Spectral Objects

On the Fetish Character of Music Technologies

"Commodity fetishism? I love that idea!" It is 2012. I am in Northern California, in a car with Matt Ward, then president of Universal Audio, a company that specializes in reproducing old analog audio-recording hardware, both as period-accurate reissues of the equipment and as computer software. We are discussing musicians' lust for old equipment and their fierce arguments, which populate online discussion boards, such as the question of whether software models of hardware instruments and technologies will ever sound "as good as the real thing." I ask Ward why he thinks musicians are so invested in the technologies his company produces. We go through the usual reasons: some musicians have experience with the old technology from working in studios; they already know how to use it and want to own it themselves without paying inflated prices for vintage equipment. Some lust after the equipment because they know it was used on their favorite recordings.[1] And some are just learning the craft of sound recording but want to purchase a well-known tool with the hope that it has a little bit of magic inside that will rub off on them.[2]

When I tell Ward that scholars have a name for this last phenomenon—commodity fetishism—and explain the basics of the concept, he is amused. It explains so much, and yet it

does not explain away the phenomenon. Wendy Chun calls commodity fetishism a kind of false causality. She writes, "A fetish allows one to visualize what is unknown—to substitute images for causes. Fetishes allow the human mind both too much and not enough control by establishing a 'unified causal field' that encompasses both personal actions and physical events. Fetishes enable a semblance of control over future events—a possibility of influence, if not an airtight programmability—that itself relies on distorting real social relations into material givens."[3] In other words, in the fetish, relations among people crystallize in things and the effects attributed to them.

What is a critic to do with the commodity fetishism of instruments? To leave it undisturbed would be to naturalize and affirm the workings of capitalism. To explain it away as misrecognition or false consciousness would be to ignore instruments' roles in musicians', makers', and audiences' relationships to sound. It would be to treat sonic culture as something that can be falsified. In this chapter, I offer two accounts of the fetishism of instruments. One is theoretical: I outline it through a mix of reference to Marxist work on commodity fetishism and scholarship in the new organology, "a systematic study of the natures, uses, degrees of agency, and ends of instruments in different fields and at different times."[4] The other refers the theory back to my ongoing ethnographic and media-analytical work on musical instruments and audio technologies for signal processing, as well as to other studies of commodity fetishism and music by authors such as Louise Meintjes and Paul Théberge.[5] By attending to the spectrality of instruments in both senses of the term "spectral"—their sounds and the aspects of their social character that remain intangible to the senses—I argue that we must understand commodity fetishism as a real force in sonic culture, as opposed to a form of false consciousness that must be demystified. At the same time, I show that the "objectness" of the sound of particular instruments is, ultimately, unavailable to the senses. Rather, the fetishism of instrumental sounds always gestures toward a set of relations that lie beyond the instrument itself.

Spectral Objectivity, or Commodity Fetishism in Sound

To understand commodity fetishism in sound, we have to define our terms carefully. Despite the common (and, in my reading, misguided) emphasis on their ephemerality, sounds themselves can be commodities.[6] But like

all commodities, they can become commodities only through social practice and in specific contexts and relationships. Recent work on synthesizer presets, ringtones, and stock movie sound effects suggests different ways to approach this problem.[7] But musical technologies are especially interesting, since in this case *both the object and the sound it makes becomes part of the commodity fetish*. In other words, is a Stradivarius violin or 1958 Fender bass prized because of the sound it makes or because it is a Stradivarius or a Fender? To answer this question in the abstract, we need a brief detour through theories of commodity fetishism and instruments.

Here Michael Heinrich's explication of Marx's *Capital* is helpful because of how he and his translator parse the German term *gespenstige Gegenständlichkeit*. Although it is traditionally rendered in English as "phantom objectivity," Heinrich prefers the phrase "spectral objectivity" because commodity fetishism is something more than a false apprehension of a commodity; on the contrary, he says it expresses "an actual situation:"[8]

> The value of commodities is an expression of an overwhelming social interaction that cannot be controlled by individuals. In a commodity-producing society, people (all of them!) are under the control of things, and the decisive relations of domination are not personal but "objective" (*sachlich*). This impersonal, objective domination, submission to "inherent necessities," does not exist because such thing(s) themselves possess characteristics that generate such domination, or because social activity necessitates this mediation through things, but only because *people relate to things in a particular way—as commodities*.[9]

"Under the control of things" may seem like a harsh way to put it, but even for noninstrumental vocal music, there is a robust infrastructure that subtends any form of musical production, ranging from the air as a medium through which sound travels to the architectures within which music is made and the component technologies of the instruments and sound-processing devices. Without making claims for music technologies in all times and places, it should be clear that modern music technologies have emerged in the broader context of capitalism and within a capitalist music economy. Instruments and sound-processing devices are bought and sold for profit. Music making and consumption operate according to a range of market logics, however distorted. Although state sponsorship of some music is an exception, even then the goal is as often as not some kind of intervention in the international markets for music and musicians. All this is to say that we Westerners tend to live in a musical world that is at once

ideologically individualistic, as ideas of talent, genius, and expression suggest (ideas to which I return later), and in which individual activity depends on accumulations of labor and collections of objects working in concert.

Heinrich is useful for another reason, and that is his choice of the phrase "spectral objectivity." Regardless of whether it is in fact a better translation of Marx's phrase into English than "phantom objectivity," the other meanings of the term "spectral" are immensely useful for thinking about commodity fetishism and sound. "Spectral" is also the adjectival form of the noun "spectrum," which describes the range of component frequencies that make up a sound.[10] The distribution of different frequencies and their relative intensities are said to compose the timbre of the sound, as distinct from its pitch or loudness. Timbre is the dimension of sound that explains how a violin and a piano playing the same note at the same volume can still sound entirely different from each other. While timbre (or "tone color") is notoriously difficult to define, it is also the key to the fetishism of instruments.[11] To speak of an instrument's spectral objectivity is thus to simultaneously reference the web of social relations in which it exists and the sonic history of which it is a part. I intentionally distinguish these phenomena from the sounds the instrument makes, because instruments cannot make sounds independently of their playing—this is true even for automated instruments like player pianos or sequenced synthesizers. For musicians who play stringed instruments, this is embodied in the old cliché, "The tone is in the hands." At the same time, certain instruments come to be associated with certain performance styles, genres, and timbres. People want certain kinds of instruments because they want certain kinds of sounds—or, at least, to plug into those histories of sound. The (sonic) spectral objectivity works only because of the (social) spectral objectivity of the instrument.

This is most obvious in cases where people get it wrong, believing in the instrument as a singular cause of the sound. Even Theodor Adorno, as he criticizes the pursuit of timbre, or a signature sound, in his essay on musical fetishism, falls into this trap when he denounces the "cult of the master violins. One promptly goes into raptures at the well-announced sound of a Stradivarius or Amati, which only the ear of a specialist can tell from that of a good modern violin. . . . Moments of sensual pleasure in the idea, the voice, the instrument are made into fetishes and torn away from any function which could give them meaning."[12] As is often the case, even if his political aesthetics are open to critique (a point not worth rehashing here), Adorno has described a vital dimension of modern mediatic music

culture. A great deal of musical pleasure for both musician and listener is in the sound of the music quite apart from the structure of the work or its larger meaning. This is made apparent in the work of social psychologists such as Daniel Levitin, who has shown that test subjects can identify many well-known songs by snippets so short that the only audible aspect of the song is its timbre (and maybe pitch). It is also made apparent in reviews of new music, especially electronic music, on sites such as *Pitchfork* that describe the tonal palette or spatial feel of new records.[13]

But Adorno misses his own point when he says that "the ear of a specialist" can distinguish a Stradivarius from a good modern violin. No, it cannot. By any measure, the category of "Stradivarius violin" contains a wider range of differences than the differences between Strads and other kinds of violins.[14] As Emily Dolan shows, the very elevation of the Stradivarius coincides with the increasing standardization of symphonic instrumentation and repertoire in the nineteenth century and the creation and expansion of a market for old violins. The same pattern can be found today, as (not quite as) old guitars, drum machines, or drum sets come to be associated with certain music and musical sounds.[15] Even software instruments now conform to this pattern, as when a representative of Native Instruments explained that the company's software synthesizer Massive remained in version 1 because of its importance to the genre of Dubsteb.[16] As music genres' repertoires become canons, the instruments associated with them begin to take on additional forms of value, which in turn feed back into their spectral objectivity in both senses of the term "spectral."

In new media studies, much has been made of the term "prosumer" to describe the elision of categories of production and consumption, or professional and consumer, in the age of digital technologies.[17] Conceptually, this is not so far from Adorno's claim that relations to instruments as keys to particular sounds or tones "are the same relations as exist between the consumers of hit songs and the hit songs."[18] What Adorno missed is that this is a feature of the historical capitalism of the music he loved just as much as it was a feature of the contemporary capitalism of the music he despised. Musicians' fetish for instruments is a long-term trend in the history of instruments and not something that arises with the mass media. Its current form is outlined well by Paul Théberge, who writes that, over the 1980s and 1990s, the musical instrument industry became increasingly dependent on a range of digital "tech" industries—especially those that produce microprocessors, storage, and software—which in turn accelerated the rate and quantity of music instrument acquisition and replacement among practicing musicians. In

other words, making music became a form of consuming technology. While this had always been the case on some level, the industries and practices surrounding digital technologies ramped up the speed and intensity of consumption. He writes, "By becoming 'consumers of technology,' many musicians have been able to take advantage of the enormous productive potential of new digital technologies. At the same time, however, they have witnessed the incursion of capitalist relation(s) upon their creative practices at the most fundamental level."[19] In other words, musicians' relationships to instruments are shaped by the capitalistic contours of their specific moment. It is not only digital signal processing that is at play here: containerization in shipping, printed circuit boards, CNC (computer numerical control) and CAD (computer-aided design), and other new processes of design and manufacture all shape the current consumer environment for musicians. In anachronistic terms, musicians have always been "prosumers"—producers and consumers at the same time—as evidenced both by the markets in prized instruments and in their quests for tone. But the past three decades have witnessed an acceleration and intensification of market logics and cycles of acquisition and replacement for whole subsets of the music-making and recording industries.

Musical instruments are thus spectral objects in the richest possible sense: when operated, they produce a range of distinctive timbres that are available to the senses. Those operations stand in for whole histories of aesthetics and social relations, to the point that it is possible to hear aspects of the sounds that are not even there, as in the fantastical trained ear that can distinguish a Stradivarius from another make of violin. This is why it is not enough to simply reword "allows one to . . . substitute images for causes," as Chun writes," as "substitute *sounds* for causes." To study commodity fetishism in the sonic domain is to ask after the causes of the sound. And causal listening, as Michel Chion has written, is the most deceptive form of listening. All sounds have multiple causes.[20] They index webs of relations and context as much as things coming into contact with one another and transmitted through a medium.

Spectral Instrumentality

We can now return to Universal Audio's business. Ward and I agree that Universal Audio is at least in part in the business of commodity fetishism, because the company produces devices, sounds, and interfaces all at

once. Universal Audio goes even further, producing potted histories of the technologies it sells online, thereby educating its potential user base about the mystique it intends to invoke in its design and marketing choices. One part of the company's business involves building hardware copies of paradigmatic sound-processing devices used in the 1960s and 1970s. Universal Audio also produces software replicas of analog audio devices. The graphical interface on its software screen looks like a photo of the hardware, and the algorithms beneath the surface model every part of the circuits, down to the level of components. The user "grabs" images of knobs with the mouse to turn them. Even with the added flexibility afforded by software, Universal Audio shies away from introducing new capabilities, apart from maybe making a monaural unit into a stereo one or adding presets.

Although Universal Audio is exceptionally committed to a notion of faithfulness to originals, it is hardly alone. Native Instruments in Berlin got its start modeling old Hammond organs and analog synthesizers in the software domain. Line6 in Los Angeles builds tools for guitarists based on models of classic instruments, amplifiers, and effects but goes more for the sound than the old interfaces. If you acquire a comprehensive software package for music recording, composition, or performance, it is likely to come with software models of old instruments and signal processing devices as part of the bundle. Its own operating parameters are likely to be skeuomorphic, as well, presenting users with knobs and faders as if they were sitting before a giant mixing desk, providing at once a degree of legibility and an illusion of control. In her discussion of software interfaces, Chun argues that interfaces are "driven by a dream of individual control: of direct personal manipulation of the screen, and thus, by extension, of the system it indexes or represents. . . . Interfaces offer us an imaginary relationship to our hardware."[21] Between a mouse click and an action on the screen lie countless digital instructions deliberately obscured from the end user, along with the labor that went into making the computer, mouse, and screen and the elaborate standards and protocols that allow them to work with one another consistently, to work with other systems, and to appear seamless in the experience of use. Yet it is not simply about hidden labor.

Whether we judge it to be real or illusory, a feeling of agency and control is crucial to rendering sensible what is otherwise unavailable to the individual's senses: the web of relations and histories of which the sound partakes. But since we are talking about sound technologies taking on different interfaces, we must also account for the fact that interfaces address sense modalities differently. People who use an analog mixing board can

use all of their fingers to control it and can find their way around by touch as well as by looking. Desktop and laptop software is generally confined to keyboard shortcuts and mouse clicks and requires a more fixed gaze on a screen. Touchscreen interfaces bring back more fingers and promise greater immediacy, but currently they do so without much haptic feedback, thereby also demanding the musicians' gaze. In all of these cases, the skeuomorph helps to create a sense of equivalence.[22] This may be especially important for sound, since if listeners cannot tell modern violins from Stradivarius violins, their chances of distinguishing a well-designed digital model of a compressor or delay from the hardware by sound alone is also quite low. The rhetoric and representation of the model becomes part of the model itself.[23]

In the experience of use, operational control stands in for whole sets of relations and histories that otherwise are not immediately available to the user's senses. This is true of software, as Chun notes, but it also true of any technology for making sound or music. Barry Blesser and Linda-Ruth Salter make the connection explicitly in their discussion of artificial reverberators that Blesser worked on in the 1970s. Blesser designed one of the first commercial digital simulations of a room, and here is how he and Salter describe operating that simulation in practice: "Once a spatial parameter is connected to a knob, button, or key, [from the perspective of the person operating it] a reverberator becomes effectively indistinguishable from a musical instrument, played in real time by a musician." In music technologies, media collapse into instruments—or, rather, the line between instruments and media grows fuzzy.[24]

We are used to thinking of instrument design as interface design when an instrument is digital, such as a synthesizer or sampler. But all instruments have interfaces. The apparent immediacy of an acoustic instrument conceals just as much labor, craft, and standardization as a software interface or digital signal processor. Alongside a set of pedals, a piano key operates a hammer, mediating and modulating the percussive dimensions of the instrument. The taut head of a tabla presents itself as a target for the player, with vastly different tones available depending on where and how fingers strike the surface. The fingers are meant to hit one end of the keys on a mbira, not the other, just as Western string musicians know that the strings on members of the violin and guitar families are meant to be played between the bridge and the nut (though many have violated that rule for interesting effect). As with the example of software, all of these mechanisms obfuscate all manner of labor, learning, and decisions.

The pitch and temperament compromises built into a piano keyboard or cut into a guitar's fretboard come from sustained collective reflection on the differences between the physics of sound and the cultured ears of musicians and listeners. This is no accident, for reference pitches and tuning standards are some of the oldest continuous controversies over standards in Western culture. For instance, in *Harmonious Triads*, Myles Jackson chronicles the politics of pitch in nineteenth-century Europe, which were intensely bound up with nationalism but also with the broader spread of international standards for the purposes of commerce.[25] Standardized pitch provides a basis for musical complementarity, but so do a whole other set of protocols. Members of the violin or brass family—or the drums in the "kit"—exist in a relation of complementarity with one another within specific genres, shown in Emily Dolan's history of orchestration, Matt Brennan's forthcoming history of the drum kit, and Georgina Born and Joe Snape's study of Max patches, where even "limitless" music software quickly refers back to common standards and practices.[26] This is even true *within* instruments. A synthesizer, drum set, or computer is a kind of system based on a set of relations that are at once social, physical, commercial, and customary, but so, too, are acoustic instruments such as acoustic guitars.[27] The chain of physical causes and effects are more readily apparent to the untrained observer, but they are no less real: move the bridge on a stringed instrument even a little and you will probably have to adjust the neck and retune the strings to achieve the same intonation as you had before the move.[28]

The decisions built into instruments have real ramifications for musicians, from the finer points of technique to the injuries one can suffer from playing too much or incorrectly. During the same trip to Northern California in 2012 that took me to Universal Audio, I spoke with Roger Linn in his living room. He was seated near a piano and not far from an electric guitar connected to a pedal and then a computer. Linn made his mark as an inventor of electronic instruments. After designing one of the first sampling drum machines—in other words, a drum machine that used the sounds of recorded drums rather than synthesizing its own drum sounds—he developed the concept for the MPC (MIDI Production Center), which became the most important instrument for rap and hip hop besides the turntable.[29] At the time of my visit, Linn was hard at work trying to create a properly "expressive" digital instrument. By "expressive," he meant that it would have the qualities of a stringed instrument as used by a trained musician, where even subtle gestures are mapped to variations in pitch, timbre, or loudness. Gazing over at the piano and guitar, he lambasted them both from the

standpoint of interface design. For both, the hand gestures change when the musician wants to change key. In other words, the skills are not transferrable. From the standpoint of modern interface theory, old instruments are unnecessarily difficult to learn and lack sound ergonomics. But while he criticized old instruments for their inaccessibility, Linn criticized new digital instruments for their lack of expressivity, because—he argued—they do not offer musicians sufficient control to produce sophisticated melody, harmony, and timbral variation in real time.[30]

Historically, virtuosity has been described as an expressive relationship to an instrument achieved *in spite of* the difficulties inherent in learning that instrument. This suggests a contradiction in the scenario Linn set out: while expressivity is held up in theory as the value that will most set new instruments apart from their limits, expressivity may be the value that most functions in setting *social* limits for new instruments and circumscribing the category of musicianship itself. In my discussions with instrument makers, expressivity is consistently held up as a value—none of the people I have interviewed have argued against it or for an alternative term. But when pressed as to its meaning, the point of reference is always a set of established techniques for playing *another* instrument (usually violin, piano, or guitar), not a definable quality. Even references to abstractions such as "virtuosity" depend on understandings and instances of musicians' relationships to existing instruments rather than abstract categories of practice. For instance, Christopher Dolan and Daniel Koppelman argue that instrument designers need to distinguish between control and virtuosity to promote expressiveness in new instruments. To this end, they propose using motion-tracking technologies to study how musicians play existing instruments and to use virtuosi on existing instruments as models for virtuosity on new instruments.[31] To have their expressivity properly evaluated and improved, the reasoning goes, new instruments must be tested on people who are good at playing old instruments. The strategy is inherently conservative: the skills needed to be a great MPC player cannot be divined by watching a great electric guitarist; the skills needed to be a great electric guitarist cannot be divined by watching a great trombonist. Linn encapsulates the contradiction in our interview: while he criticizes new instruments for not being expressive like old instruments, musicians have used his MPC and its descendants to make music that has different rules for meaning and expression and different criteria for expression and expressiveness.[32] Virtuosity and skill across the history of instruments is an endless chain of nonequivalence.

In musical practice, skills developed on an instrument require skills with an interface *and* the system to which it is connected, whether we are talking about a set of energy transfers built into assemblies of metal, bone, and wood or about electronics and plastic. A fretboard, a keyboard and a GUI are all interfaces of a sort.[33] Playing an instrument is a form of embodied knowledge—a knowledge won with hours and years of practice, a "second nature."[34] Embodied knowledge mediates the standardization that went into the instrument's interface. When I pick up an electric bass guitar, my hand movements are now second nature, even though long ago they were a struggle. After years of playing, my body seems to conform to the instrument, even though it feels like the instrument is conforming to my body or my will. Phenomenally, this is not so different from typing out this sentence on a keyboard, where again my body has conformed to a standard—a standard that was originally developed for an system entirely different from a computer. The conformity results in the actual transformation of the body, as dramatically shown in Lochlann Jain's history of repetitive stress injuries.[35]

From the outside, gestures such as these can appear effortless to the casual observer because the labor behind them is obscured in the design of the instrument and the skill of the musician. When observing skilled musicians perform (or people skilled with any technology), we might say that they are *in instrumentality*. This is to say, they are in a relationship to the instrument in which intention and action conform to each other, where certain prior actions and knowledges are relegated to a background status so that the musician may "sustain a certain direction," to use Sara Ahmed's terms.[36] But what happens when we confront instruments outside this moment of performance? They can be experienced as tools of learning or as partial objects, but they may also be experienced as magical in their own right.

In her classic ethnography of a South African recording studio, Louise Meintjes tells a story of a singer named Joana mistaking a MIDI clock that synchronizes all of the studio's different devices for a sound-container. "The MIDI clock does not actually house the sounds to which Joana refers," Meintjes writes. "For her, there is a whole sonic world packed into that sleek machine. . . . It is a world to which Joana can point, but that she cannot enter herself. It is invisible but sensed to be of enormous proportion."[37] This specific case illustrates a general condition: when people do not have access to the inner world of an instrument—because of knowledge, experience, power differences, custom—they are more likely to attribute to it a vast, complex inner world.

In part, this is a deliberate design feature, and an old one at that. My recording teacher Mark Rubel calls this dimension of instruments "psychocosmetic." The ornate scrolls and flourishes of the violin family; the branded headstocks of the guitar family; the shiny, smooth surface of a piano; the finishes on wood or brass; the blinking LEDs of a drum machine—all of these allude to the magic within, the agency held inside the thing, just beyond a person's fingertips. Writing about the recording studio, Meintjes captures the futurism that enrobes so many electronic instruments today. For her, the studio space is

> constructed and experienced as magical and as a fetish by music-makers who work within it. By typifying the space as magical, I mean that it is remote from the ordinary and that through the art of illusion and the capacity of the imagination, it seems to house a natural force . . . that when tapped produces compelling art. By thinking of the studio as fetish, I reify it into an object that can procure for those who have earned access to it the services of that force, or "spirit," lodged within it.[38]

Hanging on walls at music stores, leaned up against the chairs on a stage, assembled into racks, or organologically classified at museums, instruments can suggest some kind of spirit when separated from their moments of making or use. It is perhaps more appealing to believe that magic lies in instruments than in people's labor because of the ways in which music and musicianship are mystified and separated from everyday life; because of the appearance of effortlessness that attends so much good performance; and because of the distance most people will have from most instruments in their lived experience.

In the fantasy lives of musicians and artists, we can also see a connection between instrumentality and spirit or magic. A quick search of the phrase "It's like an instrument" yields a steady drone of artistic longings attached to equipment. Like Blesser's parameter-assigned-to-a-knob, magic manifests in machinery the moment that parameter control and efficient operation yield inspiration and hidden resources for art. One genre of comments comes from communities of musicians online who are discussing equipment, sometimes as users and sometimes as reviewers. A reviewer for a microphone writes, "The mic is a pleasure to sing through, it's like an instrument for singers like a guitar is to a guitarist." A user of digital reverb software called ValhallaShimmer writes, "I see Shimmer as a special effect—it has so much character it's almost like an instrument." Another musician, writing about a sequencer (which controls other instruments

but does not make any sounds on its own) says, "It's almost like an instrument in itself when you start doing things like assign knobs A + B to control when things happen relative to other things."[39]

Artists, too, use this terminology. The artist Jim Andrews writes about the interactive visual art program Aleph Null, "It takes practice to tease the really good stuff out of it. It's like an instrument that way." Note that the good stuff is teased out by the user but resides in the thing itself. In an interview with *ART iT* magazine, Janet Cardiff and George Bures Miller describe an installation the same way:

ART iT. If you don't know where the sensors are, it seems natural to explore [*Experiment in F# Minor* (2013)] through movement, to see whether you can control the intensity by waving your arms in one direction or another. The work sucks you into performative behavior. With the walks too, there's a mechanism of unconsciously entering a different zone of behavior.

JANET CARDIFF. You see how unlimited it could be. It's like an instrument.

GEORGE BURES MILLER. That's the problem for us. We're always discovering these things that could be unlimited.

CARDIFF. With *Pandemonium* (2005), for which we installed robotic percussive beaters in the cells of the Eastern State Penitentiary Museum in Philadelphia, we discovered that was like an instrument too. You could have made any piece of music with it. You could invite percussionists in and say, here's an instrument, what do you want to do with it? There's all these offshoots that would be great to follow through. Our problem is we have too many ideas and not enough time.[40]

"You see how unlimited it can be": this turn of phrase marks the moment where description calls forth fetishism. The limitlessness—"you could have made any piece of music with it"—is the fantasy of that "natural force that produces good art" to which Meintjes gestures.

Conclusion

It is not accidental that people attribute magical powers to instruments at some distance from the moments of their use: either the moment of observation from a distance where embodied practice is not fully possible or

the moment of reflection from a distance of time. In *Queer Phenomenology*, Ahmed writes about what is revealed when "technologies are no longer ready for action." An experience of being unable to use a thing—or at a distance from the moment of use—leads to attribution of properties to the thing itself. Writing about failure, using Martin Heidegger's example of a hammer, she says that it "might then lead to 'the object' *being attributed* with properties, qualities and values. In other words, what is at stake in moments of failure is not so much access to properties but attributions of properties, which become a matter of how we *approach* the object. . . . The moment of 'non-use' is . . . the same moment in which objects may be judged insofar as they are inadequate to a task, the moment when we 'blame the tool.'"[41]

This may also be the moment when we credit the tool for the sound. Drawing on Ivan Illich's philosophy of technology, Christopher Small has famously argued against the prevalent notion that some people possess innate musical ability while others do not. Instead, he shows how this idea both represents the limits of the modern educational system and functions to limit democratic cultural participation.[42] But here we can extend his ideas in a slightly different direction. The idea that one needs a particular instrument to get a good sound is not, as Adorno suggests, merely an index of a novice's ignorance and false consciousness masquerading as aestheticism (although it certainly *could* be that in some cases). It may also be, as Meintjes suggests, an index of a musician's search for greater meaning and relationality in musical practice. The deep feeling that an instrument brings magic or power to musicians, rather than they to it, is a residuum of this more general way of thinking. This agential inversion of musician and instrument defines the role of commodity fetishism in sound.

Like all technologies, sound technologies' actual contours are available only in their entelechy. Without a player, an instrument's sonic powers sit at rest. Without a phone call, you can know only so much about a telephone. Yet it is precisely in this moment of rest—in anticipation or retrospection of use—or when an instrument is in the hands of someone else that its fetish character is most effective, for this is where it most fully points to a set of social relations that are otherwise unavailable to the senses. Instrumentality recursively transforms contingent effects, themselves barely perceptible, into new kinds of causes. In apprehending sound technologies' spectral objectivity, we eavesdrop on this process.

Notes

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1 Matt Ward, interview by author, February 17, 2012.
2 Matt Ward, interview by author, February 17, 2012.
3 Chun, *Programmed Visions*, 50.
4 Tresch and Dolan, "Toward a New Organology," 281.
5 These categories are actually quite fluid, but explaining the fluidity is beyond the scope of this paper. Meintjes and Théberge are discussed in detail later.
6 For a critique of the ephemerality of sound thesis, see Sterne, *The Audible Past*, 15; Sterne, "The Theology of Sound." For an example of a sound in commodity form, see Gaines, *Contested Culture*; McLeod and DiCola, *Creative License*.
7 Gopinath, *The Ringtone Dialectic*; Théberge, *Any Sound You Can Imagine*; Wright, "The Wilhelm Scream."
8 Heinrich, *An Introduction to the Three Volumes of Karl Marx's* Capital, 72.
9 Heinrich, *An Introduction to the Three Volumes of Karl Marx's* Capital, 75, emphasis in original.
10 This, too, has a history: see Mills, "Deaf Jam."
11 See Dolan and Rehding, *Oxford Handbook on Timbre*.
12 Adorno, "On the Fetish-Character of Music and the Regression of Listening," 295.
13 Levitin, *This Is Your Brain on Music*. Almost any *Pitchfork* review of electronic music will do, but here is a choice quote from a review of Tim Hecker's *Love Streams*. "Hecker's palette has evolved in other ways, too. 'Obsidian Counterpoint' opens the album with a blippy stream of arpeggios, an explicitly electronic sound that is unusual for his work. Throughout, his sounds seem tugged in two directions at once, as though caught between the digital and the physical. In 'Music of the Air,' a buzzing, droning synthesizer patch bobs in unpredictable motions like a handful of jewel-colored flies. Toward the end of 'Bijie Dream,' a harpsichord-like sound mutates into something resembling a steel pan, a far cry from Hecker's typically Arctic-inspired palette": Philip Sherburne, "Tim Hecker *Love Streams*," *Pitchfork*, April 7, 2016, https://pitchfork.com/reviews/albums/21635-love-streams.
14 Dolan, "Mendacious Technology"; Wilder, "Patina and the Role of Nostalgia in the Field of Stringed Instrument Cultural Production."
15 Bennett, *On Becoming a Rock Musician*. See also Ian Dunham, "From Kitchy to Classy: Reviving the Roland TR-808," *Sounding Out! The Sound Studies Blog*, June 9, 2014, https://soundstudiesblog.com/2014/06/09/808.
16 Wellmer, "Machines to Hear for Us."
17 Maxwell and Miller, *Greening the Media*, 20; Ritzer and Jurgenson, "Production, Consumption, Prosumption."

18 Adorno, "On the Fetish-Character of Music and the Regression of Listening," 295.
19 Théberge, *Any Sound You Can Imagine*, 255; see also 244–45.
20 Chion, *Audio-Vision*, 26.
21 Chun, *Programmed Visions*, 62, 66.
22 Victoria Simon's forthcoming dissertation on touchscreen interfaces describes this relationship in greater detail. A skeuomorph, following Katherine Hayles, is "a design feature that is no longer functional in itself but refers back to a feature that was functional at an earlier time": Hayles, *How We Became Posthuman*, 17.
23 I pursue this further in Sterne, "The Software Passes the Test When the User Fails It."
24 Blesser and Salter, *Spaces Speak, Are You Listening?* 91.
25 Jackson, *Harmonious Triads*.
26 Dolan, *The Orchestral Revolution*; Waksman, *Instruments of Desire*; Weintraub, *Power Plays*. See also Georgina Born and Joe Snape, "Max, Music Software and the Mutual Mediation of Aesthetics and Digital Technologies," working paper, Oxford University; Matt Brennan, "The Drum Kit: A Social History of the Instrument That Changed Popular Music," unpublished ms., University of Edinburgh.
27 Gura, *C. F. Martin and His Guitars*.
28 Jackson, *Harmonious Triads*.
29 On the MPC, see, e.g., Butler, *Unlocking the Groove*; Rose, *Black Noise*.
30 Roger Linn, interview by author, February 13, 2012.
31 Dobrian and Koppelman, "The 'E' in NIME."
32 Butler, *Playing with Something That Runs*; Demers, *Listening through the Noise*.
33 Kursell, "Visualizing Piano Playing."
34 Bourdieu, *The Logic of Practice*.
35 Jain, *Injury*.
36 Ahmed, *Queer Phenomenology*, 31.
37 Meintjes, *Sound of Africa!* 89.
38 Meintjes, *Sound of Africa!* 73–74.
39 Pete Pell, reviewer's comment on the Sterling Audio ST66 Large Diaphragm Tube Condensor Microphone, Musician's Friend sales website, https://www.musiciansfriend.com/pro-audio/sterling-audio-st66-large-diaphragm-tube-condenser-microphone; Aniston, user's comment on "Valhalla Shimmer or EOS?" thread, KVRAudio music software forum, https://www.kvraudio.com/forum/viewtopic.php?t=302426; Gosh, user's comment on "Sequentix Cirklon" thread, Muff Wiggler modular synthesis forum https://www.muffwiggler.com/forum/viewtopic.php?p=933082&sid=c75363c58507ef9674cb8b3bac00fc8c. All accessed March 2, 2014.
40 "Jim Andrews," artist profile on Rhizome.org, http://classic.rhizome.org/profile/jimandrews/?page=2#activity_stream; "Janet Cardiff and George Bures Miller: Part II," ART *iT*, September 27, 2013, https://www.art-it.asia/en/u/admin_ed_itv_e/k15nouprnfsy6i3capt9. Both accessed March 2, 2014.
41 Ahmed, *Queer Phenomenology*, 49, emphasis in original.
42 Small, *Music, Society, Education*.