

# Sound Particles and Microsonic Materialism

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**Abstract:** The cultural imagination of data is crucial in a society increasingly enmeshed in the datasphere. In writing around recent experimental audio (“microsound”), sound data is frequently described in terms of matter, through the figure of the sound particle. Here this material metaphor is examined in detail, and critiqued for misrepresenting the crucial relationship between sound, matter and data which is at the core of this field of practice.

In the affluent West, our lives are increasingly entangled with flows of data; specifically, networked, digital data. Our financial transactions, our interactions with bureaucracies and each other, our work, the consumption and creation of culture; all pass increasingly through a mesh of digital systems – we might call it the datasphere. We know the datasphere only through its functional inputs and outputs: ATMs, computers, phones, and so on. We rely on its consistency, while remaining almost completely insulated from the details of its operation. The datasphere can be decomposed into an intricate tangle of hard- and software structures, databases and protocols, but 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. This cultural imagination of data is a crucial process, exactly because of the significance and power of that sphere: 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.

This paper examines a very specific imagination of data, from within a subculture of experimental electronic music and sound. What’s striking here is that through the intermediary of sound, digital data is figured here as exactly the thing that it is not: matter. The tension between these terms is crucial in contemporary culture: it is reflected in our everyday experiences of data systems, as simultaneously material (I can kick my computer) and immaterial (exactly *where* is my money?). In electronic audio, the interface between data and matter is basic: data becomes signal becomes sound, projected into physical space and subjective time. I have argued previously that much of the work in experimental electronic audio is centrally concerned with materialising the media infrastructure that underpins the signal.<sup>1</sup> However in much of the discourse around this work, the articulation of data and matter is collapsed into the figure of the sound particle.

## Sound Particles

The sound particle is a persistent trope in the discourse around contemporary experimental electronic audio. It has been most prominent in the “microsound” scene – a loose grouping characterised by real-time digital processing, live performance with laptops, and influenced by popular electronica, minimalism, computer music, improv, and technoculture at large. Particles can be traced through the artist statements, reviews and press releases that form the basis, in this subculture, of a discourse which informs how the audio itself is heard, understood and imagined.

Michael Bentley, a Californian musician who records as eM, writes of his 1998 release *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.<sup>2</sup>

New York label 12k describes Shuttle358’s 1999 *optimal.lp* as

a self-replicating ecosystem that grows and unfolds with the movement of sonic particles and binary rhythm. “optimal.lp” plays on the juxtaposition of ambient drones and delicate melodies with layers of digital static, lo-fi rumblings, and distressed microscopic sounds.<sup>3</sup>

Sean Cooper, writing in *The Wire*, describes the same recording as “lean, microscopic bitscapes ... digital detritus.”<sup>4</sup> 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.”<sup>5</sup> *Ambientrance* webzine describes *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.<sup>6</sup>

*Makesnd Cassette* by British minimal-house duo Snd, is described by Philip Sherburne:

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.<sup>7</sup>

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.”<sup>8</sup> Tetsu Inoue’s *Fragment of Dots* (2000) is described in the label’s press release as “sonic microscopy” revealing “an ecstatic bustle of sound particles careening through acoustical space...”<sup>9</sup>

While the notion of the sound particle might be native to the “microsound” scene, it seems to have propagated more recently through other, related genres – just as the clicks, cuts and glitches of experimental digital audio have rapidly hybridised with established dance music genres. Lena is an electro-dub project on Belgian label Quatermass: “The centre of Lena’s universe of sound is a sonic black hole of

infra-bass from which sound particles manage to frenetically escape, spiraling off into the cosmos in a frenetic rhythm,...”<sup>10</sup> Meanwhile a press release for hardcore breakbeat artist Venetian Snares hears “the scrutiny of an atomic-force microscope.”<sup>11</sup>

So here we find a consistent mixture of material conceits: a variety of particles (drops, specks, molecules, cells, electrons, dust motes) as well as some more aggregated, but undifferentiated, substances; snow, mercury, “detritus,” an “ocean” of digital data. 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 0 to 1 – as singing nano-events.

Of course these statements operate in a system of discourse which tends towards the poetic – these are reviews, artists’ statements and press releases, not technical documents. It might be, then, that this metaphor is unimportant in itself – simply a convenient conceptual handle. As Sean Cooper responded, when asked about these material conceits: “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.”<sup>12</sup> Yet this material figure is so ubiquitous, I would argue that it is far more than a reflection of what a reviewer or artist “finds” in the work; it is a concept which shapes the whole cultural circuit at work here: process and product, artist and listener. The sound particle stands for a (problematic) convergence of data, sound and matter that is central to this field.

### Metaphors in Software and Technique

Working back up the production chain, we can follow the material metaphor into the technical discourses, and software artefacts, which inform microsonic practices. The sound particle is much like the “grain” in granular synthesis. This technique was developed in the 1950s, and became widely used in “serious” computer music composition. Briefly, granular synthesis involves dividing audio source material into tiny segments (around 50ms) which are given an amplitude envelope 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. 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. Shareware software synth Crusher-X grinds even finer with a technique billed as “vapour synthesis.”<sup>13</sup> Finally, one of the most favoured tools used in this field is 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.

The most substantial example of microsonic materialism in the technical domain is Curtis Roads’ recent book, *Microsound*. (The name is not coincidental: Kim Cascone

heard the term “microsound” in a lecture Roads gave in 1999; he appropriated it soon after to name the mailing list which is now an important part of this international scene.) This text describes the author’s work on a family of granular and related synthesis techniques, but also, importantly, asserts the microsonic domain as a perceptual and musical territory. In it, Roads seems determined to maintain the notion of a sound particle, despite some logical and scientific obstacles. He traces a history of particulate models of sound back to early Atomist philosophers such as Lucretius, then illustrates their demise as the wave model came to prominence during the 17th century. The nearest he comes to proposing an actual physical sound particle is in recounting Einstein’s theory of acoustical quanta or phonons – distinct units of vibrational energy which reflect the quantum nature of subatomic structures. These are ultrasonic vibrations however, emerging from atomic lattices in crystals, and with frequencies in the gigahertz range are well beyond the domain of human perception. These are clearly distinct from the sound particles Roads works with. Even so he is reluctant to surrender any sense of the physical reality of the particle, suggesting that wave and particle models “are not opposed,” but “represent complementary points of view,” and that sound may be “either wave-like or particle-like, depending on the scale of measurement, the density of particles, and the type of operations that we apply to it.” [55]

In the technical body of the work, Roads shows very clearly that particulate models offer powerful techniques for analysis and synthesis. These are ways of making, or ways of analysing, not ontological models of sound. Yet Roads plays up the metaphor, laying out varieties of sound particle in a kind of acoustic periodic table: glissons, grainlets, trainlets and pulsars. The sound particle is literally a framing concept here: the jacket graphics of the book show the curling trails of subatomic particles, smashed in a cyclotron.

### Clicks, Glitches and Particulate Mimesis

Philip Sherburne’s description of snd’s *Makesnd Cassette*, quoted earlier, imagines 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.<sup>14</sup>

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....)<sup>15</sup>

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, whirrings and hissings, shifting layers, have an abstract quality that 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: the sound of a stylus bumping over a dust mote in the tiny valley of a record groove. 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. The CD-skipping glitches made famous by Oval also signify matter, in a (digitally) 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. The CD-glitch is a way of hearing the physical medium of digital audio. As I have argued elsewhere, "inframedia" audio, which foregrounds hiss, crackle, breakdown and glitch, is fundamentally concerned with materialising normally transparent media substrates.<sup>16</sup>

### Materialism

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, matter and their (critical) relationship.

Taken seriously, the sound particle performs a striking reconciliation of matter and information. A cultural domain that is self-consciously digital – which identifies itself with digital processes and tools – talks about its practice 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 that (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 imagines itself in the language of matter – the very thing that 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 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, and even engineer living bio-matter.

This audio subculture seems 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.”<sup>17</sup> This discourse signals a form of organicism, an art that parallels natural structure, which 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 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.”<sup>18</sup> 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. This is key: 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 typical 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, embodied affect 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 that the audio-datasphere contains – but those very pleasures are products of malleable data, rather than manifestations of the (impossible) matter of the digital. The sound particle is a figurative distraction from what’s most interesting here: the circuits and interfaces of data systems with sound, embodied experience, and culture.

#### Postscript: Micro to Macro - Beyond the Sound Particle?

There are signs that the figures of microscopic matter are waning as tropes in digital audio culture. This may be a reflection of a group of related shifts in practice and discourse, occurring since around the turn of the millennium. One significant change has been the backlash following the installation of the “glitch” as not only an aesthetic feature, but also a generic tag and a fashionable flavour of electronica. Now, for the laptop avant-garde, glitches are at risk of becoming a cliché. At the same time there have been signs of a turning-outwards in orientation: the digital particle is a reflection of an intensely inward-looking, reflexive stance, a geekish fascination with the tools and processes of digital audio. Kim Cascone’s term “post-digital,” used to describe this genre, suggests however that data-introversion may not be the way forward.<sup>19</sup> Also in the work itself, there seems to be an increasing shift from interior, micro-scales and particles, to exterior, macro-spaces, and environments. Field recordings have come to the fore.<sup>20</sup> In 1998 eM released *Greater than Zero, Less than One*, while his 2003 release is titled *Outward*. On the cover, the digital particles become an expanding cosmic cloud (Figure 1). As for the significance of this shift, it is probably too early to comment;

at the very least, it seems like an indication that this culture is now looking up from the laptop screen, and coming to grips with the real materiality of its environment.

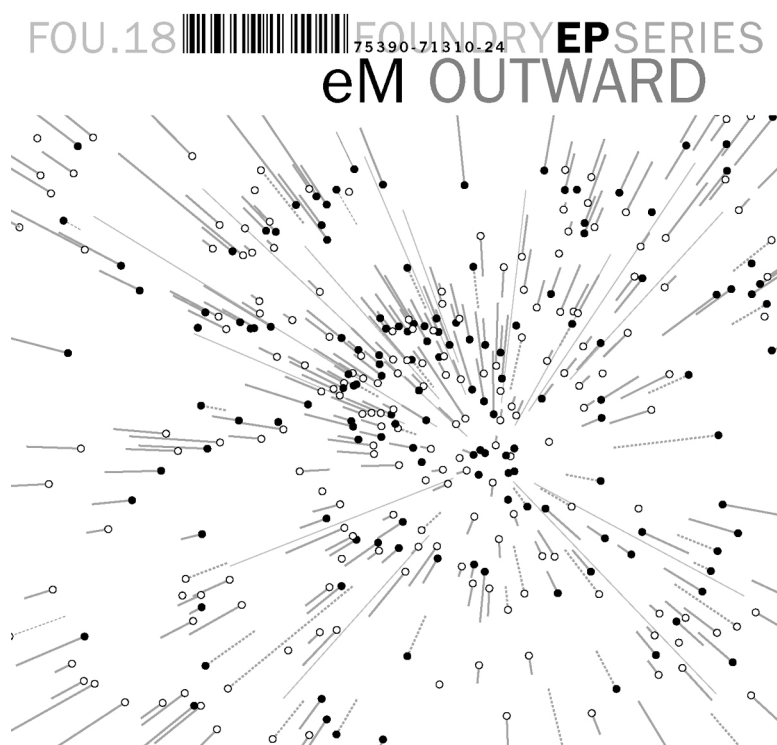


Figure 1. Cover art from eM, *Outward* (Foundry FOU.18, 2003). Used with permission of the artist.

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