records are pleasing to the ear ("Fake Records," 1898:10).

Here, it is not a matter of accuracy, but a matter of tonal preference. As Steve Waksman (1999) has written, we can find the same objections to the electric guitar approximately half a century later. In fact, almost every debate about the

so-called fidelity of a recording to a source is actually a debate about the aesthetics of sound: how *should* recordings sound? By the second decade of the 20th century, the Victor company had concluded that it was more an enterprise of art than science. The sound of the phonograph was to be crafted in a collaboration between manufacturer and listener, just as the sound of the instrument was crafted by a collaboration between luthier and musician.

The ideas of "preferred tone" and consumer choice were useful selling points for phonographs and, later, for radio parts. In a 1913 advertisement, Victor claimed that its "system of changeable needles gives you complete musical control." The copy masterfully blended this idea of consumer choice with the transparent aesthetic of pure fidelity: "A changeable needle is the only system that positively guarantees a perfect point for playing every record; a changeable needle adapts the different selections to the requirements of different rooms, and to meet the tastes of different people; a changeable needle enables *you* to hear every record just as *you* want to hear it. . . . Always use Victor Machines with Victor Records and Victor Needles—*the combination.* There is no other way to get the unequaled Victor tone" (Victor 1913:68). "A perfect point for playing every record": if fidelity had been a gold standard for sound reproduction, Victor's ad agency had just floated the dollar. As with post-1973 American currency, the ad enjoins us simply to have faith in the process. The unequaled Victor tone is, in this case, presumably no tone at all except for the sound of the recording, yet this ad offers its readers *four different* "no" tones—presumably so

that listeners could match both the variations in their musical tastes and the variations in their states of mind. Perfection becomes situational. Instrumental reason and technical control congealed together in the hand that changed the needle and the ear that perceived the difference between versions of "unequaled" tones: the practiced listener was to become the connoisseur. Other manufacturers followed Victor's lead in turning tone over to the listener.

Today, you can see this same logic at work at any hi-fi store, where the tonality of the equipment – from reproduction device to amplifier, to speaker – is carefully quantified and meticulously discussed. Traveling turntablists also partake of this orientation to recording: they leave their record players at home, but bring their discs and their own cartridges and needles to insure they get "their own sound" at the performance venue. Meanwhile, engineers debate the desirability of characteristics like "warmth" and "smearing" vs. "detail" in analog-to-digital and digital-to-analog converters.

We can also move beyond recording and playback devices to fully apprehend the intermingled history of media and instruments: their conjoined history exists in the human ear itself. In the first chapter of *The Audible Past* I explore how the human ear was a model for all modern transducers – microphones, speakers, or any other device that turns sound into signal or back again. This was rendered most explicitly in a machine called the ear phonautograph, and later an ear telephone. Both were built by Alexander Graham Bell and collaborators, and both used excised human ears to transduce sound

(Sterne 2003:30-85). One can also find connections in the history of modern acoustics, as in Hermann von Helmholtz's *On the Sensations of Tone* (1954), which explicitly links the human ear with the arts of sound synthesis and reproduction. But since the 19th century, the relation has become more subtle and more pervasive, and today our stereos, headsets and speakers play our ears like radios.

In 1936, two psychoacoustic researchers at Bell Labs discovered that the frequency response of human hearing changed as the volume of a sound increased. Named from its discoverers, the Fletcher-Munson curve is a defining feature of 20th century musical aesthetics. Here's how it works: at normal room levels, the frequency response of human hearing looks like a bell curve. That is, our hearing is most sensitive to midrange sounds: the cry of a child or the ringing of a cellphone, both of which cut through any normal-to-quiet room, are two examples of sound to which our ears are especially sensitive. At higher volume levels, the frequency response of our hearing begins to resemble a smiley-face: we become most sensitive to very low and very high sounds, and less sensitive to midrange sounds. Now, consider the "loudness" button on a stereo, or a "bass boost" switch on a portable CD player. Both offer enhanced bass, and the former also offers increased high end (which is less necessary in an age of ice-pick-clear CD mixes). Both "trick" the ear into hearing the music as if it were louder than it actually is. And modern music, like rock or hip hop, which is meant to be heard loud – or at least *as if* it is loud – sounds better to many listeners with the loudness

button engaged. So every time we make a decision to press the loudness or bass boost button, we are – in collaboration with the manufacturers of our playback devices – playing our ears like an instrument, with its own timbre and frequency response.

There are many other examples of cultural psychoacoustics, such as the use of upper partials to synthesize lower-sounding tones in telephone receivers or in power chords played through overdriven guitar amplifiers. But my argument should be clear by now: every point in the process of sound reproduction – from its initial performance *for* reproduction to its audition on the other end as reproduced sound; from the hands and mouths of musicians all the way into our middle ears – "reproduction device" and "instrument" are really intermingled terms and practices. There is no reproduction without the artifice of an instrument, and all instruments in some way reproduce sound.

There are, of course, many other sites where we could explore this blurred and conjoined history of medium and instrument. But I want to conclude with a few polemical points.

1. Even as in one arena, we must challenge the lies put forth daily by PR officials in the news, in the creative arena we must free media of the burden of fidelity, of aura, of reference, of reference of an imagined existence prior to mediation. For like imagining music without instruments, to imagine sound communication without mediation and technology is to mistake enrichment for distortion.

2. Accepting the above will entail a more imaginative sonic aesthetics than "more or less faithful to a source." Musicians have criteria for "better" or "worse" sound that correspond to the social and aesthetic dimensions of specific musical practices and contexts. So can we.

3. At the same time, we must follow the new organologists and interrogate instruments as technologies of representation, as artifacts situated in specific musical and sonic cultures.

4. In short, our theoretical logic should take a hint from a century of musicians' rich and developed practical logic. It is time to collapse "instruments" and "media" in our analytic schemes. In doing so, we can develop a more robust political and aesthetic account of music – and indeed all forms of communication.

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[*] This is an English version of "Pour en finir avec la fidélité (les médias sont des instruments)," which appeared in *Mouvements* #42 (November/December 2005): 44-53. An earlier version of this paper was presented at *Music Constellations in the Digital Age*, 22nd Music Biennale, Zagreb, Croatia (7 April 2003). Many thanks to the audience for their interest and comments.

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Bio:

Jonathan Sterne teaches in the Department of Art History and Communication Studies and the History and Philosophy of Science Program at McGill University. He is author of *The Audible Past: Cultural Origins of Sound Reproduction* (Duke, 2003) and numerous articles on media, technologies, and the politics of culture. His next book is tentatively titled *MP3: The Meaning of a Format*. Visit his website at: http://sterneworks.org.