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**Mapping the Musical Commons:
Digitization, Simulation, Speculation**

This essay is a speculation on how recent digitization and simulation technologies are providing a means of mapping cultural processes that may contribute to new ways of enclosing the musical commons. Three broad, shifting, and interwoven themes permeate this speculation: contested concepts of ownership between a disorganized and reorganized capitalism; blurred distinctions between cultural products and human processes; living beings between the convergence of technologies for mapping and simulation. By outlining a potential paradigm shift in how people understand music, the essay suggests some new directions for ownership and control of primary cultural resources, especially with respect to embodied and simulated musical processes.

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Introduction

Transnational corporations are rapidly enclosing what was once a musical commons. Although they still proceed from modernist assumptions of ownership, international trade agreements include provisions for ensuring that entertainment conglomerates maintain their profits on the trade in intellectual properties such as music. But maintaining a steady state in a predatory globalized economy is not possible. The cultural capitalists need to expand to survive, finding new frontiers and working to enclose them. Digitization allows researchers to parameterize human processes by way of mathematical operations known as waveguide simulation and motion capture. These developments, along with recent research on micro-timed musical phenomena, suggest that digitized simulation of human processes is one frontier that the cultural predators may one day attempt to enclose. But this depends on a paradigm shift from seeing music as a product to experiencing it as a fluid cultural process. Similarly, although copyrights on music have existed for many years, they are still limited to macro-musical materials, primarily fixed melodic phrases. Accordingly, the new enclosure will be contingent on new modes of ownership.

I. Musical Products and Modernist Enclosure

Much of public cultural space is enclosed, owned and operated by private interests. This is part of a larger tendency toward what Herb Schiller calls "the corporate takeover of public expression" [1]. In the case of sporting events and museums, public space is highly subsidized by corporate interests. Concert halls and other places for public music performances are rapidly being enclosed. Jazz and rock concerts are usually promoted by cigarette, alcohol or junk food corporations. MTV is privatized space for music corporations to advertise their stables of performers, and it is not by coincidence that music videos resemble commercials - they are commercials. In short, what was once a musical commons is now being rapidly enclosed, primarily by transnational corporations. But it is not the only public space that is becoming privatized. By the late 1980s, libraries and their collections have become privatized by publishers and other for-profit institutions. There have been various legal cases debating this development. For example, there were suggestions that the [U.S. Government Printing Office](#) be taken over by a private publishing conglomerate, a case of "downsizing" government by privatization. Entertainment libraries, films and television programs are already owned by media moguls like Ted Turner (Turner Network Television in turn is part of Time Warner), leading to debates about what constitutes the transfer and right of ownership. Music is increasingly becoming a product to be owned and traded in the global market economy, with most recorded music owned by a handful of mega-media corporations [2].

International trade agreements already include provisions for ensuring that corporations maintain their profits on the trade in "intellectual property," which includes music. Soon after the long-awaited Uruguay round of the General Agreement on Trade and Tariffs (GATT) passed in 1994, the U.S. and China (the latter under threat of trade sanctions) agreed to terms regarding control of intellectual property. The agreement was celebrated with the closure of two Chinese compact disc factories and the public steamrolling of thousands of CDs, all with plenty of ecstatic cheerleading by the American corporate media. This was done, presumably, to "normalize trade" and "open markets" to U.S. goods. But an important lesson of the Chinese CD squashing is that it plays out a form of coercion necessary to re-educate people into a pay-per-use model, moving the media-moguls closer to ideals of the utopic celestial jukebox. This need for re-educating consumers is echoed by the main shakers of the media-industrial complex.

Cary Sherman, Senior Executive Vice President of the Recording Industry Association of America, puts it this way:

We are working to promote understanding and consensus among artists, music companies, technology providers and consumers about the legal and ethical aspects of copyright law. The re-education program is intertwined with enforcement of existing copyright laws, all of which serves as both an immediate protective measure and an extension of education about existing copyright law. Enforcement casts a bright light on

persons and activities that blatantly infringe upon the rights of creators and copyright owners [3].

In the early 1990s, techno-utopianist Alvin Toffler prophesized, and people like Newt Gingrich proselytized, that intellectual property and information are the newest commodities in the global marketplace. Toffler's reasoning is that those who control the flow of information control the world [4]. This is his much heralded "third wave" of power relations, the first two being based on brute force and bribery (he uses nicer words). Of course, it is those who did most of the brutalizing and bribing that are now promoting the new information age (in the event that information doesn't do the trick, Alvin and Newt can rest assured that the earlier tools will always be lying at the ready, an irony of transnational globalization relying on the usual exigencies of state power). In any case, Toffler and his disciples are envisioning a paradigm shift. This led me to consider the implications for music as intellectual property.

As a currently disorganized capitalism gives way to a reorganized capitalism, many of the trappings of post-modernity (simulation, hybridity, autobiography) may actually become tools for the next phase of (digital) enclosure. This transient moment requires intense focus both on political economy and on technology and culture [5]. Reorganized capital will penetrate further into health, education, and entertainment, colonizing personal life with market logic. If the global economy needs to grow in order for transnational corporations to continue increasing their market shares, then maintaining a steady state, even the already highly inequitable one, is not profitable. Like other transnational corporations and mega-industries, the cultural industries must continue expanding to survive; they must prey upon weaker entities; they must find new frontiers and enclose them; and, they must do this while insisting it is for everyone's best interest.

Recent developments in technology have problematized the music-as-product paradigm. The lawsuit against the Diamond Rio MP3 player and the Secure Digital Music Initiative are useful cases in point. In June, 1999, the courts ruled that, "The Rio's operation is entirely consistent with the Act's main purpose - the facilitation of personal use. Because the Rio cannot make copies from transmissions or from digital music media such as CDs and tapes, but instead can make copies only from a computer hard drive, it is not a digital audio recording device" [6]. Such developments are attempts at enclosing the commons. MP3 has caused corporations to rethink their competitiveness, and focus on an industry standard to protect themselves from the grassroots threat of audio compression. The resulting Secure Digital Music Initiative (SDMI) aims to create a set of standards that protect copyrighted music from distribution through channels they do not control. The Recording Industry Association of American (RIAA) sums up the initiative:

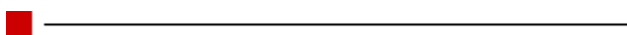
The mission of SDMI is to enable consumers to conveniently access music in all forms, artists and recording companies to protect their intellectual property, and technology and music companies to build successful businesses in their chosen areas. To accomplish this goal, SDMI will actively help develop an open and interoperable means for providing security for copyrighted music in all existing and emerging digital formats and their respective delivery channels [7].

If the current cultural-economic shift is moving more toward a delivery-on-demand, or pay-per-listen, or some other demand-side model, the question still arises as to what will be the role of ownership that keeps the big corporations involved? One-to-one marketing, with musicians providing songs directly to listeners via MP3-based Web sites might cut out the middle men, the marketing, distribution, and promotion networks, and dump the profits in the laps of those who manufacture MP3 players. The new technology may also allow delivery of music from performers to people in community settings. Even mass mediated marketing on the Internet might turn out to be cheaper, thus reducing record industry investments. Musicians could have Web sites and downloadable MP3 tunes, with worldwide distribution and control of their own wares. Yet the ambiguities of the emerging media complex still drive cultural capitalists toward further enclosure. Rob Glaser, MP3 mogul of RealNetworks, says of the RealJukebox,

With music, the mass-consumer product has been digital for years. Its a product form where consumers have a well-established pattern of wanting to collect and own it. The capacity of devices to hold enormous amounts of music will just leap. All the factors are lining up to drive acceleration of broadband [8].

Although copyright laws have a long and varied history dating back to Gutenberg and the printing press, the legal branch effecting music ownership was codified primarily in the early 18th century, framed in such a way as to protect authors of literary works, but soon extended to protect composers of European art music [9]. In the modernist copyright scheme, completed works (scores in the case of music) are the ownable entity. The resulting product-oriented copyright laws have been amended and modified somewhat over the past century and a half, primarily to make provisions for the changing nature of music publishing and performance, and for covering sound recordings. Interestingly, while the United States refused to sign the Rome Convention of 1961, which included provisions for ensuring payment of copyright wages to musicians, it rigorously supported and enforces the intellectual property copyright and patent provisions in the 1994 GATT agreement.

Copyrights on music are still limited to macro-musical materials, primarily entire scores or melodic phrases in some cases, and sound recordings in other cases. Despite several superficial changes, the laws treat music as a product. But there is a general awareness in the music industry that copyright laws are dated and not fully relevant in a technologically sophisticated global music market. And according to Wallis and Malm, copyright laws are also inadequate for protecting the rights of musicians, since the conditions surrounding what constitutes ownable music have changed [10]. But, as of yet, no one is acting to drastically change the laws, probably because it isn't clear where changes need to be made in order to maintain the highest profits for the transnationals while still keeping intact the veneer of protecting musician's rights. For now, the old laws seem to be adequate for maintaining corporate profits. But a paradigm shift away from product and closer to process - another facet of postmodernity - may open heretofore unimagined frontiers to the enclosure movement.



II. Musical Processes and Micro-Timed Phenomena

Another possible way in which copyright and patent laws may be altered to accommodate the growth and enclosure imperative is to change the scope of what is ownable, by allowing copyrights and/or patents on micro-musical phenomena. My research with Charlie Keil on participatory discrepancies, though not originally intended to do so, suggests that this is one area which the culture corporations and the media industrial complex may one day attempt to enclose. For now, our work demonstrates the real possibility of digital mapping of complex musical interactions [11].

According to Keil's participatory discrepancy (PD) theory, musical groove is about process, not product. A groove needs to be negotiated each time between players - there are no essential grooves. Keil believes that because "much of whatever groove or sound in question is subliminal, variably in and out of awareness, we have to further develop theory and methods beyond straightforward ethnography." To substantiate this claim, he suggested developing ways of measuring the micro-timed phenomena that make up groove, in order to demonstrate that there are "gaps between the taps" and that musicking is not about abstract perfection. Keil believes that this will help us to remember that "every groove has a material dimension - sticks tap metal, fingers pluck strings - and has to be constructed between players." He sees this as a form of "dialectical materialism in action."

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Following Keil's suggestions, I conducted a series of experiments and analyzed several recorded examples of digitized jazz swing. I was able to determine that PDs do indeed "exist" - there were subliminal micro-timed ways in which musicians interacted while creating a groove. While the results are only preliminary, there may also be patterned ways in which musicians interact on a micro and mostly out-of-awareness level. Charlie was delighted, since I had proven his long asserted hunch that "music, to be personally involving and socially valuable, must be 'out of time' and 'out of tune'" (that is, in relation to the standards dictated by civilization). Much of his most recent article on this topic is a "happy meditation" on these results. Happy because, as he puts it, "surely a deepening awareness that abstract perfection, absolute time, perfect pitch, ideal form, flawless performance, etc., etc., are weird myths of the West and the eventual death of music, surely this knowledge will help us teach better. Surely the excitement of playing a little out of time and a little out of tune in the paths that all genuine cultures require will bring more and more children into musicking more of the time." We were both eager to consider the benefits of our findings, and we both speculated on the liberating aspects of PD theory. While I am still enthusiastic about the positive implications for our work, I have also begun to see another set of implications for what we've "discovered." In light of the potential for this research to lead to mapping of musical processes for profit, I want to

develop what might be called a "sad meditation" on the negative implications of PD theory, with an ear toward music ownership in a digital age.

I wish to consider what Jerry Mander calls a "worst case scenario," following his suggestion that technology be considered "guilty until proven innocent" [12]. Briefly, Mander believes that the introduction of a new technology is only viewed in the context of its best case scenarios. He points out that this is a terribly dangerous tendency of Western civilization, a form of amnesia, that has already led to all sorts of environmental, cultural and human destruction. Worst case scenarios involve asking informed "what if" kinds of questions. My question is, "What if the musical paradigm shift that Keil and I envision leads to music being even more enclosed by the big transnational corporations?"

Many people have already commented that such concerns are absurd, since computers can never map music in the way Keil and I are suggesting. Others have raised points of a practical nature, that even if mapping became common, there is no way to enforce ownership of micro-phenomena. But these miss the essential point, the paradigm shift from product to process. In general, there is a tendency among some ethnomusicologists and scholars to treat music as being somehow unknowable. Most research focuses on "music as culture" or "music in culture." Some of the published responses to our PD research suggest that ethnomusicologists are uneasy with the prospect of knowing exactly how music works in material terms.

This notion that music is somehow unknowable reminds me of Edward T. Hall's work with "out-of-awareness culture." Hall identifies three levels of culture, one that he terms "primary culture." In primary culture, norms are known and obeyed by all, but are not stated and occur "out-of-awareness" [13]. His research on out-of-awareness culture includes detailed study of films depicting human interaction. Hall argues that meaningful out-of-awareness human interaction is made up of micro-timed phenomena, visible only when the films are slowed down or sped up. Hall is convinced that these primary level ways of interacting can be completely different from culture to culture. He calls this out-of-awareness micro-timed human interaction "entrainment." Hall sees a certain urgency in engaging primary level culture, suggesting that if human beings don't spend more time figuring out how entrainment works (and doesn't work), then there is going to be a lot more intolerance and destruction in the world. As I worked on the PD project, it seemed to me that if anthropologists like Hall were able to generate important research questions through analysis of micro-timed phenomena in human behavior, then there was certainly a role for PD research in ethnomusicology.

Some ethnomusicologists believe that the study of micro-timed musical phenomena can provide insights into musical change and the relationships between local music and music produced for the globalized marketplaces. Local musics are loaded with PDs. However, when they are recorded for the global market in high-tech studios, the rough edges of PDs are usually rounded off or sanded down, according to corporate assumptions about mass marketed tastes. By observing and comparing micro-timed musical phenomena, Chris Waterman noted that "the timing gaps of Wolof social dance drumming are compressed in Parisian studio recordings of *mbalax* music, sucked up against the equal pulse base by

the gravitational field of Worldbeat aesthetics." Waterman believes that research into micro-timed phenomena can be useful for study of "the musical correlates of culture change and imperialism."

I agree with Waterman, but want to take this issue beyond what he is suggesting. If the market likes more predictable PDs, this means that producers can take a "rough" local music groove and "smooth" it over for the global market. It seems to be working, at least if sales of this kind of music in the global market are any indication of its popularity. At the same time, the "musitechnologists" (and their bosses) have in a sense done the same thing with music that the biotechnologists (and their bosses) have done with seeds, allowing corporations to take the product of generations of local know-how and clean it up a bit - just enough to patent it for exclusive use. Let me elaborate on this analogy.

The patenting of seeds and other biological materials is a useful cognate for illustrating my concern with ownership of music. Transnational corporations are working fast to patent biodiversity (and, in some cases, biomonstrosity). Usually this involves isolating the DNA of a specimen and "mapping" its genome (an apt term - "mapping" has always been an early step toward enclosing a new frontier). This means breaking down organic material into sets of amino acids, chromosomes and the like - isolating the "building blocks of life," as it is usually described in reductionist science terms. Once this is done, patents can be applied to the newly "discovered" biological processes [14].

Since the development of this process a few years ago, there has been a patent feeding frenzy going on, a mad scramble for chromosomes. The most ambitious of these endeavors is the "human genome project," a mapping of human genetic structure. Scientists, mostly in American universities or research institutions, aim to patent every genome they can lay their pipettes on, either at the behest of or in attempts to curry the favor of large medical and pharmaceutical corporations. At times, a genome is even modified, for example "creating" or inventing hybrid seeds that will only grow under certain controlled conditions. The resulting "new" materials, which have now been "mathematically simulated" (more on this below) can also be patented. In the case of seeds, one end result is that farmers have to pay royalties to multinational corporations for using seeds that their own ancestors cultivated for centuries.

The significance of the seed debate is that it suggests a convergence of copyright, which protects authored works, and patent, which protects processes of invention. It is into the place where the two meet that I wish to interject some speculation on the implications of digitization of musical and human processes. This conjunction has implications for ownership, along with copyright and patent laws. Eben Moglen has already pointed out the absurdity of copyrighting a sequence of numbers, and that this is a portent to the eventual collapse of the copyright system as we know it. Claiming to own large streams of numbers, while making radical distinctions between them despite their similarity, will lead to the withering away of the intellectual copyright system [15]. Owners get around thorny questions of ethics by engaging in a form of mental ju jitsu, which has them believing that what is patentable is not the cell or gene, but the process through which it


will be utilized. This suggests that a paradigm shift from product to process is already in motion, and I want to consider that in light of recent developments in digitization.



III. Digital Simulation with Waveguides and Motion Capture

There are several examples illustrating the possibility of scientists (or technicians - there's really not much difference in this context), in collaboration with corporations, being able to capture and simulate human micro-timed phenomena in ways that are quantifiable yet not mechanical. The Center for Computer Research in Music and Acoustics (CCRMA, pronounced "karma") at Stanford University is carrying out research on the digital simulation of acoustic instruments and human voices. Utilizing a new technology known as "waveguides", Stanford researchers are working to mathematically recreate the distinct expressive characteristics of musical instruments. Waveguide technology is rapidly replacing sampling as the preferred mode of digital simulation. While sampling can capture an instrument's sound precisely, it is less useful in capturing the minutia of sound production that change over time as an instrument is played by a human being. Eschewing sampling, waveguide researchers use probability frameworks and mathematical formulas to recreate sound in time as well as the variable processes of sound production. In conjunction with developing more sophisticated controllers, which can simulate the feel and player action of a particular instrument, CCRMA hopes that waveguides will revolutionize the electronic music industry.

While much of the research is focused on timbral aspects of instruments, CCRMA technicians hold out the prospect that one day their machines will be able to "sing like Pavarotti", adding that with "certain permissions, a [synthesized] singer could sing works that had not been composed in his or her lifetime." Such a prospectus requires one to have "a good model of Pavarotti after he's long gone." But what is a "good model" of Pavarotti, and what are "certain permissions"? CCRMA researchers also want the next generation of synthesizers to "replicate the physical sensations that a good performer feels." Sampled instrumental sounds are usually not very responsive to the controlling touch of performers. Waveguides are more desirable, because they are more controllable. Users cite their flexibility in hearing real sounds without having to hire real people. Composers can hear their pieces sung and played by the great players and masters, without having to hire them, or even after they're dead. There is even a plan to catalogue and use waveguide simulations of actual performers, which is possible, though not yet demonstrated [16].



The barriers to large-scale digital manipulation of music are being rapidly torn down.

Intertwined with all this high-minded research and talk of models and permissions, one finds a heavily vested corporate presence. CCRMA is operated with the proceeds of its own foundation, established from the profits of an earlier invention, "frequency modulation", a form of sound synthesis that fueled synthesizers in the 1980s, such as the incredibly popular Yamaha DX7, from which CCRMA made upwards of \$20 million. CCRMA industrial affiliations began in 1987. Member corporations for 1998-99 include DigiDesign, Hewlett Packard, NTT Basic Research of Japan, Texas Instruments, Yamaha and Opcode. Annual meetings attract industry veterans, like Ted Hoff (formerly of Intel), and others affiliated with Apple or AT&T's voice recognition labs. CCRMA's supporters receive copies of research reports and gain early access to papers submitted for publication, while CCRMA graduate students essentially work for industry.

The barriers to large-scale digital manipulation of music are being rapidly torn down, moving industry closer to realizing the dream of complete enclosure. One of the key problems inherent in digitizing sound, the storage and handling of the resultant large amounts of data, has already been largely overcome by new compression techniques. Again, this breakthrough would not have been possible without financing from the media-industrial complex, ironically with their government subsidies at the public expense.

Another recent technological innovation, known as "motion capture", also has implications for digital enclosure of human processes. Motion capture utilizes digitized films of live action, whether of people or animals, by placing "point trackers" on the film image to track the live action movements. Tracking movement allows a model to execute the motion performed by the living being, based on where trackers are placed. Experimentation involves placement of point trackers. This is used primarily in virtual reality systems and various simulations. There are problems with occlusion in virtual reality systems, much of which is done in a studio setting. Proposed solutions involve global positioning satellite systems that can motion capture free running animals and athletes outside instead of in the studio [17].

But, like audio sampling, motion capture is not fully responsive to user control. Norman Badler, originator of the virtual test dummy "Transom Jack" and other real-time human simulations, uses anthropometry based on U.S. Army and NASA measurements of ranges of human types, scaled from Japanese women to American men [18]. Anthropometry is more flexible than motion capture, because it is easier to alter and parameterize. Motion capture is better with forced applications, when the user defines the movements specifically. But the Army and NASA need more flexibility for their testing regimes. Badler also notes that simulated humans can be created in time scales through motion

capture and time synthesis, exhibiting autonomy and intelligence in decision making in novel and changing environments. Research strives to create interactive virtual people with individual personalities. Applications of virtual humans include cartoons, games, special effects, medical, ergonomics, educational, tutoring, military, within dimensions of appearance, function, time, autonomy and individuality ranked according to the needs of different applications. Its major uses are in safety simulations, training programs and auto design. The function parameter, highest in medical and ergonomics use, or the individuality parameter, which is high for cartoons, games, special effects, medicine and education, might be important in parameterizing human musicking.

The motion capture literature discusses future prospects for autonomous animation and human figure simulation, all directed to utility, applied to industrial needs. This is reminiscent of Hall and his early analysis of motion analysis. But Hall takes a concerned anthropological approach, asking ethical, moral and legal questions, and considering issues of human survival. Badler and others look to fine-tune the technology with a decidedly utilitarian kind of approach. Motion capture research is interested in real time virtual humans, gestural effort control and locomotion. This recent maturation of computer technology to portray and control virtual humans, simulations which are increasingly interactive with their human cohorts, has some people envisioning a cultural movement "toward smarter avatars" [19].

While much of this is going on in sequestered labs managed by the university-corporate-government complex, the entertainment industry is the major way that most people are becoming aware of the (rather crude, in some cases) fruits of motion capture and anthropometry research. Hollywood and Madison Avenue are making strides toward using naturally occurring movements for bringing more "life" to their animated characters. For example, since the mega-hit movie "Jurassic Park" used computer animation and motion capture techniques stemming from film of elephants and other animals to bring dinosaurs to the big screen, the technique has become increasingly common. The astonishing realism is due in part to plotting and patterning the animations after live human and animal movements. As with waveguides research, these major breakthroughs in motion capture would never have been possible without vast infusions of industry and state capital, with hopes for even vaster profits.

The advertising industry is doing similar work. Using computers and film, animators are able to capture the participatory discrepancies of human movement for applications in their imaginary creations. Some of this is being funded by oil and auto conglomerates for a joint advertising campaign. It works like this: professional human dancers are carefully filmed and their movements digitally mapped. The maps are used as frameworks over which animated characters can be digitally drawn (in this case cars and gas pumps dancing in couples, rather corny and unimaginative, I might add). The human images are digitally removed, but the animations are built upon the human movements (sort of like killing the dancers but keeping their shadows). The result is animations that seem more lifelike than ever before. I suspect that the dancers are simply paid union scale for the initial sessions in which their "imperfections" are filmed. They also likely have no control over how those imperfections are used, since the dancers themselves are conveniently

removed from the picture (not to mention the years of training it took them to move with such graceful imperfection). Once a sound or motion phenomenon is separated from its organic source, and digitally "captured" and "mapped," it seems to me that patenting it as a "new creation" is only a step away. How long before musicians are routinely paid a one-time scale for maps of their imperfections?

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I'd like to explore for a moment some further implications of the interface between humans and data that I've outlined above. There is lot of talk lately about "cyborgs." Arthur Kroker paints a grim picture of a future where human society is in "recline" and has entered the "terminal phase of a slow but nonetheless fatal fade out" [20]. Kroker believes that humans are "gripped in the cyber-jaws of virtualization." His underlying thesis is that "the human species is rapidly evolving into an electronic species: half flesh, half data." In this brave new world, there is no nature and all life is in a cybernetic relationship with technology. Let's hope Kroker is wrong, but what he projects does seem to be the logical outcome of a techno-obsessed society. Who will benefit from the New World techno-society which some have aptly dubbed "Cyberia?" Surely the transnational corporations that make computers will profit (although the amount of chemical pollution and Third World slave labor required to make all the necessary computers is hard to fathom; I wonder if Newt and Alvin have considered this). If humans are indeed interfacing with data, then this suggests that what we consider to be culture will be logged even more completely into the realm of privatized property for profit. As Kroker and others suggest, all our current "cybersurfing" on the waves of a new info-age will likely wash us up on the barren shores of "cyberserfdom," and that many people may end up as road kill on the information superhighway [21].

Kroker's virtual purgatory may already be taking shape in the house music and rave music scenes. These musics often combine live musicians, sampled live sounds, and prerecorded musics with a mechanized and well-controlled cyber-groove. Technicians create machine-music geared toward keeping ravers on the dance floor as long as possible. According to several practitioners I've spoken to, they are already manipulating subtle aspects of groove (mostly by way of tempo controllers). But I wonder if anyone is also learning the subliminal shifts and perturbations of groove that can whip dancers into a frenzy? This all may sound quite insidious, but machines are insidious. And they make it easy for humans to do insidious things. I recall Frank Zappa saying once that there are musical tones for everything, and that all you need to do is find the right tone in order to make someone, for instance, defecate (Zappa's example, though he used a cruder term). One wonders if grooves can have similar powers. As far as I know, little research is being done on house and rave musics, other than considering their relative social import [22].

Some ethnomusicologists are adamant in their opinions that computers will never be able to completely capture and simulate the intricacies of human feels and grooves. I agree to an extent, but do not think this to be the issue. All computer programmers need to do is take a local groove, "clean it up" a bit, making it sellable on the global market. Locals and scholars might scoff that it's not the "real thing," but that never bothered anyone in the transnational marketplace before, and I don't see how it can now. Computer-assisted, systematic study of micro-timed musical phenomena, especially when done in conjunction with the needs of the global market, is capable of creating and/or simulating sellable and patentable cyber-grooves. Such an alliance between science and the market can inflict serious damage to musical diversity worldwide, as it has already inflicted serious damage to biological diversity. But there is a paradoxical dilemma here: if ethnomusicologists deny that music can ever be enclosed in the way I describe, then they will be ill-prepared to deal with the enclosure movement in the event that it can. By asserting that music is somehow beyond quantifying, ethnomusicologists may be in a sense giving in to those who want to turn a profit on culture, even if what they clone and patent is not the "real thing."




Conclusion

In my rejoinder to respondents to our PD articles cited above, I asked, "What is next? CEOs determining the precise PDs for the most sellable groove? Global McMusic studios controlled by entertainment megacorporations? Or, worse yet, will there be a redefinition of the human grooves of many musics with a quasi-electronic cyber groove?" I wondered about the prospect of patentable cyber-grooves becoming the criteria for good musicking, the way scores and recordings did with other kinds of music. Since, as noted above, the rules of music ownership are enshrined in out-dated copyright and patent laws, I believe that these laws (like most other laws when the time is right for maximum benefit to those in power) will change once the paradigm shift Keil is suggesting occurs, once people in the industry are able to accept the basic premises of PD theory. Then what is to be done?

One response might be to use all this fancy technology for preserving music grooves before they are all "sucked up," "compressed," or captured and enclosed by the media-industrial-entertainment complex. But such an impulse would not be new. What used to be called "salvage social science" came about when anthropologists and ethnomusicologists in the late 19th century became concerned that indigenous peoples and their traditions were quickly disappearing as a result of colonization (though they were often not explicit in making that connection). Their solution was to "salvage" the artifacts of these disappearing cultures, depositing them in museums and other institutions for safe keeping. The Smithsonian has accumulated thousands of cylinders and discs of Native American music, while the American Museum of Natural History has warehouses full of Native American arts and crafts (thanks mostly to the anthropologist Franz Boas). Some Native peoples are finding these materials useful in rediscovering their past cultures, and others want to physically reclaim their ancestor's stolen voices and objects (including, in some cases, bones) for repatriation to reservations. But this is an

unintended benefit of the salvage operations, since most everyone assumed that Native Americans either wouldn't be around to rediscover their past, or wouldn't want to be reminded of their "savage" past once they were "civilized" into the norms of white America. Beyond this, very few of the dutiful collectors asked why the savages needed to be salvaged in the first place.

In the late 20th century, there seems to be a need once again for some kind of salvage operation. However, it's not just cultures this time - the whole planetary ecology is endangered. While there are some old school salvage operations going on (for example, there is an institute in India that is collecting specimens of endangered plant life in order to salvage its DNA, and environmental collectives are trying to buy up public lands that are going private), concerned scholars and activists learned an important lesson from the first round of salvage operations a century ago. It's not enough to salvage the products (cultural or biological); we need to prevent their destruction in the first place (not to mention saving the humans who live in these cultures and ecosystems), and to preserve the processes. Concerned scientists like Vandana Shiva are on the forefront of this movement in India, taking a stand against patenting of seeds and DNA as well as against the reductionist science behind it all. I see an eventual similar struggle for concerned social scientists.

Returning to my concerns with the musical commons, preliminary inquiries suggest that there are no legal cases currently pending which involve ownership of music beyond the conventional copyright and patent norms, although the recent cases involving MP3 and SDMI add a few new twists to the product paradigm. Since my concerns for a paradigm shift involving a redefinition of laws to include processual micro-phenomena are largely speculative, my worst case scenario may never come to pass. If that turns out to be the case, I'll gladly (and with great relief) admit that I was wrong. 

About the Author

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Moglen at Columbia University, who kindly offered insightful comments on a late draft, and Ghada Ramahi, who has tolerated my often pointless meandering and late night revising.

Notes

1. Herbert I. Schiller, 1989. *Culture, Inc.: The Corporate Takeover of Public Expression*. New York: Oxford University Press.

2. Richard J. Barnet and John Cavanagh, 1994. *Global Dreams: Imperial Corporations and the New World Order*. New York: Touchstone. Also see David C. Korten, 1995. *When Corporations Rule the World*. West Hartford, Conn.: Kumarian Press. For some exceptions, and for background on the music industry in a global and local context, see Deanna Campbell Robinson, Elizabeth B. Buck and Darlene Cuthbert (editors), 1991. *Music at the Margins: Popular Music and Global Cultural Diversity*. Newbury Park, Calif.: Sage, and Steve Chapple and Reebee Garofalo, 1977. *Rock n Roll Is Here to Pay: The History and Politics of the Music Industry*. Chicago: Nelson Hall.

3. [Protecting Music Rights in the Digital Era: the U.S. Experience](#). Sherman continues:

We're working to reach out in a distinctive and constructive way to college students and other amateur music distributors. College kids - with more time on their hands than money, are collecting and trading sound files like baseball cards. RIAA launched a pilot program last April working with 10 colleges and universities to educate students and administrators about music in cyberspace. It is a website and program called Soundbyting, that contains educational material for students and other visitors so they can understand how copyright law applies to the Internet. It also discusses the ethical and practical implications of illegal activity for artists and consumers. Since its inception, more than 120 schools have signed on to the Soundbyting campaign.

He also notes that,

Our companies are actively exploring ways to target, serve, and deliver value to consumers in new ways. Technology has the potential to profoundly expand the presence of art in our world, to deliver music in a series of expanding circles where creators are supported for their work and inspired to create more and greater works of art.

I cannot think of a better example to demonstrate the blind hubris of capital.

4. Alvin Toffler, 1990. *Powershift: Knowledge, Wealth, and Violence at the Edge of the 21st Century*. New York: Bantam Books.

5. Steven Best and Douglas Kellner, 1997. *The Postmodern Turn*. New York: Guilford Press.

6. [Courts Okay Diamond's Rio](#). The article continues:

"The ruling opens a host of new opportunities for us," said David Watkins, president of RioPort, Inc., Diamond Multimedia's Internet music subsidiary. "We have always believed that the Rio line of devices operated well within the law. The Rio has always been marketed as a playback-only device for the thousands of legitimate music and audio tracks on the Internet." Watkins added, "We do, however, continue to share the RIAA's concerns about piracy and protecting the rights of content owners. While the Rio device has become a world-renowned product, we have expanded our digital audio initiative beyond the hardware players with the deployment of RioPort.com, a leading resource for consumers who want access to working, legitimate digital music and audio content on the Internet."

7. [From the Secure Digital Music Initiative Mission Statement by RIAA.](#)

8. Glaser is quoted in Randall Rothenberg, 1999. "Rob Glaser, Moving Target," *Wired* (August), p. 128.

9. For background on copyright and patent laws, see L. Ray Patterson and Stanley W. Lindberg, 1991. *The Nature of Copyright*. Athens: University of Georgia Press, and Paul Goldstein, 1994. *Copyright's Highway: The Law and Lore of Copyright from Gutenberg to the Celestial Jukebox*. New York: Hill and Wang, 1994.

10. Roger Wallis and Krister Malm, 1984. *Big Sounds from Small Peoples: The Music Industry in Small Countries*. London: Constable.

11. See the special issue of *Ethnomusicology* devoted to the topic (volume 39, number 1, Winter 1995). In addition to the articles summarized here, there is an essay about micro-timed musical processes in Cuban music, as well a number of responses to the articles from prominent ethnomusicologists, and our rejoinders. For further discussions on Keil's theory of participatory discrepancies, see Charles Keil and Stephen Feld, 1994. *Music Grooves: Essays and Dialogues*. Chicago: University of Chicago Press. Throughout this section, I use the word musicking, the present participle of the verb to music, as coined and further developed by Christopher Small. See his *Musicking: The Meanings of Performing and Listening*. (Hanover, NH: Wesleyan University Press, 1998).

12. Jerry Mander, 1991. *In the Absence of the Sacred: The Failure of Technology and the Survival of the Indian Nations*. San Francisco: Sierra Club Books.

13. Edward T. Hall, 1983. *The Dance of Life: The Other Dimension of Time*. New York: Anchor Books.

14. On patenting seeds and other biological entities, see the ongoing series of articles in the journal *Third World Resurgence* at www.twinside.org.sgsouths/south/tside.htm and books by Vandana Shiva, especially *Monocultures of the Mind: Perspectives on Biodiversity and Biotechnology* (London: Zed Books, 1993).

15. For stimulating implications of this issue, see Eben Moglen, 1999. "Anarchism Triumphant: Free Software and the Death of Copyright," *First Monday*, volume 4, number 8 (August), at http://firstmonday.org/issues/issue4_8/moglen/index.html
16. Much of the material on CCRMA cited here is from its Web site (<http://www-ccrma.stanford.edu>) and from an article on CCRMA by Don Clark, 1994. "Making a Synthesizer Sing Like Pavarotti," *Wall Street Journal* (6 May), pp. B1, B3. For research on waveguides, see the work of CCRMA operative Gary Scavone, "Real-time Computer Modeling of Woodwind Instruments," *Proceedings of the 1998 International Symposium on Musical Acoustics* (Leavenworth, Wash.); and, "Digital Waveguide Modeling of Woodwind Toneholes," *Proceedings of the 1997 International Computer Music Conference* (Thessaloniki, Greece).
17. There are a number of useful sources on motion capture, especially the work of Norman Badler, "Real Time Virtual Humans," at www.cis.upenn.edu/~badler/bcs/Paper.htm For general history and background on motion capture, see the Motion Capture White Paper at http://reality.sgi.com/jam_sb/mocap/MoCapWP_v2.0.html Some of Badler's other works make interesting reading. See, for example, his book, with Cary Phillips and Bonnie Webber, *Simulating Humans: Computer Graphics, Animation, and Control* (New York: Oxford University Press, 1993), and his paper, with Rana Bindiganavale, "Motion Capture and Mapping with Spatial Constraints," Workshop on Motion Capture Technology (Geneva, Switzerland, Nov. 1998) at www.cis.upenn.edu/~badler/paperlist.html
18. Ergonomic design is but one of the numerous applications for [Transom Jack](#). Badler's anthropometry research is funded by the U.S. Air Force, U.S. Office of Naval Research, NASA, National Science Foundation, U.S. Army Research Lab, National Institute of Standards and Technology, and a host of government and private interests in Korea and Japan.
19. See www.cis.upenn.edu/~badler
20. Arthur Kroker and Michael A. Weinstein, 1994. *Data Trash: The Theory of the Virtual Class*. New York: St. Martin's Press.
21. On cyberserfdom, see Rick Crawford, 1994. "Techno-Prisoners," and Barry Shell, 1994. "Will We Be Cybersurfers or Cyberserfs in the Information Age?" both in *Adbusters Quarterly: Journal of the Mental Environment*, volume 3, number 2. *Adbusters Quarterly* is available at www.adbusters.org
22. For further discussion of rave music, see Philip Tagg, 1994. "From Refrain to Rave: The Decline of Figure and the Rise of Ground," *Popular Music*, volume 13, number 2, pp. 209-222.
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