
On the process and aesthetics of sampling in electronic music production*

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Most scholars writing on the use of samplers express anxiety over the dissolution of boundaries between human-generated and automated musical expression, and focus on the copyright infringement issues surrounding sampling practices without adequately exploring samplers' musical and political goals. Drawing on musical examples from various underground electronic music genres and on interviews with electronic musicians, this essay addresses such questions as: What is a sampler, and how does the sampling process resonate with or diverge from other traditions of instrument-playing? How do electronic musicians use the 'automated' mechanisms of digital instruments to achieve nuanced musical expression and cultural commentary? What are some political implications of presenting sampled and processed sounds in a reconfigured compositional environment? By exploring these issues, I hope to counter the over-simplified, uninformed critical claims that sampling is a process of 'theft' and 'automation', and instead offer insight into the myriad and complex musical and political dimensions of sampling in electronic music production.

This essay will examine the process and aesthetics of sampling in electronic music production in detail, and aim to shift the focus from well-worn debates over copyright infringement issues by pointing toward greater understanding of the musical attributes of samplers and other digital instruments – which might be considered a new 'family' of instruments, like woodwinds or strings, with a particular set of musical possibilities to be learned and explored. I will provide an overview of sampling practices and break down the prevalent discourse on sampling – the main thread in this discourse being how sampling functions as a postmodern process of musical appropriation and pastiche, often filtered through modernist conceptions of authorship and authenticity. Drawing on my own experience as an electronic musician as well as on quotes from other musicians gathered from magazine interviews and web-based user group discussions, I will offer some definitions of samplers and sampling; dispel myths and misinformation about the sampling process; and discuss how sampling resonates with other forms of (non-digital) music-making and offers

unique ways of (dis)organising and articulating sound. I will also examine how samples function in a mix, as polysemic sonic bits that can be read for their musical qualities (such as rhythm and texture) as well as for their broader cultural references and implications.

In the production of electronic music, the sampling process encompasses selecting, recording, editing and processing sound pieces to be incorporated into a larger musical work. It is well documented that sampling is not a new musical practice, nor is it linked to the advent of the microchip. Roots of sampling extend throughout Afrodiasporic musical practices, including Caribbean 'versioning', bop 'quoting', and dub and reggae production techniques (Rose 1994: 75, 79, 83–4). Sampling also draws on the tradition of *musique concrète*, developed in the mid-twentieth century, and on the ideas of sound art articulated by Italian Futurists in the early 1900s (Chadabe 1997). Since the 1980s, electronic music producers have worked with technology specifically designed for the purposes of sampling; the musical examples gathered in this essay represent work created in the context of the availability of such tools. While sampling practices now pervade most forms of popular recorded music, for this project, I use the terms 'electronic music' and 'sample-based music' to refer to any groove-based or abstract music that is constructed primarily of samples, or of a combination of samples and synthesised sounds (i.e. hip hop, house, minimal techno), and which is 'underground' in identity and aesthetic (adopting and inhabiting a perceived non-mainstream cultural and economic space).¹ I will use the terms 'electronic musician', 'producer', and 'samplifier' interchangeably to refer to musicians who work with sampling technology to create sample-based music.

A sampler is a hardware or software device that records an analogue sound signal as digital information, and offers detailed ways of processing and reconfiguring this recorded sound. The first sampler at a price point affordable to a broad market was the Ensoniq Mirage, introduced in 1984 at a retail price of under \$2,000 – only a couple hundred dollars more

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¹For a definition and discussion of the term 'underground', see Fikentscher (2000: 9–15).

than the revered synthesizer of the time, the Yamaha DX7, but roughly one-quarter the price of other samplers on the market (Mirage-Net website 2002). Now, the major music equipment manufacturers (i.e. Yamaha, E-mu, Akai) offer several samplers at a range of price points. Software samplers tend to be priced lower, and, compared to their hardware competitors, emphasise visual editing capabilities at the expense of traditional tactility. Samplers are connected to other instruments in the studio via MIDI (Musical Instrument Digital Interface), a specification developed by synthesizer manufacturers in the early 1980s that, put simply, allows digital instruments to exchange information and operate in sync with each other. In most electronic music studios, a MIDI sequencer and/or multitrack recording device are used to arrange samples with other audio components to make a complete track or song.

With the increasing convergence of tools in software studios, as well as with synthesizer manufacturers' continual development of multi-functional hardware instruments, it is often difficult to isolate the sampler as a discrete object in the studio. A producer with a software studio may, for example, use several different software programs for the sampling process, such as a dedicated software sampler in conjunction with a sound editing program and digital signal processing (DSP) effects plug-ins. Likewise, hardware samplers often perform multiple tasks in the studio: sequencing, synthesis, and effects processing as well as sampling. Given the intertwined nature of tools in electronic music studios, one might question why it is important to isolate and discuss the process of sampling. First, evidence suggests that the gathering and manipulation of samples is one of the most time-consuming (and thus, central) aspects of electronic music production. One member of the now-defunct web-based mailing list for users of the Yamaha A3000 sampler confessed to spending roughly fifty per cent of the time it takes to make an entire track honing individual samples before dropping them into a sequence (A3K-list, 7 May 1999). Prince Be Softly of PM Dawn has compared hip hop production with writing songs on a guitar, arguing that 'it can take more time to find the right sample than to make up a riff' (Rose 1994: 79). In addition, because there are many similarities, and even direct overlaps, between a producer's sampling process and a DJ's process of weaving together myriad audio components into an overall mix, as well as analogies between a samplist's cultivation of digital bits meant to function in a broader mix and the recombinant aesthetic of digital culture in general, it can be argued that any musicological and/or ethnographic inquiry into electronic music and digital culture demands a thorough understanding of the sampling process.

Existing literature does not do justice to the musicality of the sampling process; instead, it fosters an incomplete understanding of sampling and spreads a certain amount of misinformation. In his essay, 'Sample and hold: pop music in the digital age of reproduction', Andrew Goodwin frets over the increasing difficulty in distinguishing human- from machine-generated music and unleashes a barrage of incriminating descriptors of sample-based music, such as: 'orgy of pastiche', 'stasis of theft', and 'crisis of authorship' (Goodwin 1990: 260, 263, 270). He fails to acknowledge that sampling is a creative process, and that the so-called tactics of 'stealing' and 'pastiche' are musically and politically constructive, capable of encompassing a complex web of historical references and contesting dominant systems of intellectual property and musical ownership.²

David Sanjek's "'Don't have to DJ no more": sampling and the "autonomous" creator" provides some insight into the dialogue between turntablists' 'scratching' practices and the emergence of digital sampling techniques in the 1980s, and also untangles many of the copyright and legal issues related to sampling. But his essay is weakened by less-than-accurate information about music technology – for instance, confusing the actual process of recording a sample (when an analogue audio signal is converted to digital information via audio input jacks) with MIDI (a set of programming commands that transpires within and between electronic musical instruments), and not clarifying the differences between a synthesizer and a sampler. Sanjek rightly concludes that further study might better focus on musical aspects of sampling as opposed to hair-splitting over authorship and ownership issues, but his reductive statements about digital music tools (such as, 'In effect, if one can type, one can compose') do little to encourage this (Sanjek 2001).³

Tricia Rose's study of hip hop culture, *Black Noise*, provides the most eloquent and detailed analysis of sampling available. Rose grounds hip hop sampling practices in Afrodiasporic expressive traditions and provides extensive evidence of how digital music tools can be employed to articulate specific cultural and musical priorities. In the decade or so since the publication of *Black Noise*, sampling has become much more pervasive throughout all electronic music genres, no doubt largely due to rap producers' pioneering uses of the sampler in the 1980s and 1990s. Rose writes, 'prior to rap, the most desirable use of the sample was to mask the sample and its origin; to bury its identity. Rap producers have inverted this logic ...' (Rose

²For discussion of hip hop musicians' use of sampling to challenge dominant ideologies of musical authorship and intellectual property, see Rose (1994: 62–96).

³For an overview of MIDI, see Lehrman and Tully (1993); on the distinction between synthesizers and samplers, see Pressing (1992).

1994: 73). While roots of contemporary electronic music are indeed various – including the traditions of *musique concrète* and disco, to name two examples – the indebtedness of much contemporary sample-based music to rap producers’ ‘inversion’ of the sampler’s logic cannot be underestimated.

How do samplers function as musical instruments – as tools for the (dis)organisation of sound? Sampling indeed complicates the boundaries of what constitutes an instrument. Beyond being merely a postmodern contestation of the ‘real’ in popular music (through, for example, the simulation of guitar amplifiers and of performance spaces like ‘stage’ and ‘basement’ in DSP effects processors), sampling uses ‘reality’ as a point of departure to an alternate, metaphysical sonic vocabulary. The electronic musician Matthew Herbert says:

The thing is, you can take the sound of a pencil, and find enough noises in a pencil to blow your mind for the next 10 years! And yet you assume a pencil has no noise . . . It’s not something you would associate with music, but it has the potential to produce a whole range of amazing and beautiful sounds. (Sherburne 2001: 65–7)

While it is tempting to imagine that samplers are not constrained by physical properties as are other instruments are (e.g. a trumpet will never sound like a trombone because of the physical constraints of the instrument design), there are, of course, physical aspects of hardware samplers or computers running software samplers that impact these tools’ musical use: aspects such as memory, processing power, storage capacity, and sampling rate; as well as the fact that sampling operations are made possible by electrical flow or battery power.

Yet samplers, arguably more than other instruments, offer musicians the opportunity to articulate a personalised ‘aural’ history – an archive of sounds that can be employed to express specific musical and political statements. As electronic musicians have increasingly become consumers of technology as well as producers – consumers of pre-recorded sounds and patterns that are transformed by a digital instrument that itself is an object of consumption and transformation⁴ – some have adopted a purist, anti-consumerist approach. Herbert disciplines himself by ‘never sampling anyone else, always [using] new sounds for each track’, and positions this musical practice in opposition to what he sees as the increasing homogeneity of electronic music and of society (Sherburne 2001: 66).

Like the practice of learning and playing almost any musical instrument, sampling is a laborious, and eventually habitual, embodied physical routine.

Much has been written about how synthesizers, drum machines, samplers and laptops sever the traditional relationship between gesture and sonic output. Goodwin wrote – nearly fifteen years ago, but his is still one of the most widely cited essays on sampling – that samplers ‘place authenticity and creativity in crisis, not just because of the issue of theft, but through the increasingly *automated* nature of their mechanisms’ (Goodwin 1990: 262; emphasis in the original). More recently, a *New York Times* article in 2001 by Tony Scherman reflected deep-seated anxiety over a perceived loss of human agency in recording studios due to the prevalence of digital tools; even the title, ‘Strike the Band: Pop Music Without Musicians’, denies that artists working with digital instruments are indeed ‘musicians’. The author expresses nostalgia for a pre-digital era when skilled musicians played acoustic instruments in recording sessions, implying that digital instruments do not demand a comparable level of skill. And like Goodwin, Scherman confers authenticity on a pre-digital era when ‘technology’ supposedly did not intervene in musical process, despite the fact that musical instruments and music-making have always evolved in tandem with technological developments (Scherman 2001). To move beyond these incorrect, uninformed assumptions, it is productive to explore how digital music tools have their own accompanying sets of gestures and skills that musicians are continually exploring to maximise sonic creativity and efficiency in performance.

The Yamaha RM1X sequencer, for example, has an interface shortcoming that prevents muting tracks simultaneously with switching sections of a song – a problem which surfaces often in live performances. An RM1X web-based user group actively discussed and resolved this problem, trading stories about which buttons should be pushed in what configuration, until a workaround solution was sorted out. This is one example of how performance gestures on digital instruments (pressing a button or turning a knob) are not a prescribed, fixed routine, but are instead a site of continual negotiation among users, and ultimately, a measure of one’s connoisseurship of and intimacy with the instrument (hwseq-list 2000).⁵ Along the same lines, musicians might choose a particular model of sampler over another because it can be ‘played’ a certain way; many hip hop producers favour Akai’s MPC samplers for their touch-sensitive pads – a unique feature that facilitates expressive beat programming (Rose 1994: 76–7; hwseq-list, 3 July 2000). The repetitive (or so-called ‘automated’) gestures associated with making music on digital instruments can even serve as a source of musical inspiration.

⁴Analysis of how electronic musical instruments represent a change in the relationship between production and consumption within the history of popular music is provided in Théberge (1997).

⁵This idea dovetails with Robert Walser’s analysis of how heavy metal musicians have redefined the use of the electric guitar; see Walser (1993), cited in Théberge (1997: 159–160).

M. Singe, a producer who is part of the New York-based abstract/experimental music crew, SoundLab, describes herself as someone who ‘cut her teeth’ on electronic music rather than on an acoustic instrument. For her, the disconnect between repetitive gestures and uncontrollable sound is part of the allure of creating electronic music in a studio:

I like that repetitiveness; I think that’s why I make this kind of music. It works for me, it helps organize what the zone is, even if it’s annoying repetition . . . for me, electronic music is so much that really stupid slave-like repetitiveness mixed with a totally unbounded frame of what you can make there, and I like that. (Rodgers 2002a)

Perhaps the more important question, then, is what is at stake with perceived automation and loss of human musical agency? Electronic music culture is at least in conversation, if not inextricably entwined, with the legacy of modernist notions of authorship and authenticity. But electronic musicians destabilise these notions by exposing the fluidity of boundaries between human- and machine-generated music, as well as the cultural angst over the dissolution of these boundaries.

In opposition to claims that digital music tools foster ‘automation’ and remove ‘human agency’ from the studio, many electronic musicians instead use these instruments to achieve specific and varying degrees of what they consider to be ‘human’ musical expression.⁶ One way this is achieved is through techniques of randomness. Most digital instruments contain several features that enable the generation of random patterns or events: random panning, velocity, pitch, filtering, and loop remixing features. Over the course of several months, randomising features were identified as favourites by several members of the A3000 web-based user group. While some users were using randomising features toward surrealist ends (one musician proudly claimed to set off ‘a marching band in a brownian [*sic*] motion’), most talked about the potential for using randomising as a means of emulating real instruments. In a post about programming drum patterns, one user wrote: ‘Use the RANDOM PITCH feature. It’s absolutely necessary for realistic [*sic*] programming and also recommended for more techno sounds, because it adds some irregularity’. In another post, the random velocity feature was identified as a good way to achieve ‘realistic’ programming of hi-hats (A3K-list, 13 September 1999; 9 December 1999; 5 June 1999; emphasis in the original). What we see emerging is an ongoing interplay between a musician and machine where the goal is a mutual musical spontaneity that will articulate a ‘human feel’

through a digital tool. A recent recording of mine, entitled ‘solitary confinement (duets for piano and sampler)’, uses the A3000’s loop remix figure to reconfigure recorded loops of improvised acoustic piano into new, randomly-generated rhythmic and melodic phrases; this practice embraces the sampler’s capacity as an improvisational instrument in and of itself.⁷

Further, as digital music tools become capable of increasing precision, many musicians are contesting technological sophistication by incorporating audible ‘glitches’ into musical output, even making these the centerpiece of recordings. Kim Cascone has described a new era of ‘post-digital’ music characterised by an ‘aesthetics of failure’, of which sampling practices are a part (Cascone 2000: 12–18). Despite the futuristic, technologist aesthetic that pervades electronic music culture (one need only look at the subtitles of the two major electronic music magazines, *XLR8R*: ‘Accelerating music culture’, and *URB*: ‘Future music culture’, for an idea), sampling is a process that unfolds in direct relation to the imperfections of technology, and often explicitly calls attention to technological ‘glitches’ by using them as musical tropes. Among the most eloquent examples of this is a trilogy of albums by the minimal techno artist, Pole, which incorporates clicks and pops of his defective Waldorf 4-Pole filter effects unit (Pole 1999a, b, 2000). Similarly, Matthew Herbert has created a manifesto for producing his own compositions, a set of rules called ‘Personal Contract for the Composition of Music (Incorporating the Manifesto of Mistakes)’. A key point is that he affords ‘accidents . . . equal rights within the composition as deliberate, conscious, or premeditated compositional actions or decisions’ (Sherburne 2001: 66). For me, the faulty optical knobs on the A3000 sampler, which, within a few months of purchase begin to randomly jump to settings beyond the point one turns them to, have been as much a source of musical inspiration as of programming frustration. These are not new compositional practices; in many ways they are an extension of John Cage’s ideas of a half-century ago (Chadabe 1997: 55–8). However, given the pervasive technologist/utopian rhetoric within electronic music culture, and in that digital instruments are marketed as tools that offer extensive and precise programming capabilities, it is particularly noteworthy that the ‘aesthetics of failure’ and ‘Manifesto of Mistakes’ have emerged among many musicians as compositional priorities.

An important distinction, however, must be made between artists whose ‘mistakes’ constitute perceived imperfections or ‘glitches’ in an expensive computer

⁶For more on ‘human feel’ in digital musical instruments, see Théberge (1997: 224–6).

⁷‘Solitary confinement’ can be streamed online from the dice3 project of women in new music: <http://ishtar.cdemic.org/dice3.html>

system or studio set-up, and artists who use low-budget (or 'lo-fi') recording techniques as a politicised expression of limited economic resources or as a critique of the pristine production values associated with historically white- and male-dominated musical genres. In a recent interview, the New York trio Le Tigre discussed reasons why the electronic music media typically focuses on the band's feminist lyrical content rather than the intricate sample-based grooves that they construct in the studio. They concluded that their music may not reflect the pristine production values that are prioritised by the media, or rather, that production values are coded differently along gender, racial and economic lines. They talked about attending a panel discussion in New York that featured four or five producers – all men – discussing the use of 'glitch' in electronic music:

Johanna Fateman: It really struck us that . . . when men make mistakes, it's fetishised as a glitch, and when women do it, it's . . .

Kathleen Hanna: . . . a hideous mistake.

Johanna: Yeah . . . It's not considered an artistic innovation, or a statement, or an intentional thing . . . (Rodgers 2002b)

In a 1998 *New York Times* article, Evelyn McDonnell observes that few electronic music producers are women, and that 'when women run the gizmos, they are considered exceptions, iconoclastic loners – performance artists. When men do it, they create a genre in their own image' (McDonnell 1998).⁸ This account from Le Tigre illustrates, similarly, that when women electronic musicians cultivate a 'lo-fi' aesthetic, they are often maligned for lacking production knowledge or technical skill, and linked aesthetically with older musical genres like punk or Riot Grrl. When men articulate a comparable 'aesthetics of failure', they are instead hailed by critics (and by themselves) for creating an innovative genre of electronic music like 'glitch' techno.

Electronic musicians are particularly concerned with foregrounding grain, which is a controversial compositional tactic in that timbre has arguably been suppressed throughout the Western classical music tradition (Gilbert and Pearson 1999: 54–63). To borrow from Barthes, the 'grain' of a sample might be thought of literally as the producer's 'body in the music' – the audible result of decisions regarding sound design made during the recording process and embodied in musical gesture (Barthes 1991: 276). The grain of a sample reveals the tactility and pleurability of the recording process, and, in the case of much groove-based electronic music, it often reflects a producer's attempt to create a texturally nuanced sound that will elicit physical response from a dancefloor.

Analysis of how a particular grain or texture is constructed during the sampling process – through techniques of sound design, spatialisation, panning, and effects processing – can also offer insight into how samples resonate with particular musical functions and cultural meanings. Le Tigre's 'Dyke March 2001', a track on their 2001 album *Feminist Sweepstakes*, is a collage of beats, synthesised bass sounds, and vocal samples gathered from participants in the Dyke March during gay pride weekend in New York City. The recurrent beat is a militaristic, synthesised snare drum roll (paralleled at times by the vocal sample: 'We recruit!'); this main rhythm is offset by off-beat percussive drum hits, like the spontaneous drum-beating that typically occurs at a political march. Le Tigre's decision to use overtly synthesised drum samples and warbling bass sounds (aural textures that are thoroughly synthetic and artificial) renders the image of militaristic marching as a construct – a musical 'queering' of the march rhythm. Their use of stuttered or repeated vocal samples takes a musical trope of early house music – which was traditionally produced by men who incorporated female vocal samples as disembodied sonic fragments devoid of lyrical content – and inverts this trope so it becomes a mechanism for delivering feminist lyrical messages. Unlike other tracks on the album, 'Dyke March 2001' does not explicitly feature the band's vocals; several participants in the march are quoted instead. One can read this as a feminist statement of multivocality; this is strengthened by the use of panning techniques, which result in vocal samples emerging from all points in the stereo field – at times from many points simultaneously. Toward the end of the track, a conflict between marchers and a policeman is enacted musically through a barrage of vocal samples. Initially, the policeman's harsh instruction to 'Move back!' is the dominant voice in the centre of the mix; this is soon contested by women's cries of 'Resist!' panned hard left and right. The 'Resist!' samples are triggered with increasing pace from the margins of the mix until one repeated sample of a woman saying 'Feminist fury' reclaims the centre of the mix; the voice of the policeman is displaced to the background and eventually out of the mix completely (Le Tigre 2001).

The environment of a sampled 'performance' is also worth interrogating; when considering the various ways that samples can be heard in a final mix – as historical recuperation, appropriation, pastiche, or sound for sound's sake – one might also note the presence or 'aura' of domestic or other space (such as the environment of the Dyke March discussed above) represented in the capturing of the sampled sound. Nic Endo of Atari Teenage Riot recalls doing sampling sessions (recording herself playing synthesizer) on her living room floor with her gear spread out around her. She likes to have the TV on with the sound off

⁸Thanks to Jane Park for calling this quote to my attention.

while she works, which gives her the sense that she is composing a soundtrack (Rodgers 2001). Now, whenever I listen to Nic Endo's work – a mix of edgy and cinematic samples and beats – I recall the idea of her creating it on her living room floor in front of the muted TV, an incongruous image of tumultuous noise and domestic comfort. Prevalent discourse over how digital instruments complicate contested boundaries between originals and copies, and between humans and machines, tends to leave unnoticed the fact that electronic music – say, that which is recorded within the confines of a laptop by a musician working alone in a bedroom studio – indeed has a social context. What are the historical roots and ongoing implications, for instance, of the particularly destructive and violent terminology (i.e. 'mangling', 'crunching', 'chopping') used by samplers to describe their work, considering that samplers, more often than not, are men producing music privately in the realm of domestic space?⁹ While some ethnographic studies have emerged on DJ cultures and rave scenes, much work remains to be done on the social aspects of electronic music production, taking into account how electronic music is often created (and uploaded to public performance via the Internet) in solitude within domestic space.¹⁰

Following examination of a sample's source, we might ask: what are the politics of recontextualising a sound source into a new sonic environment? The initial selecting of source material to be sampled, much like (and often one and the same as) a DJ's practice of 'digging' for vinyl records, entails an ongoing and circuitous archeological process in which the producer hunts and gathers sounds. Some electronic music producers and journalists cultivate a romantic, modernist notion of the electronic music producer as intending genius with the power to create a sonic universe and reconfigure 'time' within the space of a mix. DJ Spooky writes in the liner notes to one of his albums: 'Each and every source sample is fragmented and bereft of prior meaning – kind of like a future without a past. The samples are given meaning only when re-presented in the assemblage of the mix' (Miller 1996). On a fundamental level, sample-based music indeed problematises, and at times collapses,

notions of sequential 'time' both within the temporal framework of the composition as well as through the layering of polysemic cultural and historical references in a mix, and the producer, in conjunction with sampling technology, does direct this process. However, it is important when considering the archeological process of sonic hunting and gathering, not to dismiss the circumstances of a sample's 'past' meanings and the politics of its reconfiguration into a new musical environment. As Gilbert and Pearson have pointed out, 'working with samples, or enfolding your own repeated musical performances within those of others creates a kind of community of production' (Gilbert and Pearson 1999: 118). But 'community' with, or at the expense of, whom?

As Timothy Taylor has argued, many contemporary electronic musicians tend to view samples as disembodied raw material, or 'extremely aestheticised bits of sound', simply part of the overall sonic mix (Taylor 2001: 150–5). While hip hop artists typically employ samples to accomplish what Rose has described as 'cultural literacy and intertextual reference', other electronic musicians' 'taking' of musical samples can amount to a sort of sonic colonialism, whereby aural fragments are used for perceived 'exotic' effect, without investment in, or engagement with, the music culture from which the sample was gathered (Rose 1994: 89; Taylor 2001: 136–54). Barbara Bradby has likewise problematised the sampling of female vocals in dance music, arguing that despite certain post-feminist and utopianist ideals that pervade electronic music culture, the gendered power dynamic evident in rock music (which privileges male control of technology) still persists. This power dynamic is reproduced and perpetuated by the ways in which many male producers incorporate female vocals – as disembodied sonic fragments – into house music productions (Bradby 1993).¹¹ Moreover, especially in the work of artists who do not use previously recorded music as the foundation of their compositions, it can become extremely difficult to unpack the layers of agency and subjectivity within the 'community' of performances that constitutes a sample. Work by musicians such as the Japanese noise artist Aube, who created entire albums using only sounds of the human heart, lungs, and vascular system (released in limited editions of 300 to 500 copies), and the San Francisco-based duo, Matmos, who made an album based on sounds of surgery, may have as much in common with traditions of medical science (and its accompanying ethical dilemmas) as with other forms of music-making (Aube 1997a, b, c, Matmos 2001).

⁹See Cascone (2000: 16), and the A3K-list archive for examples of electronic musicians' terminology. Douglas Kahn points out that 'militarism rationalised noise' in the rhetoric of Luigi Russoli's *The Art of Noises* manifesto in 1913, and that artistic noise echoed war and violence throughout the subsequent history of the avant-garde (Kahn 1999: 24).

¹⁰For accounts of specific DJ scenes and rave cultures, see Fikentscher (2000) and Reynolds (1998). Brief analyses of electronic music-making in domestic space can be found in Taylor (2001: 139–44), and Théberge (1997: 231–5). See also Keir Keightley's extensive piece on the history of hi-fi audiophile culture as it relates to gender and domestic space (Keightley 1996: 149–77).

¹¹For more on technologically mediated subjectivity in house music, particularly as it relates to black female vocal performance, see Currid (1995: 165–96).

Matmos, who are perhaps best known for their collaboration with Bjork on the production of her 2001 *Vespertine* album, released an album earlier that year entitled *A Chance to Cut is a Chance to Cure*, which features sounds gathered from liposuction, laser eye surgery, acupuncture, the human skull, and plastic surgery. The album's liner notes indicate that some samples – for example, the sounds of skin taken during acupuncture – were gathered from Matmos member M. C. Schmidt; the eye surgery patient's identity is likewise revealed, but the plastic surgery patient remains anonymous (Haynes 2001: 26–9; Matmos 2001). The precision of Matmos's beat programming, particularly in 'l. a. s. i. k.' and in the opening minutes of 'California Rhinoplasty', creates an atmosphere of high-tech efficiency and provides a musical parallel to the precision of surgery. But there is an uncomfortable disconnect between perceived violative acts of surgery and the catchy rhythms and melodies of Matmos's music. While the 'sampled' patients likely consented to use of noises from their surgeries, Matmos's extensive digital tweaking of these samples essentially reproduces, in the music studio, the power dynamic between surgeon and patient – whereby sonic 'bodies' are reconfigured by the electronic music producer. Matmos's work thus forges an intersection between biotechnology and music technology by drawing a parallel between physical bodies (subject to endless revision in form via plastic surgery, for example) and sonic 'bodies' (which can be repeatedly morphed and tweaked in the digital studio).

This example and others throughout this paper demonstrate that rather than constituting a simplistic, 'automated', or primarily reproductive process of 'theft', as some critics have suggested, sampling is instead a creative musical endeavour that encompasses the selection, cultivation and presentation of aural fragments that can function in myriad recombinant, remixable forms. The sampling process resonates with various forms of non-digital music-making, and is also both constructive and critical of the larger digital culture of which it is a part. While sampling machines are dependent to a certain extent on a technological and industrial system for their existence and operation, samplers are actively critical of this system through the incorporation of randomness and glitch into musical output. Samples themselves must be analysed as highly aestheticised digital bits with a specific musical function within the context of a particular sequence or mix. The historical and cultural circumstances of a sample's source, and the politics of its reconfiguration into ongoing, evolving sonic environments (such as DJ mixes or remixed recordings) are likewise essential to how sample-based music is interpreted. In arguing for the recognition of sampling as a complex musical process, this

paper has focused on the forest rather than the trees; I encourage further study of how sampling techniques are practised toward varied musical and political ends within specific genres of electronic music.

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