

sound / data / matter - a metaphor in experimental audio

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In the affluent cultures of the West, the lives of individuals are increasingly entangled with flows of data; specifically, networked, digital data. Our financial transactions, our interactions with bureaucracies of all shapes and sizes, our interactions with each other (by mobile phone or email), our work, our consumption of and participation in culture; all pass, increasingly, through that vaguely-sensed netherworld which might be termed the datasphere. We know the datasphere only through its functional inputs and outputs – ATMs, computers, phones and other networked devices. We rely on its consistent operation, on its faithful response, while remaining almost completely insulated from the details of its operation. While the datasphere can be decomposed into an intricate tangle of hard- and software structures, databases and protocols, we don't need to be conversant in these to, for example, send an email. In fact this insulation from the structures of the datasphere is what brings it into being as an object of the cultural imagination. We are ever-more-acutely aware of the importance of this flow of data, of its reach and cultural impact, of its commercial value; yet the specifics of its operation are, to most, both imperceptible and arcane. In their place we might imagine a vast, glittering web, or a kind of atmospheric layer, a digital ether, a vague "out there."

This cultural imagination of data is a crucial process, exactly because of the significance of that "sphere," and its ever-growing reach: how we think of digital information informs what we do with it, how we use it, critique it and interpret it. If we examine the ways in which data is figured in contemporary cultures, we can begin to consider how this imagination operates and what its consequences are. The datasphere is one particularly broad, nebulous and widely-invoked figure through which we imagine the digital – and I don't intend to tackle it here. Instead, the following case study begins with a very specific domain of cultural practice; a strain of experimental digital audio production sometimes termed "microsound"

or "glitch". This audio and the discourse around it set up a striking three-way circuit which joins data with its Janus-twin, matter, through the intermediary of sound.

This audio practice comes out of an intersecting network of cultural and technological processes which is interesting in itself. In terms of technology, it arises as the personal computer becomes powerful enough to process and manipulate high-resolution digital audio, in real time or close to real time, and as software becomes available which allows non-technicians to begin experimenting with these digital signal processing (DSP) techniques. A cultural shift results: previously, creative applications of these techniques were the exclusive province of "computer music", a practice based in academia and drawing on the traditions of Western classical music. Around the mid-1990s, musicians and sound artists from outside that tradition began to take up its tools for their own ends. They brought aesthetics and processes from other domains: techno, and in particular a more cerebral subgenre sometimes known as "intelligent dance music," but also experimental rock, noise, improvised music, and sound art.

While the work that has emerged is far from homogeneous, it has a handful of aesthetic hallmarks. It tends towards minimalism, deploying limited sonic means and using extended repetition, and here it draws both on "American" minimalism (Young, Riley, Reich, and Glass, among others) and on techno. It tends to be abstract and textural, though those textures span harsh noise, warm drones and fragile clicks and crackles. It often pulses, like dance music, though in a less rigid structure, and it tends not to use (or at least to abuse) that palette of drum and synthesiser sounds which define the aural profiles of dance music. Perhaps its most characteristic aesthetic strategy is to seek out, and use, "glitches" or discontinuities – often clicks, pops, crackles, buzzes – which arise through the technological process of sound production. Austrian-based ensemble Oval have been highly influential; their

Systemisch (1996) is an elegant digital collage whose raw material is the sound of a skipping CD player. In the music that crunching interruption becomes a rhythmic marker, like a drum machine hi-hat or hand-clap; in cultural terms, it helped catalyse the formation of this pseudo-genre. That discontinuity operates both as sound and as an indication of a general approach. This work bends sound until it begins to fray, processes source material until it is unrecognisable, amplifies errors and stretches time. It celebrates both the potentials and the failures of digital audio technologies; the artefacts and by-products they throw off, as well as the unimagined deformations which they enable.

This area raises a whole slew of interesting issues, crossing musicology, "new" media theory, art theory and cultural studies. It is a sophisticated and highly active domain which offers a fascinating case study in cultural production (and the production of a distinct aural culture) using, and reflecting on, digital media technologies. As outlined above, I want to focus here on a very specific aspect of this complex. It is a particular line of metaphor, a trope which has appeared only recently, as this scene has begun to solidify and become more reflective. Artists, record labels and reviewers have begun to talk about digital sound as *if it were a kind of matter*.

Michael Bentley, a Californian musician who records under the name eM, writes of a release titled *Greater than zero, less than one*;

Digital snow is falling, melts into satellite systems, CRT screens and automated teller machines. We swim in an ocean of zeros and ones. Walk along the edge of this sea, lift a silicon shell to your ear, and listen... *Greater than zero, less than one* is a sonic journey between 0 and 1, between off and on, magnifying the singing of nano-events and giving the listener a unique window onto the digital world.¹

New York based label 12k released *optimal.ip* by Dan Abrams (aka Shuttle358) in 1999. Their website describes the recording as

a self-replicating ecosystem that grows and unfolds with the movement of sonic particles and binary rhythm. "optimal.ip" plays on the juxtaposition of ambient drones and delicate

¹ Michael Bentley, "*Greater than zero, less than one*."

<http://www.foundrysite.com/s.greater1.html> [March 2000]

melodies with layers of digital static, lo-fi rumblings, and distressed microscopic sounds.²

Sean Cooper, writing in British music magazine *The Wire*, describes the same recording as "lean, microscopic bitscapes ... digital detritus."³ Another 12k release, *spec.*, by Richard Chartier and Taylor Deupree, is billed as "infinitesimal drops of synthetic sound woven in minimal, cell-like structures." "*spec.* delves into the molecular world of DSP programming... [a] specification . a blueprint . a speck."⁴ 12k also quotes webzine *Ambientrance* describing *spec.* as

somewhat like ear-peering through a special audio-microscope to hear the daily lives of digital electrons at work and at play. ... Bloopier loops bubble up ... dappled with glinting subatomic particles and rougher outbursts... sprinkled with electronic detritus.

Snd is a British duo whose work is like very minimal house music constructed entirely from tiny clicks and bassy thumps. Philip Sherburne writes of their 1999 release, *Makesnd Cassette*, that

The results sound like a thimbleful of mercury slicked across two records, sliding over itself, shimmying into new forms of opiate ambience... Silted noise permeates everything, sonic dust motes scattered by the whirring of a hard disk.⁵

In a post to the microsound mailing list, Sean Cooper gave this account of Kim Cascone's 1999 series *Pulsar Studies*: "Sounds crackle and fizz as they make contact, their jostling edges producing emissions of sound particles that aren't so much heard as witnessed via the constantly displaced perspective of the ear."⁶

So we find a remarkably consistent mixture of material conceits: an abundance of particles (drops, specks, molecules, cells, electrons, dust motes) as well as some more aggregated substances; snow, mercury, "detritus," an "ocean" of digital data. Somehow this is sound that sounds like *stuff*, and *stuff*, moreover, which is digital. These are "digital electrons," this dust is stirred by a hard disk whirring; we hear the flipping of bits — from

² 12k records, <http://www.12k.com/1005.htm> [March 2000]

³ Sean Cooper, review of Shuttle358, *optimal.ip*, *The Wire* 186 (August 1999), 56.

⁴ 12k records, <http://www.12k.com/1007.htm> [March 2000]

⁵ Philip Sherburne, "snd / Byte-size breadcrumbs," *The Wire* 186 (August 1999), 11.

⁶ Sean Cooper to the microsound mailing list (microsound@hyperreal.org), 31 March 2000.

0 to 1 — as the singing of a sea of “nano-events.”

It would be easy, of course, to over-read these statements; certainly they operate within a system of discourse which tends towards the poetic — these are reviews and artists’ statements, not technical documents. It might be, then, that this metaphor is unimportant in itself — simply a conceptual device, an image, which is taken up as a way to conceptualise the work. This was the response of Sean Cooper, when I contacted him to ask his opinion of these material conceits. He writes, “I look at music journalism/criticism as the attempt of one person to ‘enter into’ the music in some way and to articulate what he or she finds there. ... A syntax/vocabulary takes hold and different writers attempt to develop it, to put it to use in various different ways.”⁷ Certainly, this process accounts for the prevalence of the metaphor — but it does not account for its origin. How, and why, does this material conceit offer a way in to this audio culture?

This linkage between data, sound and matter is formed in several ways, at several levels. Traces of the metaphor can be found through the technological systems involved in this practice, as well as in the audio artefacts themselves. Given the centrality of digital audio processing techniques in this work, it is appropriate to begin by tracking the sound particle as it is formed in digital audio software.

Software Metaphors

“Granular synthesis” is a technique developed in the 1950s, and since that time it has been widely used by computer-music composers such as Barry Truax. The central concept is simple: the digital audio source material is divided into tiny segments (around 50ms) which are smoothed off — faded rapidly in and out — to form sound “grains”. These grains can then be manipulated and distributed using mathematical and statistical techniques, transforming the original sound radically. The source material for these grains might be synthetic, or a sample of an acoustic sound; one familiar form of acoustical granulation is time-stretching, where the duration of a sound is extended without altering its pitch. The characteristic

(artefactual) sound of time-stretching has become widely used in dance music, particularly applied to vocal material. With the increasing sophistication and wide availability of DSP software on personal computer platforms, granular synthesis has reached a new and far wider user-base, and it is now one of the central techniques of “microsound”.

Interestingly the notion of microscopic matter inherent in granular synthesis has been taken up, and generalised, in the recent proliferation of programmable digital audio tools. Australian computer-musician Ross Bencina is the author of a flexible real-time DSP environment called “Audiomulch”. The name suggests that these signal-grains are decomposing, becoming richer and also more fertile. In fact the software allows complex cycles of interaction between processes which might be considered more nonlinear or “organic” than the more traditionally linear processes of computer-music. More recently a German company has released the fabulously-named “Crusher-X”, a program which grinds even finer with a technique billed as “vapour synthesis.” (In fact this is essentially real-time granular synthesis with some modulation and live audio input.) Finally, one of the most favoured, and most esoteric tools used in this field is called “Supercollider”, another real-time DSP toolkit created by American James McCartney. Here sonic matter isn’t decomposing or evaporating, but being exploded into showers of exotic high-energy subparticles.

While these examples show that the metaphor is written very explicitly into the tools which this music employs, it can also be found implicitly in the most basic forms of digital audio processing. By definition, digital audio reproduces sound as a set of discrete units: individual samples. With the high resolution (high sampling rate) of current digital audio, these samples are tiny: each lasts 0.02 milliseconds. Even the simplest digital editing tools allow sound to be manipulated at this scale. The representational structures of digital audio encourage us to think of sound as plastic “stuff” — a malleable temporal object. As well, the visual waveform of digital audio creates a sense of landscape, a space through which the user can zoom and scroll, and a space which is dense with detail — right down to the tiniest instant. If the sound is stuff, then these instants — samples — are the

⁷ Sean Cooper, email of 3 April 2000.

immanent constituents of that stuff: sound particles. This ubiquitous representational structure feeds directly into microsound's material conceit.

Clicks, Glitches and Particulate Mimesis

Philip Sherburne's description of *snd*'s *Makesnd Cassette* was quoted above; sliding mercury and sonic dust motes. Writing on the microsound mailing list, Sherburne suggests some explanations for these material figures:

Perhaps it's [microsound's] avoidance of traditional song-structure that lends itself to more microscopic descriptors. Perhaps it's the onomatopoeic quality of the sounds ("buzz," "whirr," etc.). Perhaps it's that the dustier my records get ... the more *snd* sounds like itself. click, pop, sssss.⁸

Similarly Sean Cooper, when pressed on the "sound particles" which pop up in his reviews, observes that "the sounds used by many artists in this field 'sound' small (ie, they are discrete, often quite brief, and are typically not accompanied by lots of effects which serve to "cloud" their materiality....)"⁹

The timbres and structures of this work certainly contribute to the metaphor. A click is, in a sense, the tiniest sound imaginable — so why not call it a sound-particle, a sonic atom? These textures and pulses, whirring and hissings, shifting layers, have an abstract quality which seems to suit the metaphor. Noises of brownian motion, of unknown, microscopic objects.

However as Sherburne points out, the clicks and glitches of this music also signify matter in another important way. They remind us of the pops and crackles of a scratched or dusty record: noises of surface and friction, the sound of a stylus bumping over a dust mote in the tiny valley of a record groove. And it is significant that this is the nearest thing we know to the sound of raw, undifferentiated matter; the produced, recorded encoding of the vinyl is occluded, interrupted by a lump of stuff, and we hear it as clearly as if it were rubbed over our own cochlear pickup. If this association with an analogue medium seems odd for a culture wholly immersed in the digital, think of the persistence of the DJ-led vinyl revival: it remains a central medium in this culture (for both performance and distribution).

⁸ Philip Sherburne to the microsound mailing list, 27 March 2000.

⁹ Sean Cooper, email.

Of course the CD-skipping glitches made famous by Oval also signify matter, in an analogous way. They demonstrate that even as it bears the symbolic bit-strings of digital sound, the compact disc is made of matter, too; the skip is a disruption of the CD-player's tracking induced by a physical disruption of the medium. A scratch in the plastic coating diffracts the laser, throws the player out of alignment with that tiny furrow. One possibly apocryphal account has Oval attacking CDs with paint and screwdrivers, hoping to wring out new extremes of digital disfunction. So, if crackles and pops infer matter through the analogue medium of vinyl, the CD-glitch is the sound of the physical medium of digital audio.

Sound - Data - Matter

If we're looking for an explanation for the material metaphor, it can be found largely in this convergence of software fetishes and associative descriptors. A resonance arises between the spatialised, substantialised representations of data in digital audio, and a reflexive interest in the material grounding of that data in recording technologies. Perhaps more interesting, however, are the ways in which this conceit can be read for what it says about data and matter — and the relationship between these terms is one that is particularly important in the cultural present.

Taken seriously, this material figure performs a striking reconciliation of matter and information. A cultural domain which is self-consciously digital — which identifies itself with digital processes and tools — comes to be talked about in terms of atoms and molecules, particles, surfaces, dust, substance. Yet this is a cultural form whose production and distribution rely precisely on the *transmaterial* qualities of information. Information is by definition a pattern, an organisation of matter which (in the case of digital information) can be interpreted symbolically, reproduced precisely, and formally manipulated in unimaginable ways. Digital signal processing techniques are, by definition, informational techniques; they deal in discrete units of data. Certainly these patterns are encoded in material substrates — CDs, hard drives, RAM chips — but the activity here occurs at the level of the pattern, not the matter. Despite the reliance of one on

the other, the two must remain conceptually distinct: a bit is not an atom.

What does it mean, then, that this audio culture begins talking about itself in the language of matter — the very thing which it is not? For one thing, the idea of matter brings with it a particular set of very positive cultural values — despite the apparent ascendancy of the digital. While it was once considered base, corrupt and imperfect, the material domain has come to be understood — largely through the sciences — as rich and complex, dynamic, and imbued with life. No longer seen as the container for an animating spirit, or the work of an almighty Hand, we are left with a sense of wonder at matter's capacity to organise itself. At the same time, we are ever-more-impressed at matter's susceptibility to engineering, its pliability. Scientists arrange individual atoms like a child's blocks, invent exotic new materials; even the paradoxes of quantum phenomena — perhaps matter's ultimate trick — seem likely to be harnessed for their computational capacity.

This audio subculture seems to be seeking to appropriate these values from matter: it wants to think of sound-data as being like matter, having those complex dynamics, that internal richness, that immanent activity and also that ultimate malleability and plasticity. At times, as some of the earlier quotes indicate, sound-matter even manifests signs of life — Deupree and Chartier create “minimal, cell-like structures.” Rob Young, writing in *The Wire*, makes a very explicit link between sound-data-matter and life-matter: “Granular synthesis ... makes a dust of music. In the hard drive's gigabyte wilderness, grains can be scattered like seeds and the potential for genetic modification seems infinite.”¹⁰ One of the artists involved goes by the name “Autopoieses” — this term, coined by theoretical biologists Francesco Varela and Umberto Maturana, means “self-creating”, and refers to a mode of organisation particular to living systems. This discourse indicates a form of organicism, an art that parallels nature, that evokes and aspires to natural generative processes. This in itself is nothing new: what is interesting here is how that evocation has been imported, wholesale, into the realm of the digital.

In October 1999, American artist Kim Cascone published a microsound manifesto entitled “Residualism.” It reiterates many of these material conceits; Cascone imagines “bits racing around, bumping, chafing, building friction, emitting bursts of energy that radiate out into meat-space.”¹¹ While this quote performs a typical mapping of microscopic matter onto sound-data, it also points to another material realm: that of aural and bodily experience. In performing this rhetorical merger between matter and data, microsonic audio is misrepresenting the real and important relationship between those two terms which is at its core. What marks this audio culture out is its exploration of the very rich and immediate interface between the informational domain of digital signal processing and the material domains of acoustic sound, listening, embodied experience, physical presence and awareness. Whatever bit-friction may be occurring inside the computer is only meaningful as it radiates out into real space. Microsonic data materialises as it reaches the speaker-cone, becoming sound.

The real-time, improvisatory processes of microsound involve the artist in a sensory feedback cycle; a parameter is altered, a set of data-points shifted, but most importantly that shift is heard, evaluated, and shifted again. The material space and subjective time of the performance (or recording) are folded into the manipulations of the datasphere underpinning the sound. This practice is characterised by an intuitive, sensate exploration of its data-systems. It explores the novel aesthetics, cultural fetishes, perceptual thrills, and kinetic and sensual pleasures which the audio-datasphere contains — but those very pleasures are products of malleable data, rather than manifestations of the (impossible) matter of the digital.

¹⁰ Rob Young, “Worship the Glitch”, *The Wire* 190/191 (January 2000), 54.

¹¹ Kim Cascone, “Residualism,” <http://www.anechoicmedia.com/residualism/silence.html> [December 1999].

Select Discography

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