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Minimalism, Technology and Electronic Music

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## **Minimalism, Technology and Electronic Music**

*Richard Glover*

Concept has always been the driving force of many composers associated with a minimalist approach. It is for this reason that much of their output retains strong similarities throughout their composing life. So while some of these composers' ideas emerged out of working with technology, the main concept itself was very much divorced from the continual need to update technological tools in order to achieve what were perceived as better musical results.

This chapter's central thesis is that the key minimalist figures, and indeed those on the fringes of scholarly work<sup>1</sup>, have not tended to push technology to its progressive ends on a purely technical level, but rather to take existing technology and employ it in conceptual settings that often lead to musical results far beyond the capabilities of human performers in terms of endurance and precision. However, what links all these composers is not their reliance on technology, but how working with technology has inspired and influenced their work with acoustic instruments (written either alongside the music using technology, or subsequent to it). This chapter aims to shed light on the various ways in which developing technologies can renew ideas for traditional acoustic instruments.

This chapter cannot be - and is not intended to be - a comprehensive description of technological methods adopted by composers associated in some way with a minimalist approach to composition. Rather, it charts some of the significant changes in selected artists' compositional lives.

### **Early Experiments with Computers**

James Tenney (b. 1934), an American composer not often associated with minimalism but who investigated gradual transformation through imperceptible change, worked for Bell Labs in New

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<sup>1</sup> Composers such as Phill Niblock, Eliane Radigue and Charlemagne Palestine who have not received as much scholarly attention as, for instance, Steve Reich and Philip Glass.

Jersey from 1961 to 1964, where he was able to work with digital computer systems to create synthesised sounds. Tenney had by this point written his thesis, *Meta-Hodos*<sup>2</sup>, which detailed his approach to perception, employing theories of *gestalt* psychology to describe our auditory grouping mechanisms. At Bell Labs, Tenney was able to apply his perceptual theories to composition with the aid of the advanced parametric controls attainable with computers. His friend Larry Polansky states that 'Tenney felt that the computer should be used to show him new things about music, perception, and the nature of composition, rather than to simply execute a set of pre-composed musical-dramatical ideas'.<sup>3</sup>

The computer's ability to control every single parameter to produce a near-ergodic state – in which any given piece of information is statistically equivalent to any other piece – clearly helped to solidify Tenney's tentative early theories concerning perception as outlined in *Meta-Hodos. Ergodos I (for John Cage)* (computer music recorded on two magnetic tapes to be played separately or together, in either direction, optionally with 'String Complement' or 'Instrumental Responses') (1963) is formed around the middle six minutes of sound on both of the tapes, where all the parameters are constant near the middle of the respective scale-ranges, with these ranges at their maximum generating an almost-ergodic state.<sup>4</sup> Thus, regardless of whether the tapes were played separately or together, in either direction, a particular version of the piece would not result in a greater statistical distribution of any given parameter than any other. Technology had allowed Tenney to control each parameter so acutely that he could ensure a lack of parametric difference across an entire six-minute section, thereby allowing listeners to examine the manner in which they were perceiving and experiencing this music, rather than have their attention drawn to parameters which may have a greater rate of change than others.

From Tenney's focus on the nature of perception, the computer had allowed him a method to

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<sup>2</sup> Tenney, James, *Meta + Hodos and META Meta + Hodos*, 2nd edn. (n.p., 1988).

<sup>3</sup> Larry Polansky, 'The Early Works of James Tenney', in Peter Garland, ed., *Soundings 13: the music of James Tenney* (Santa Fe, 1984), p.151.

<sup>4</sup> *Ibid.*, p.167. The outside two minute sections of each ten minute tape were given some statistical shaping or either an increase or decrease of both tempo and intensity towards the midrange levels for these parameters.

create environments that he could control in detail, but whose details would in turn structure the work in question. Polansky has said that '[i]t's no so much that Tenney wants to tell you something, as it is that, like Cage, he is interested in providing a tool to help you evolve'.<sup>5</sup> Indeed, it is Tenney who is mentioned in Reich's 'Music as a Gradual Process' essay as saying that the composer 'isn't privy to anything'.<sup>6</sup> The notion that there are no 'hidden' aspects in a work manifests itself clearly in Tenney's later acoustic compositions such as the *Postal Pieces* (1971) and the *Harmonium* series (1976-81), which very clearly derive from his early work with computers. These all use strictly defined large-scale forms, but on the micro-level remain indeterminate upon performance.

### **Technology and Repetition**

#### *Tape as Solution and Inspiration*

Terry Riley's extensive use of tape loops and feedback systems devised from simple sound recording devices had enormous influence on pulse-pattern minimalist works from the mid-1960s onwards. Riley (b. 1935) used tape loops to expand upon repetitive acoustic drones and rhythmic patterns, but in a much less systematic manner than would soon be deployed by Steve Reich; instead, it was a much more intuitive approach, often being used in live-performance contexts. Riley created what Edward Strickland calls 'orchestral texture' from the tape loops,<sup>7</sup> allowing a single performer to create a wholly immersive acoustic environment through the use of technology. To support this, Riley would surround the audience with speaker systems, as '[t]he music has to flow in our bloodstream and we have to be carried by its bloodstream'.<sup>8</sup>

From his work with tape, Riley was involved with early sampling techniques, often working as intuitively with the tape recorder as he did as an improvising saxophonist. He experimented with combining different tapes together, and several writers have described the textural nature of instrumental loops created by Riley in *Music for 'The Gift'* (1963). *The Gift* itself was a theatrical

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<sup>5</sup> Larry Polansky, 'Jim Tenney and Space Travel', *Perspectives of New Music*, 25/1 (Winter – Summer 1987), pp. 437-38.

<sup>6</sup> Steve Reich, 'Music as a Gradual Process', in Paul Hiller, ed., *Writings about Music* (New York, 2002 [1974]), p. 35.

<sup>7</sup> Edward Strickland, *Minimalism: origins* (Bloomington, 1993), p. 188.

<sup>8</sup> Wim Mertens, trans. J. Hautekiet, *American Minimal Music* (London, 1983), p. 42.

piece written and directed by Ken Dewey, and included Chet Baker and his band playing Miles Davis' *So What* live on stage. The time-lag accumulator which had recently been created for Riley in Paris was employed, as it produced repeated echoes, the durations of which could be manipulated; Riley's use of the accumulator took samples of the band and created sustained repetitive textures over the modal harmonies from Davies' original. The band played alongside Riley's loops of these musicians playing the same material, with the accumulator being controlled live in performance.

As Keith Potter highlights, Riley was particularly pleased with Baker's decision to use *So What* in *The Gift*, as the two main modal areas, of Dorian on D and Eb, allowed Riley to create 'fields of loops' that would create dense, blurred textures.<sup>9</sup> Using the accumulator, Riley was then able to remove the loops in D, generating a gradual shift up to Eb. This approach to controlling loops, where a rough framework is in place but the specific details are worked out in each performance, heavily presages electronica-based work in the 1990s and onwards using multiple layers of loops and samples to create dense textures switching between various harmonic fields.<sup>10</sup> This type of technique clearly foreshadows Riley's *In C* of the following year. He had been attempting to continue the ideas he had realised in *Music for 'The Gift'*, and it is clear from the gradual shifts from module to module that *In C* stems directly from the application of the time-lag accumulator's effects to an instrumental ensemble.

Riley maintained a strong interest in tape composition, despite becoming increasingly engaged in following up the success of *In C*'s purely acoustic application of the time-lag accumulation; he experimented with cutting and splicing tape together in an exploratory fashion, searching for an immersive experience from the continual repetition and layering of various samples. The tape composition *You're Nogood* (probably late 1967)<sup>11</sup> shows a development from purely sampled works to the inclusion of a sine-wave generator and a small Moog synthesizer,

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<sup>9</sup> Keith Potter, *Four Musical Minimalists* (Cambridge, 2000), p. 107.

<sup>10</sup> For instance, in the output of Brian Eno, Robert Fripp and Rhys Chatham.,

<sup>11</sup> Keith Potter, *Four Musical Minimalists* (Cambridge, 2000), p. 119.

resulting in what Riley calls 'a combination of a synthesizer piece and a cut-up tape-loop piece'.<sup>12</sup> *A Rainbow in Curved Air* (also 1967) is centred on overdubbing instrumental improvisations on the electronic organ, clavichord, rocksichord, tambourine and dumbec, all played by Riley. The essence of a one-man-band creating eternal loops was here defined.

Riley continued saxophone improvisations with the time-lag accumulator throughout the 1960s. A programme from a concert in New York's Steinway Hall in April 1967 reads:

All the material that I am playing subsequently recycles and combines in an accumulative manner. In this way many generations of the material can be quickly built up without having to add each track one at a time, therefore adapting itself naturally to use in live performance.<sup>13</sup>

Once the time-lag accumulator had been realised, Riley had seized the opportunity and created various avenues exploring its abilities, including its first purely instrumental incarnation, *In C*. Via his tireless forays into looped textures, Riley has instigated a long history of manipulating the same sounds; indeed, the website 'Looper's Delight' places Riley as 'the most important pioneer of tape loops and tape delay/feedback systems'.<sup>14</sup>

#### *Tape as Inspiration, Electronics as Solution*

Steve Reich (b. 1936) has attributed his compositional approach in part to working with Riley in the early 1960s: 'The idea of using constant repetition partially grew out of working with tape loops since 1963, but mainly through helping Terry Riley put together the first performance, in 1964, of his *In C*.'<sup>15</sup>

It is clear that the modular structure of *In C*, such as it is with instruments repeating a cell multiple times before moving onto the next, would have appealed to Reich, and that his experience of working on rehearsals of the piece would have supported his own emerging approach to repetition.

He was, however, clearly concerned with developing a new approach to the use of repetition

<sup>12</sup> *Ibid.*, p. 119.

<sup>13</sup> Terry Riley, 'Program Notes Steinway Hall April 25 and 26, 1967', *Cortical Foundation* <<http://www.cortical.org/SteinwayHall.html>> (accessed 7 September 2011).

<sup>14</sup> Michael Peters, 'The Birth of Loop', *Looper's Delight* <<http://www.loopers-delight.com/history/Loophist.html#hist7>> (accessed 7 September 2011).

<sup>15</sup> Reich/Hillier, *op. cit.*, p. 20.

that Riley's loops had generated. It is interesting to note how *In C*, an acoustic work that developed out of Riley's use of tape loops, subsequently influenced Reich's worked using similar tape-loop technology.

As Potter documents<sup>16</sup>, tape loops lined up in unison on the tape recorders that Reich had at the time - two Wollensacks and an Ampex - would slowly shift out of phase with each other. These machines were the cheapest that Reich could find, and they provided quite a large amount of drift away from the unison, a phenomenon that occurred even on the better Sony 770 and Uher portable machines that he used subsequently. The composer, however, decided to control the speed of the drift of one of the loops against the other by holding down one tape with his thumb, producing the exact result he desired. Riley's use of the time-lag accumulator was accompanied by the saxophone to create a highly personal expression, whereas the only human element in the actual production of Reich's tape music was his thumb on the rim of the tapes, slowing them down to his specifications.

Riley's manipulation of shifting patterns constructed from spoken material with the aid of the time-lag accumulator and his use of tape loops to effect the transformation of speech through repetition, overlay and slow changes of speed are clearly influences on Reich.<sup>17</sup> It was, however, Reich's highly specified approach to parametric control in his own music which generated a highly original approach to the manipulation of samples, and resulted in drawing attention to the aspects of the sounding patterns which Riley's never intended to do.

*It's Gonna Rain* (1965) was the first work that Reich created using repetitive phase patterns on tape, and it initiated the phasing approach that was to dominate Reich's thinking for the next seven years. These early studio works have been fully documented elsewhere and the information need not be replicated here.<sup>18</sup> However, what we can take from this for the present argument is the simple manual approach of Reich's methods. Whereas other composers were creating dense computational systems to generate the effects they desired (for instance, Tenney at Bell Labs and

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<sup>16</sup> Keith Potter, *Four Musical Minimalists* (Cambridge, 2000), p. 166.

<sup>17</sup> Potter, *op. cit.*, p. 165.

<sup>18</sup> Potter, *op. cit.*, Reich/Hillier, *op. cit.*, Strickland, *op. cit.*, Mertens, Wim, *American Minimal Music* (London, 1983).

Larajen Hiller at University of Illinois Urbana-Champaign), Reich was perfectly content with using his thumb to control the speed of the tapes. A later work, *Pendulum Music* (1968), continued this simplicity of approach in the manipulation of technology: three or more performers each pull a hanging microphone away from its default position over a loudspeaker, and let them swing across the loudspeaker, producing feedback, until they all reach a state of rest. In all these works there is a distinct sense of the subversion of simple technical set-ups for artistic exploration; the directness of the artistic vision is not through the complexity found elsewhere, but rather requires only that technology which reveals clearly the intentions of the music, rather than relying on the complex technological set-ups found elsewhere.

However, Reich's theoretical concepts outran the technology of the time in *Slow Motion Sound* (1967). This text score instructs the performer 'to take a tape loop, probably of speech, and ever so gradually slow it down to enormous length *without lowering its pitch*'.<sup>19</sup> The available technology could not maintain a constant pitch, and the work was not realised until 1981, at IRCAM in Paris, where Reich found the results musically unsatisfactory. However, the concept for *Slow Motion Sound* was applied in a modified form in Reich's *Four Organs* (1970), as electric organs can successfully elongate note duration without lowering the pitch.

From late 1966 Reich began composing live electronic music, a concert situation where (in his own words) '[I]nstead of playing tapes in a dark hall, we'd twist dials in a lighted hall.'<sup>20</sup> The audience is made aware of the living impetus behind the machine, and often the dial twisters would be joined by performers playing acoustic instruments alongside the tapes, similar to the technical set-up for Riley's instrument-and-tape extemporisations. The composer's first work of this kind is *Reed Phase* (1966), in which a live reed player 'moves gradually ahead and out of phase with a fixed tape loop'.<sup>21</sup>

Reich's stance aligns with Riley's outlook on electronic instruments: 'there's a certain lack of breath, a breathing quality . . . the sound is sort of like light bulbs going on and off. Even though the

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<sup>19</sup> Reich/Hiller, *op.cit.*, p. 26.

<sup>20</sup> Reich/Hiller, *op.cit.*, p. 29.

<sup>21</sup> Reich's original programme note, as cited in Potter, *op. cit.*, p. 181.

tone is supposed to be so sophisticated, it's still rather dull and flat compared to acoustic instruments'.<sup>22</sup> By comparison, Tony Conrad, a member of the Theatre of Eternal Music, describes how he was actively trying to remove the human element from the sound of his violin: 'I found that I had to make a very minute pitch adjustment to compensate for the change in the direction of travel of the bow.'<sup>23</sup> By reducing subtle performance variations Conrad is evidently aiming quite intentionally at the 'dull and flat' sound that Riley bemoaned.

By the time that *Come Out* had been released on LP in December 1967, Reich had become so depressed by the limitations of the tape medium that he had begun 'to feel like a mad scientist trapped in a lab'.<sup>24</sup> Via work-shopping his ideas on combining tape and live musicians, *Piano Phase* was composed in 1967. Reich's first composition solely for human performers to be retained in his catalogue, this marks his discovery that reliance on tape to create phasing had been overstated. As Potter suggests, 'the transferral of phasing from tape to live performance must count among the major influences which electronic music has had on the development of music for players of conventional Western instruments'.<sup>25</sup>

His conviction that technology imposed crucial limitations led Reich to seek new avenues for creativity, and prompted his involvement with Experiments in Art and Technology, an emerging organisation aiming 'to develop effective means of stimulating collaborations between artists and engineers'.<sup>26</sup> Reich teamed up with Bell Laboratories engineers, Larry Owens and David Flooke, through a programme that EAT operated, designed to initiate collaborations between artists and scientists for the generation of new works; and, having gained a grant from the National Science Foundation, the group was able to go ahead and build the Phase Shifting Pulse Gate. It was Reich's own creative drive that led to the creation of the Pulse Gate (although he acknowledged a 'good

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<sup>22</sup> Riley, quoted in Edward Strickland, *American Composers: dialogues on contemporary music* (Bloomington, 1991), p. 121.

<sup>23</sup> Tony Conrad, 'LYssophobia: on *Four Violins*', in *Audio Culture: Readings in Modern Music*, ed. Christopher Cox and Daniel Warner (London, 2004), p.318.

<sup>24</sup> Quoted in Michael Nyman, with Hugh Davies and Richard Orton, "Steve Reich: an interview with Michael Nyman", *The Musical Times* 112, no. 1537 (1971), p. 230.

<sup>25</sup> Potter, *op. cit.*, p. 247.

<sup>26</sup> Keith Potter, *Four Musical Minimalists* (Cambridge, 2000), p. 192.

deal of help' from Owens and Flooker<sup>27</sup>) in which electronic pulses at subdivisions far too small and precise to be performed by human performers could be produced.

Reich wrote two new compositions for this instrument. *Pulse Music* (1969) uses phasing processes similar to those of *Reed Phase* but overlaying many different phase patterns to expand chords into complex rhythmic patterns. The Phase Shifting Pulse Gate was also used in *Four Log Drums* (also 1969), in which four performers play two-note wooden log drums with feeds from the Gate appearing in their headphones, giving them pulses to follow. There were problems in performance, however, with various players complaining of disruption from the feed of the pulse into their headphones, and the intricate rhythmic patterns becoming hard to discern due to the unstable technology.

Afterwards, in an essay titled 'An End to Electronics', Reich stated that 'the perfection of rhythmic execution of the gate (or any electronic sequencer or rhythmic device) was stiff and unmusical. In any music which depends on a steady pulse, as my music does, it is actually tiny microvariations of that pulse created by human beings, playing instruments or singing, that gives life to the music.'<sup>28</sup> As Jonathan Bernard has put it, a central strategy of minimalism is the 'minimisation of chance or accident'<sup>29</sup>; though such minimisation is afforded by the rigidity of the fixed scores of *Pulse Music* and *Four Log Drums*, Reich actually bemoans the fact that electronic instruments allow *no* deviations from the notation, whereas human performance tends to results in small fluctuations that to him contribute to a more appealing musical effect. While Bernard is clearly referring to the compositional framework and concept of the music, it is significant that Reich has almost opposing views on the music's performance. Reich also states in the same essay that 'the experience of performing by simply twisting dials instead of using my hands and body to actively create the music was not satisfying'.<sup>30</sup> The ambitious project of 'Live/Electric' music did not survive more than a few years

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<sup>27</sup> Reich/Hiller, *op.cit.*, p. 41.

<sup>28</sup> Reich/Hillier, *op. cit.*, p. 44.

<sup>29</sup> Jonathan W. Bernard, 'The Minimalist Aesthetic in the Plastic Arts and in Music', *Perspectives of New Music*, 31/1 (Winter 1993), p. 95.

<sup>30</sup> Reich, *op. cit.*, p. 44.

In her current research on the subject, Kerry O'Brien has suggested that Reich's interest in creating electronic instruments for performance resulted from his associations with the *Pulsa* artists' collective based at the Harmony Ranch commune in Connecticut.<sup>31</sup> This group described themselves as 'techno-utopian', and there was a heavy cybernetics influence running throughout the commune, influenced by Norbert Wiener's 1948 book *Cybernetics, Or, Control and Communication in the Animal and the Machine*.<sup>32</sup> When asked about the mechanical nature of many of his compositions and performances, Reich replied:

People imitating machines was always considered a sickly trip; I don't feel that way at all, emotionally. I think there's a human activity, "imitating machines", in the sense in which (say) playing phase pieces can be construed; but it turns out to be psychologically very useful and even pleasurable. So the attention that kind of mechanical playing asks for is something we could do with more of, and the "human expressive activity" which is assumed to be innately human is what we could do with less of right now.<sup>33</sup>

However, Reich's views (in tandem with national and international movements) began to shift during the early 1970s towards a disillusionment about technology, arising from a growing environmental consciousness and the ongoing Vietnam War; the techno-utopia of the 1960s had begun to be replaced by a concern for humanism and the natural world. At this time he articulated clearly his opinion that American culture was 'shifting away from electronics, towards concerns about keeping the world unpolluted', and that a 'stepping aback from technology' is reflected in his music. *Drumming* (1970-71) is a work that is often interpreted as heralding Reich's move away from process-orientated compositions, its sole use of electronics being amplification to balance the voices against the instruments, rather than being involved in the integral conception of the music. (Potter suggests that the composer assimilated his friend Philip Glass's decision to use electronics solely for the amplification of voices, and acoustic instruments, including the then only recently available electronic keyboards.)<sup>34</sup>

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<sup>31</sup> Kerry O'Brien, 'Early Steve Reich and Techno-Utopianism', paper presented at the Second International Conference on Music and Minimalism (2 – 6 September 2009), University of Missouri-Kansas City, USA.

<sup>32</sup> Weiner, Norbert, *Cybernetics, Or, Control and Communication in the Animal and the Machine* (Mass, 1948).

<sup>33</sup> Nyman, etc., *op. cit.*, p. 230.

<sup>34</sup> Potter, *op. cit.*, p. 194.

In 1970, Reich wrote an essay titled ‘Optimistic Predictions about the Future of Music’. Pursuing the techno-disillusionment discussed earlier, he states here that his first ‘optimistic prediction’ is that ‘electronic music as such will gradually die and be absorbed into the ongoing music of people singing and playing instruments’.<sup>35</sup> The composer commented in 2002 that he seems to have been proven largely correct.<sup>36</sup> It is clear that live electronics has been subsumed into the live performance of acoustic instruments in concert scenarios, but Reich seems uninterested in the future of acousmatic music itself.

From *Different Trains* (1988) onwards, Reich went on to incorporate speech samples into his works, allowing not an electronic element to return to the music, but rather a stronger sense of humanity to emerge within the musical narrative. The video opera *Three Tales* (completed in 2002) takes mankind's relationship with technology through the twentieth-century as its subject matter. As John Pymm has observed, while the opera has attitudes towards technology as its basis, especially ‘the notion that technology has become our master rather than our servant’, the paradox is that ‘whilst we look to it to make us immortal, technology increasingly has the power to destroy us’.<sup>37</sup>

## **Technology and Sustained Tones**

### *Oscillators as Solution*

*Composition 1960 #7*, a sustained perfect fifth on B and F#, by La Monte Young (b. 1935) demonstrates a composer who was, by the age of 24, already focused upon singular events so that the internal detail of an event could be perceived. Realisations of the work often use synthesizers, oscillators and other similar instruments easily capable of relative<sup>38</sup> fixed pitch. However, it is indicative of Young's aesthetic that electronic technology should not be used to perform this composition; rather, it should only be played using 'continuously tunable sustained instruments such

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<sup>35</sup> Reich/Hillier, *op. cit.*, p. 51.

<sup>36</sup> Steve Reich, 'Sound and Vision', *The Guardian* 30/9/06  
<<http://arts.guardian.co.uk/features/story/0,,1884227,00.html>> (accessed 7 September 2011).

<sup>37</sup> John Pymm, 'Steve Reich: stories of machines and minimalism', paper presented at the First International Conference on Music and Minimalism (31 August – 2 September 2007), Bangor University, UK.

<sup>38</sup> “relative” is intended to imply that whilst the instruments can sustain a note which our auditory systems would perceive as a fixed pitch, the actual frequency of the note may drift microtonally.

as bowed strings and winds'.<sup>39</sup> This suggests how Young was acutely interested in the human infallibility inevitably demonstrated in performing this music: any instrument capable of a near-perfect and permanently fixed pitch would not allow the deviations that Young intends to be experienced. As Cornelius Cardew described, these deviations occur '*in spite of the instructions, although naturally they are the result of them*'.

Young went on to perform with The Theatre of Eternal Music, a collaborative group exploring just-intoned sustained-tone environments, and such deviations of pitch and timbre were enhanced in this context via the loud amplification that this ensemble used. The high volume of the group's sound resulted in an entirely immersive experience for the participating listeners, generating a rich harmonic environment. Young's work with The Theatre of Eternal Music naturally led on to his use of technology to aid in sustaining tones for so long that human performers would inevitably fail to maintain a fixed frequency. Turtle motors that had previously been used to run an aquarium filter - hence the title of Young's ongoing composition, *The Tortoise, His Dreams and Journeys* (1964 onwards) - and audio frequency generators tuned to certain pitches were deployed in early experiments with electronically-generated sustained tones

In *Drift Studies* (1964 onwards), Young experimented with precisely-tuned sine tones played on oscillators without human intervention. These are studies in the deviation effects that are created by the simultaneous and constant oscillation of two or more sine waves. Such effects are caused by changes in the phase relation of the sine waves that - despite the relatively high stability of the oscillators, even with the specialist analogue equipment that Young using was using in the 1960s and 70s - cause deviations in pitch, creating gradual glissandi in the texture.

Variations in the perception of volume as well as pitch that can be heard by listeners as they move about the space was another feature of *Drift Studies* and became significant in the Dream House installations that Young soon began to devise. The first public incarnation of the Dream House, a continuous sound installation in Young's New York loft, occurred in 1966 and used ultra-

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<sup>39</sup> Email communication between MELA Foundation and Benjamin Gait, 10/6/2007, following Gait's request for permission to perform Composition 1960 #7 at the University of York, UK.

stable oscillators that had been built especially for him. Interestingly, this shift to entirely electronic sources in search of the goal of what the composer called an 'eternal' work - as Young said, 'a piece could be forever, if you let the concept happen'<sup>40</sup> - is often seen as a natural, and logical, transition in Young's overall output. However, Potter points out that the original idea of the Dream House included live musicians, but the costs incurred were too high.<sup>41</sup> Nonetheless, the stability of the electronics in the Dream House took the focus of the experience well away from deviations involved in the performance of sustained tones by musicians to that of exploring space, one's own relation to it and the psychoacoustic occurrences within one's own auditory system, as already noted above. From Young's point of view, the search was still for 'self-reflection and a meditative state',<sup>42</sup> but the means to do this had shifted and thereby produced various other experiential phenomena.

The work of Alvin Lucier (b. 1930) with the Sonic Arts Union has been well-documented, in particular *Music for Solo Performer* (1965) and *I Am Sitting in a Room* (1970), which use, respectively, alpha wave-reading EEG scans, and re-recording playback on a tape recorder to emphasise resonant frequencies in a room. Here, it is Lucier's more recent works with instruments and oscillators that I want briefly to discuss including, among others, *Crossings* (1982) for small orchestra with slow sweep pure wave oscillator, *In Memoriam Jon Higgins* (1984) for clarinet and pure wave oscillator and *Music for Piano with Slow Sweep Pure Wave Oscillators* (1992). These compositions are extremely strong examples of employing simple technology (sine tones describing gradual glissandi), along with simple instrumental parts, often following clear patterns such as a rising scale or diverging lines.

The resulting experience, as with many of the works discussed already, is one of very subtle variations, with the measured movement of the oscillator producing beat patterns that alter at the tiniest deviations from the human performer. Lucier describes this as giving the 'music a magical quality.'<sup>43</sup> The unembellished process that structures each composition is clear from the outset, and

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<sup>40</sup> Young's accompanying notes to *The Melodic Version of the Second Dream*, cited in Potter, *Four*, p. 78.

<sup>41</sup> Potter, *op. cit.*, p. 77.

<sup>42</sup> *Ibid.*, p. 77.

<sup>43</sup> Alvin Lucier, *Reflections. Interviews, Scores, Writings 1965-1994* (Cologne, 2005), p. 216.

yet the emergent sound of the acoustic and electronic sources in combination is full of transformative detail. Sine-wave oscillators are here used, not for their inherent sounds themselves, but as instigators of phenomena that occur when electronic and traditional acoustic sources are combined.

Tenney states that another reason to place a live instrumentalist alongside electronics is to give musicians a '[deeper] kind of experience of some of these acoustical phenomena'.<sup>44</sup> Among others, Peter Adriaansz (b. 1966) and Chiyoko Szlavnic (b. 1967) continue to work with combining instruments and sine tones to generate fields of transformative surface layers. Canadian Szlavnic, in pieces such as *Triptych for AS* and *Reservoir* (both 2006) creates line drawings which are converted into just-intonated sustained tone environments, where sine tones sound continuous accompaniments to the gradual movement of the acoustic instruments. Dutch composer Adriaansz utilises often larger ensembles in close pitch clusters to create broad fields of beating patterns, with sine tones tracing gradual glissandi to create further densities within the sound (for instance *Three Vertical Swells* (2009/10)).

When Eliane Radigue (b. 1932) began composing in Paris in the 1960s, she had two old Tolana tape recorders from the 1950s given to her by her mentor, Pierre Henry. By barely touching either the playback or recording controls on these unstable machines, she could generate tape feedback that inspired her towards the 'pleasure of a work made with the tips of the . . . fingers'.<sup>45</sup> By exploring the properties of these tape recorders through subtle manipulation, she developed an interest in the expressive nature of very small and specific areas of sound, where 'a little defect could bring interesting results'.<sup>46</sup>

Ever since her first major work, *PSI 847* (1973), at last until recently, Radigue has worked exclusively on the ARP 2500 modular synthesizer. In a manner similar to Young's requirement of the greatest possible stability in his Dream-House oscillators, Radigue only needed one specific

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<sup>44</sup> Quoted in Lucier, *Reflections*, p. 218.

<sup>45</sup> Austrian Institute for Media Archaeology, 'A Portrait of Eliane Radigue', <http://vimeo.com/8983993> (accessed 7 September 2011).

<sup>46</sup> Quoted in Julian Cowley, 'Radigue: Analogue Elegist', *The Wire*, no. 180 (February 1999), p. 13.

characteristic in her electronic instrument: stability in potentiometer control (she intentionally left the keyboard attachment of the ARP in New York, upon her return to Paris, since she controls the sounds directly from the potentiometers themselves). She talks enthusiastically about the ARP, saying that it contains the 'best filters I have ever seen',<sup>47</sup> and feels that the nature of her chosen synthesizer's modular system grants her 'access within the flesh of the sounds',<sup>48</sup> drawing an interesting comparison to Riley's 'lack of breath' or 'breathing quality' that he found in electronic instruments.<sup>49</sup> Both Riley and Radigue use metaphors relating to the living body, but Radigue hears the electronic source as having its own kind of physical life, rather than failing to imitate a characteristic of a living being.

Radigue begins working with the simplest sonic elements, just a few sound waves from the ARP: 'I've been merely listening to them, and after that respecting them, trying to figure out what is the basis of any composition, what do they want to say next?'<sup>50</sup> She is clearly interested solely in the electronic sounds *themselves*, rather than also in a rigorous process overlaid upon the sounds to induce further audible patterns, as seen with, for instance, Reich's early work. However, similarities with these composers lie in the imperceptible changes heard throughout each composition - compositions which for Radigue can often last up to an hour in length.

When realising her music, Radigue mixes the full length of the work in whole takes for each single layer (often there are at least 15 layers): hence the reason why compositions take months, or even years, to complete. She states that this extended duration was 'just a matter of the necessary time I had to go through in order to reach what was my real goal, which is still my goal, a very slow changing process within the sound itself. Something which is not external to the sound.'<sup>51</sup> The intricate craft exerted by Radigue on such basic material is recognised by Tom Johnson as one of her most characteristic qualities. Is the key to her success, he asks, 'the enormous care and devotion which must have been required to make something so sensitive out of electronic sounds

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<sup>47</sup> 'A Portrait of Eliane Radigue', *op. cit.*

<sup>48</sup> Quoted in Cowley, 'Radigue: Analogue Elegist', p. 13.

<sup>49</sup> Edward Strickland, *American Composers: dialogues on contemporary music*, p. 121.

<sup>50</sup> *Ibid.*, p. 13.

<sup>51</sup> *Ibid.*, p. 13.

which most composers would consider drab and unpromising?'.<sup>52</sup> This is a clear indication of an approach that mirrors the minimalist relationship with technology: utilising existing technology that, through sustained use, allows deep inspection of perhaps just a single phenomenon over an extended duration.

In the early 2000s, Radigue was persuaded by the French electric bass player, Kaspar T Toeplitz, to write a composition for him, and the success of this project led to new works for cello, basset horn and harp over the following decade. It is in these more recent works that she has dedicated herself to writing solely for acoustic instruments, partly due to the enjoyment of working with other musicians. Interestingly, Radigue states that '[i]t is what I was trying to do with electronic music, but I never succeeded; every piece felt like a compromise between what I wanted to do and what I could achieve.'<sup>53</sup> The intensity that she achieved through her small number of works between 1973 and the early 1990s has found a new lease of life through working with musicians in acoustic contexts: the inspiration and confidence that working with tape and synthesizers gave her earlier in her composing life has now allowed for a renewed expression through human performers.

### *The Do-It-Yourself Approach*

The American composer, Charlemagne Palestine (b. 1945), was experimenting with electronic drone music in New York from the mid-1960s, taking a class in tape-music manipulation, cutting and pasting recording tape and making collage sound experiments. He was interested, in particular, in the overtone structure of sound, which led him to work with carillon bells in his early instrumental works (when he was young, he had worked as a *carillonneur* in St Thomas' Church on New York's Fifth Avenue.

Palentine realised the potential of his voice in sustained textures, and used tape recorders to help achieve the extended durations of his music. His *Surrealistic Studies* were recorded in

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<sup>52</sup> Tom Johnson, 'March 29, 1973 Minimal Material: Eliane Radigue', *The Voice of New Music* (Paris???, 1989), p. ??? [PAGE NUMBER REQUIRED.].

<sup>53</sup> Quoted in Pascal Wyse, 'Eliane Radigue's Brave New Worlds', *The Guardian* (16/6/2011) <<http://www.guardian.co.uk/music/2011/jun/16/eliane-radigue-electronic-music-interview>> (accessed 7 September 2011).

Brooklyn in the early 1960s. Using a Webcor reel-to-reel tape recorder Palestine discovered a technique of shouting into the microphone of the recorder and immediately pulling the microphone out, creating an 'interior echo chamber'<sup>54</sup> in which the sound would repeat and distort. As is by now clear, finding unintended sonic results from imaginative uses of simple technological setups forms a narrative thread in the present chapter. The sustained textures that Palestine could create from this technique led him to begin to imagine an 'expressive continuous evermoving everchanging sound form . . . an enormous sonorous 3-dimensional sculptural canvas in mid-air using electronically produced sounds'<sup>55</sup>. To achieve this kind of control over the resultant sound, Palestine had to look elsewhere than tape.

In 1967 he gained access to the Buchla 100 and Buchla 200 synthesizers in the Intermedia Centers at New York University, and wrote the *Relationship Studies* by 'adding and filtering white noise and simple sine tone generators'.<sup>56</sup> Palestine then began to experiment with making his own instruments designed to suit his concern to create fluid sonorities of constantly changing timbres and weight. He exhibited a strong do-it-yourself approach to instruments, using only specific parts of them to help generate the particular sustained textures which he desired. Indeed, *Alloy* (1969), written in collaboration with Tony Conrad, Bob Feldman and Deborah Glaser, involved an instrument called the *aluminium*. This was made from pieces of aluminium siding attached with fishing wire, each a different length and thus a different pitch when they were hit; if struck in a particular fashion these would begin to spin, producing a whirring sound.

In the same year, Palestine built his own instrument, the Drone Machine, generating similar sounds to those of the Indian tambura or the shruti box. In his own words, '[t]here weren't many synthesizers that could do what it did. It used no voltage control and it had 15 switches fitted so that I could change the beat between tones by one percent.'<sup>57</sup> This drone instrument consisted of sixteen ultra-stable oscillators, designed by Serge Tcherepnin, and four band-pass filters, designed by

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<sup>54</sup> Charlemagne Palestine, *Voice Studies* (marghen 032LP).

<sup>55</sup> Palestine, *in – mid – air* (19NMN.047).

<sup>56</sup> Palestine, *Relationship Studies* (alga 031LP).

<sup>57</sup> Palestine, *Sacred Bordello* (London, 2003), p. 48.

Donald Buchla. Palestine would build up a sound, oscillator by oscillator, then ever so slightly add to the oscillator input tiny increments of white noise that would gradually create thicker, more dense sounds, played very loudly so as to bring out the internal details of the sound. He described the results as ‘immense sacred machines humming like gargantuan Tibetan bees’.<sup>58</sup>

Palestine toured with the Drone Machine, and it features on the compositions *Two Fifths* and *Three Fifths of* on the *Four Manifestations of Six Elements* (1974). Interestingly, both of these use sine waves, giving a smoother, but less overtone-heavy sound; compare this with *Holy 1* and *Holy 2* (1967), created from simpler oscillator set-ups creating saw-tooth waves, much richer in their overtone structure than sine waves. Tom Johnson reviewed an extended performance of a Palestine concert in 1973, and wrote:

The same pitches drone on for long periods of time with slight changes. Different notes seem to protrude at various times, and occasionally a pitch will seem to change octaves. It is often difficult to tell whether some change is actually occurring on the tape or whether it is taking place inside the ear as one's attention shifts from one thing to another. It is similar to Op Art in that it deals with perception, often creating illusions of motion, even when no motion is actually taking place. The effects are subtle, and at first one does not realize what is happening, but after a while these phenomena can become quite fascinating.<sup>59</sup>

The strength of the concept in Palestine's work leads him to operate only with a very specific part of the synthesizer's capability, sustained frequencies, but his constant desire to find the best sound sources for his music led to an epiphany at the California Institute of the Arts in 1971, when he found himself in a room with a Bösendorfer Imperial piano. The tactile nature of piano playing proved attractively different as an experience from the results of his earlier realisations of electronically-generated music, yet related to these all the same. In his own words, 'I could hear all the detail of the overtone system as clearly as I could when playing my Drone Machine. That's

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<sup>58</sup> Palestine, *Allow (Golden 1)* (alga 035CD).

<sup>59</sup> Johnson, *op. cit.*, 'March 15 1973 Charlemagne Palestine's Perception', [GIVE PAGE NUMBER.]

when I decided to make piano music.<sup>60</sup>

By September 1971, Palestine had started to develop his highly repetitive keyboard improvisations for which he became well known throughout the 1970s, and dedicated many of his concerts and recordings to piano performance. *Voice + Piano Study I & II*, recorded at Cal Arts in September 1971, consists of short piano improvisations on which tape recordings of vocal compositions played at an accelerated speed are superimposed. It proved, though, to be Palestine's final use of tape. *Strumming Music* (1974) initiated a move towards concentrating on performances at the piano and organ, largely leaving behind the tape and synthesizers that had served as a strong creative impetus in earlier years.

In 1997 Palestine released *Jamaica Heinekens in Brooklyn*, which involved recording an electronic drone played at the Jamaica Day parade in New York City and superimposing on it a series of electronically-produced drone textures. The electronic sources were Yamaha organs, sixteen Serge and Rubery oscillators with bandpass filtering and a thick Arp synthesizer texture.<sup>61</sup> The variety of instrumental resources again shows that the aesthetic idea drives the technology, by using several different instruments to create similar textures.

Regardless of whether the technology is new or thirty years old, it is the basic accumulation of tone generators and filters that gives Palestine's music such an immersive sound. As he admits, although his focus is now firmly on acoustic instruments, 'electronic sound forms continue to have a major place in my compositional palette'.<sup>62</sup>

### *Technology as Solution*

Also American, and active initially more as a film-maker than as a composer, Phill Niblock (b. 1932) participated in the early days of the 1960s minimalist movement in New York. Since the latter part of that decade, he has been creating music that employs multilayered microtonal, monochromatic drones from live instrumental sources. Initially using several stereo tape machines to build up dense textures of the recorded instrumental drones, Niblock then switched to multi-track

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<sup>60</sup> Palestine, *Sacred*, p. 48.

<sup>61</sup> Palestine, *Jamaica Heinekens in Brooklyn* (bar 021).

<sup>62</sup> Quoted in Palestine, *in – mid – air* (19NMN.047).

tape recorders in the 1970s. From the early 1980s, he began creating scores that he then realised in recordings made with the aid of studio engineers, before changing to the studio software, ProTools, in 1998, enabling him to arrange and manipulate instrumental recordings from the computer.

Volker Straebel notes that the change from asking performers to play specific notes to pitch manipulation in ProTools shifted Niblock's conceptualisation of the piece away from clusters of *frequencies*, and more towards *itches*, and the ensuing detuning of these.<sup>63</sup> Whereas in the earlier tape works Niblock would carefully map out a framework for the whole composition, ProTools allowed chromatic pitches simply to be detuned, facilitating an intuitive approach. While the aesthetic didn't alter, with digital software Niblock was able to create many more layers more easily than he had done with tape recorders, and the ease of pitch manipulation helped increase the quantity of his output. Niblock is content with both methods, but appreciates the advantages of using digital software.<sup>64</sup> In *poure* (2009), for the cellist Arne Deforce, however, Niblock returns to the old method of predetermining specific pitches for the performer to generate, signalling an interest in using the technology to simply *arrange* the number of instrumental lines, rather than directly manipulating the pitch.

Straebel has noted that there is no musical reason why Niblock's tape compositions should not be played by a live ensemble of amplified instruments in which players are fed the desired frequencies via headphones or oscilloscopes. The only issues inhibiting further experimentation with this approach, which the composer has explored (see the discussion of the orchestral work *Tow by Tom*, below) seem to be that Niblock remains more comfortable with his usual methods, and his lack of 'affinity for musical performance', in particular, for how a concert environment directed toward a stage-centred performance contradicts the spatial dimensions (the experience of differing standing waves and beating patterns which occur as the listener moves throughout the space)

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<sup>63</sup> Volker Straebel, 'Technological Implications of Phill Niblock's Drone Music, Derived from Analytical Observations of Selected Works for Cello and String Quartet on Tape' *Organised Sound*, 13/3 (2008): p. 234.

<sup>64</sup> Personal communication with Phill Niblock, 2 September 2011.

inherent in Niblock's compositions.<sup>65</sup>

*Five More String Quartets* (1991), though, combines the studio-based and live ensemble approaches into a single composition. This work is for live and pre-recorded string quartet, and instructs its players to perform five different versions of microtonally-tuned octaves while wearing headphones that relay sine waves that the players then match to their instruments. These five versions are then multi-tracked in the studio to produce dense microtonal clusters around each octave, inducing various layered beating patterns.

As with Young, Niblock relies on his music being performed on non-steady-state instruments, such as synthesizers. In describing a performance by Stephan Mathieu, he states that 'the whole piece was full of these constant beatings [i.e. beatings occurring at the same rate, rather than fluidly changing as with acoustic instruments] which is totally against what I would do normally—recording instruments which have some variations in pitch as they play: wind instruments or string instruments. That really seems to destroy the constant beating a lot.'<sup>66</sup> Like Reich, Niblock regards micro-variations resulting from human performance as being important to the listener's experience, as these create a naturally transformative field of overtones, beating patterns and combination tones. The table of frequencies Niblock uses to instruct performers to pitch-match (figure 1 shows the table from *Five More String Quartets*) certainly appears to aspire to a perfectly non-transformative sound-world, but the limiting of deviation through highly-specific pitch notation merely implies that the deviations that actually occur do so on a much smaller scale than other musics, therefore providing the natural transformation of acoustic phenomena.

Within the past decade, Niblock has, at the behest of the conductor Petr Kotik, written a number of works for full orchestra without recorded layers, showing a departure from the studio-based working methods used previously. To discuss the ramifications of this approach on the sonic results, a comparison can be drawn between the performative approach involved in *Tow by Tom*, an

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<sup>65</sup> Straebel, *op. cit.*, p. 229.

<sup>66</sup> Quoted in Frank J. Oteri, 'Phill Niblock: Connecting the Dots', *New Music Box* <<http://newmusicbox.org/article.nmbx?id=6675>> accessed 25/1/2011 id=6675 (accessed 7 September 2011).

orchestral piece from 2005, and *Sethwork*, an example of a studio composition from 2003 for solo guitarist, to demonstrate how the use of technology affects the realisation, and perceptual experience, of Niblock's music.

*Sethwork* was created by recording a number of pitches from guitarist Seth Josel which were then intuitively pitch-shifted afterwards in the studio by Niblock. Importantly, the guitarist plays each note separately when recording, without simultaneously hearing the dense multilayered sound, therefore remaining unaware of how each note will fit into the overall sound of the final piece. However, a performer in one of *Tow by Tom's* three orchestras is fully aware of how their current pitch relates to the overall pitch trajectory and its context within the entire ensemble. Therefore the orchestral player may well alter their dynamic, for instance, to blend more with the ensemble (as they are instructed to do so in the score), but the soloist in *Sethwork* is much more likely to maintain fixed parametric values throughout the recording, as there is no ensemble against which to react. This means that the studio-produced works have much more consistency in primary sonic parameters, and therefore the listener's perception is focused even further upon the transformative nature of the surface layer of the sound. While both approaches are clearly identifiable as Niblock's own music, the use of studio technology enables an even greater focus upon surface phenomena than the orchestral works, which have only appeared since 2001 as a 'transference' of Niblock's studio technique to the purely acoustic medium.

Niblock is well-known for demanding very high dynamic levels of playback in performances of his compositions, whether with live musicians alongside recordings or simply tape playback. These high playback levels will, he argues, expose the overtone patterns; in a work such as *3 to 7-196* for cello (1974), the sound of the live cello itself disappears completely at high volumes, since the overtones are much more prominent.<sup>67</sup> The amplification actually hides the instrument, and subsequently the human nature of the performance, in a manner similar to Palestine's and Riley's intentions for an immersive environment that shifts the focus away from the

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<sup>67</sup> See James Saunders, 'Phill Niblock' in Saunders (ed.), *The Ashgate Research Companion to Experimental Music* (Farnham, 2009), p. 322.

human performer and towards the acoustic and psycho-acoustic consequences of the overtones or repetitive patterns involved.

However, what is most interesting of all about Niblock's music is that, as even he admits, a work such as *Tenor* (1969) for tenor saxophone, made by tape dubbing, sounds remarkably similar to works created using digital software in the first decade of the 21<sup>st</sup> century.<sup>68</sup> Niblock has always required technology to create his immense microtonal sounds clusters, but the technology has only ever *supported* the concept, as the idea itself has proved strong enough to withstand the radical advances of technology over the past forty years.

### **Minimalist Approaches in Recent Electronic Music**

This chapter concludes with a brief discussion of how recent electronica artists have used aspects of digital technology to create narrowly-defined processes and sound-worlds, in ways analogous to those seen previously in this chapter.

The 1990s heralded shifts in various areas of music towards a more serious engagement with the use of silence. Such diverse localities as, for instance, the Chicago Free Jazz scene, the Tokyo Improvisation scene and the Wandelweiser group of composers based mostly in Europe<sup>69</sup>, all saw a renewed interest in reduced and minimal approaches towards music making. In tandem with this global move, progressive electronica artists in the mid-1990s, spearheaded by the lowercase movement, began working with a reductive approach towards new digital technologies. The term 'lowercase' was coined by artist Steve Roden to describe "a certain sense of quiet and humility; it doesn't demand attention, it must be discovered...It's the opposite of capital letters - loud things which draw attention to themselves".<sup>70</sup> Roden never intended the term to become a description for a kind of music, but was his own way of articulating a personal philosophy based around silence,

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<sup>68</sup> Saunders, 'Phill Niblock', p. 320.

<sup>69</sup> Wandelweiser is a publishing house set up by Antoine Beuger and Kunshu Shim in 1992 based in Germany, and is based around a group of (currently) 16 composers; it has gained a reputation for issuing composed music preoccupied with issues of indeterminacy and silence, operating within a post-Cagean context.

<sup>70</sup> 'Ears: ElectroAcoustic Resource Site' <<http://www.ears.dmu.ac.uk/spip.php?rubrique141>> (accessed 12/1/12).

humility, intimacy.<sup>71</sup>

However, whereas Roden's approach (along with composers such as Bernhard Günter and Francisco Lopez) was of using found sound within a reductionist structure, the electronica artists discussed here work toward abstraction and purity in their self-generated sounds. Digital technology allowed them to work with clean, non-deviating pure tones due to its steady state, high precision and clarity of sound production; silences were also now available which were, to all intents and purposes, free of noise. These are artists who, in the flowering digital era of unlimited possibilities, tended towards working with the simplicity of sine tones and light textural densities to articulate form and process. Labels such as Mille-Plateaux, Raster-Noton, 12K, LINE and Touch have developed a reputation for reduced digital sound-worlds communicating minimalist processes.

The Japanese sound artist, Ryoji Ikeda (b. 1966), is seen as a pioneer of the minimalist approach to digital electronic music, beginning with his album +/- (1996). The track + uses a gradual transformation process on an extremely short digital sound that accumulates more and more overtones as the piece progresses, before undergoing further subtle spectral transformations. Two further tracks, +. and +., use similar processes with slightly varying initial sounds. The tracks reveal an intensity of detail within an extremely narrow sonic area and an intention to employ the technology to present aspects of seemingly insignificant sounds from an entirely new angle.

Ikeda's *Matrix* (2000) uses similarly sparse electronic sources; the first track, '0000000001', is entirely created from digitally pure sine-wave clusters that produce beat patterns in clear gradual processes, as one section slowly transforms into the next. The simple electronic sounds in both +/- and *Matrix* are used solely to articulate the structural, often rhythmic processes that underlie each track, similar to the approach of Reich's phasing experiments from the mid-1960s.

From investigating Richard Chartier's theoretical standpoint, it is clear how this American sound artist, born in 1971 approaches composition from a position similar to the composers previously discussed in this chapter. His is an extremely austere approach to the combination of the

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<sup>71</sup> See the essay 'On Lowercase Affinities and Forms of Paper' accompanying the re-release of Roden's 2001 album *Forms of Paper* <[http://www.lineimprint.com/pressreleases/line\\_053\\_essay.pdf](http://www.lineimprint.com/pressreleases/line_053_essay.pdf)>.

constituent parts of a work; in his own words, he 'present[s] ideas of composition without extra elements that would affect the conceptual clarity of each piece'.<sup>72</sup> His comment that '[f]or me, minimalism is an auto-referenced work that has to be clear, concise and well-ordered'<sup>73</sup> shows not only how he believes that his work stands for itself without recourse to external narrative or metaphor, but also that he clearly associates himself with some sort of minimalist heritage.

The effect that digital technology has had upon Chartier's work is telling in how he imagines it to be experienced: his ideal listening conditions would be 'closed' headphones – the kind that completely shut out the world – or an otherwise silent environment.<sup>74</sup> This allows the seemingly bare surfaces of the sounds to be heard in greater detail, as the 'near-inaudible character of the sounds used belie the activity and energy of the composition itself'.<sup>75</sup> The private and introverted nature of Chartier's favoured listening environment of headphones is particularly significant when the notion of a '0' signal (on a mixing board level reading) creates a digital silence, which allows him to use silence in a more compositional way<sup>76</sup>, meaning that Chartier can be certain of absolute silence, rather than, say, certain Wandelweiser composers who actively involve environmental sounds within their silences. The digital silence articulates the process and form of Chartier's reduced compositional structure, and helps to frame the intricate detail of the simple sounds employed.

Both Richard Chartier and the group *snd*, comprising Mark Fell and Mat Steel, have made reference to the simplicity, bareness and sparseness of their music that belies a complexity in the detail of the material. There are, again, clear parallels with the composers discussed earlier in this chapter, who acknowledge the superficial simplicity of their music but take care to point to the patterns (be they rhythmic, overtones, acoustic beats or others) that result upon performance. As we have seen, many of these previous composers capitalised on the fact that they were working with

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<sup>72</sup> Quoted in Jérôme Langlais, 'Richard Chartier', *Fear Drop*, no. 13 (2007), p. 22.

<sup>73</sup> *Ibid.*, p.24.

<sup>74</sup> See Will Montgomery, 'On the Surface of Silence: reticence in the music of Richard Chartier', in Brian Marley and Mark Wastell (eds.), *Blocks of Consciousness and the Unbroken Continuum* (London, 2005), p. 279.

<sup>75</sup> Richard Chartier, 'Bio' <<http://www.3particles.com/bio>> (accessed 7 September 2011).

<sup>76</sup> See Susanna Bolle, 'FFWD: Richard Chartier', *Grooves*, no. 16 (2005), p. 22.

unstable technology: for instance, Young's *Drift Studies* on oscillators unable to maintain exact fixed pitches, or Reich playing two tape machines and letting them drift out of rhythmic unison. But many contemporary minimal electronica composers specifically build in the local-level detail into sounds so that, as well as the simplicity of the surface being maintained, the details which can be heard upon examination (Reich's 'microvariations') can be controlled and transformed digitally, counteracting the 'stiff and unmusical sounds' which Reich found with the electronics in the 1960s.

Philip Sherburne comments upon the 'skeletalism' of recent electronica music (what I have been referring to as 'minimalist') by suggesting that in an era in which machines can silence time with any kind of sounds, perhaps the last refuge is to be found in space and restraint.<sup>77</sup> This chapter has outlined how this ethos has subconsciously infused composers' uses of technology over the last half century, from the original pioneers of minimalism right up to the present day.

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<sup>77</sup> Philip Sherburne, 'Digital Discipline: minimalism in House and Techno', in *Audio Culture: readings in modern music*, Christopher Cox and Daniel Warner (ed.) (London, 2004), p.326.