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Unfixing the Melody: Music and the Discovery of Time

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Introduction

"Time ...

is what we

and sounds

happen in." —John Cage, *Silence* (1968)

This dissertation outlines some of the ways in which music articulates the dimension of time, and, in particular, how developments in music during the last century or so have reflected concurrent changes in the understanding of time in its multiplicity of forms.

The American philosopher and amateur cellist Susanne Langer famously described music as "time made audible" (Kaduri, 2016 : 165). Although Langer was attempting to draw a distinction between "metronomic" clock time and the "tensions and resolutions" of musical, or felt time (Guter and Guter, 2018), the irony is that Langer composed her dictum at a moment in history – the mid-twentieth century – when the separation between objective and subjective time was irretrievably breaking down. After Einstein, it was not possible ever again to think of 'clock time' as an independent, homogeneous quality (Rovelli, 2017 : 66), while discoveries around the true size and age of the universe offered a radical new perspective on human time scales (Powell, 2017). Western assumptions around time were also being tested by the growing popularity of exotic, Eastern philosophies, such as the Suzuki school of Zen Buddhism (Matthiessen, 1986 : 17), and even more exotic hallucinogens, such as LSD (Kenna *et al*, 1964; Yanakieva *et al*, 2019). All the while, our own

time, both at work and in the home, was being rationed out in ever smaller portions, creating a paradoxical sense of slowness, a stream of irritating microdelays (May *et al*, 2001 : 19). Yet, even as our long-held Western notions of time were slipping through our metaphorical fingers, our appreciation of time's role as a key actor in the psychological, political, cultural and social spheres was becoming wider and more nuanced (Nanni, 2012 : 1).

As time-based artists (Wishart, 1996 : 39), composers have watched as their raw material has been deconstructed, reimagined and reconstituted as “pure number” (Loy, 2001 : 274); and, freed from the straightjacket of linear time, they, too, have wandered into the temporal sandpit. They have burrowed through time, scrambled it and thrown it into the air to see where it fell. In the process, they have reconfigured and redefined the limits of musical time. The following chapters, each viewed through a different lens – physical, socio-cultural and psychological – will examine where this newfound freedom led, with particular reference to the leading avant-garde and experimental composers of the last one hundred years.

The End of Time

“The events of the world do not form an orderly queue.” —Carlo Rovelli, The Order of Time (2017)

One day in the early 1950s, the American composer John Cage, making tape-based music in the studios of electronic-music pioneers Louis and Bebe Barron, had an epiphany: a second was not just a fleeting flicker of time any more; it was fifteen inches of quarter-inch reel-to-reel tape. It was “something quite long that could be cut up” (Roads, 2015 : 153). In other words, time was no longer an abstract, invisible construct; it had a spatial dimension. It could be touched; it could be sliced up and rearranged.

Even in 1952, Cage would undoubtedly have been aware that this revelation was, in a sense, old news. He would have known that Einstein had demonstrated that time and space are merely two sides of the same coin; he may have been aware that ideas of past and future, cause and effect are, to all intents and purposes, absent from the fundamental laws of physics (Rovelli, 2017 : 20). Still to come was the scientific consensus that everything in the Universe – from diamonds to prepared pianos to Studer tape recorders – is a matter, not of substance, but of durations, weirdly persistent ripples in the fabric of spacetime (Rovelli, 2017 : 88). But fast receding in the rear-view mirror were the ancient Heraclitan and Parmenidean notions of time as either a flowing, dynamic ‘river’ or a fixed ‘road’, permanent and unchanging (Savitt, 2017). Time, it transpires, is neither flowing nor fixed. It is unruly, subjective, discontinuous, disobliging and fickle.

Despite all this, the thing about music, still, is that it takes time. Its elemental building blocks, such as pitch and rhythm, are revealed exclusively in the time domain: our ears register a single-cycle sine wave, for example, as merely an unpitched click (Wishart, 1996 : 56), while timbre, a “problematic topic” according to the musician and writer Curtis Roads due to its complexity and indefinability (Roads, 2015 : xviii), is nevertheless at least partly time-dependent, a question of contour; by superimposing the amplitude envelope of a piano – its evolution through time – onto a flute playing in a certain register, the two sounds can be rendered almost indistinguishable (Wishart, 1996 : 63). Melodies, swells, accents, rests and fadeouts, all are “inscribed in the scroll of time”, to borrow Roads’s ripe phrase (2015 : 136). Musical form is a function of time too: a series of flows and tonal systems that drive determinedly forwards through linear time, providing a sense of continuity, purpose and unity (Imberty, 2008; Fink, 2005 : 31).

But post-Einstein, post-Max Planck and quantum theory, continuity and unity have come to seem illusory, unfashionable even; we have woken up to a granular universe where, if you chop up space into ever-smaller pieces, eventually you hit a hard limit: the Planck length. The time it takes for light to cross this distance in a vacuum, the Planck time, is the smallest division of what, until quite recently, we believed indivisible (Williams, 2010).

Down here in the parts department of the universe, sound, too, is discontinuous. Crystal lattices vibrate with the tiniest sounds we know, discrete pips of ultrasonic energy dubbed *phonons* by Einstein (Roads, 2004 : 34). Zooming out, we find larger sonic molecules agglomerating into ordinary sounds: individual pulses less than 100 milliseconds (ms) apart arriving at our ears as single, fused events by a process called forward masking (Roads, 2004 : 22). Longer intervals create rhythm and metre, until the spaces between sounds reach about 1500 ms long, or 40 beats per minute; this is the point when our ability to perceive a beat, to find connections between sounds, begins to collapse (Fraisse, 1966; London, 2006). At periodicities exceeding around eight seconds (Roads, 2015

: 160), only the particular morphologies of sounds connect them to one another: the slow envelope release of a sustained piano note; the rich, extended reverberation of a concert hall.

Relativity, in putting paid to ideas of simultaneity and universal time (Savitt, 2017), opened up physics to poetry (Wright, 2018), and music to the abyss: Iannis Xenakis wrote of being confronted with a universe that had “gaps between the paving stones, inaccessible and filled with nothing” (quoted in Roads, 2004 : 36). Early modernists such as Satie and Debussy had experimented with the fragmentation of the “musical temporal envelope” (Imberty, 2008), introducing extreme repetition and amorphous passages of pure timbre (Nyman, 1999 : 36; Ross, 2007 : 47). Now, Morton Feldman, in pieces such as *Projections* (1950–51), attempted to “release time” once and for all by “unfixing the melodic continuity [and] dissolving the ‘logical’ connections between one sound and the next” (Nyman, 1999 : 53). Meanwhile, Cage, influenced by Zen Buddhism, embraced chance operations as a way of shaking off the “burden of psychological intentions” to create music that expressed precisely nothing, a music of indeterminate “moments”, pianos and string ensembles reduced to “reservoir[s] of unconnected sounds” (Griffiths, 2010 : 23; Nyman, 1999 : 60). In their wake came Stockhausen, whose “moment-form” expressed a radical presentist conception of stacked wafers of discontinuous musical time, and the probabilistic sonic textures of Xenakis (Griffiths, 2010 : 162; 102). Directions such as ‘the duration may be anything from no time to any time’ began appearing with regularity on musical scores (Nyman, 1999 : 12).

The downgrading of Newtonian time to a locally useful metaphor brought surprising new music possibilities. By the late 1940s, the physicist Dennis Gabor’s inquiries into the micro-temporal structure of sound (Roads, 2004 : vii, 57) had pointed to the prospect of a particulate musical time, a “plastic medium that can be generated, modulated, reversed, bent, granulated and scrambled” like magic sand (Roads, 2015 : xv). Varispeed tape recorders had already begun to reveal what Cage (1968 : 9) called “a total sound-space” in which “musical action ... can occur at any point,” liberating

composers such as Milton Babbitt from time's arrow (Roads, 2015 : 153). It was left to computers ultimately to reverse-engineer the "continuum architecture" (Wishart, 1996 : 29) of sounds themselves – promptly atomised by the likes of Xenakis and Roads into twinkling clouds of sonic dust cut loose from its temporal moorings (Roads, 2004 : 40). Meanwhile, at the elongated end of the musical timescale, new synthesis and sampling technologies made possible long-scale, evolving sound morphologies that stretched musical time into new shapes. For the first time, duration could be manipulated independently of pitch (Roads, 2015 : 157), so that by the beginning of the seventies, Stockhausen (1991 : 91) could talk of drawing out a single second of sound to twenty minutes of music "whose large-scale form in time is the expansion of the micro-acoustic time-structure of the original sound."

"There can be no right making of music," John Cage wrote around 1949, "that does not structure itself from the very roots of sound and silence – lengths of time" (Griffiths, 2010 : 23). A few short years later, composers were drowning in time to the point where first Stockhausen (1991 : 46) and then, more formally, Roads (2004 : 3) formulated hierarchies of musical timescales ranging from the infinitesimal to the merely infinite in order to make sense of it.

It may be that, like the grammar of language (Covelli, 2017 : 98), the grammar of music, ultimately, is ill suited to articulating the fractured, discontinuous reality of time. Perhaps the closest we have come to musical relativity is the work of Stockhausen and Xenakis, music of "states and unpredictable changes of state" (Griffiths, 2010 : 231); or the "constant flux" of Boulez's total serialism (Ross, 2007 : 395), with its cool relativism, its steely withholding of favour with respect to duration, pitch and effect. But, even at their most fragmentary, such works may be littered with temporal tricks such as foreshadowing and recapitulation, proving that "ideology is not immune to

the claims of drama” (Griffiths, 2010 : 163) – nor music to the one-dimensional current of time. So how might we imagine a music *without* time? What would be left?

Whilst expounding on the possibilities of stretching music like taffy, Stockhausen would often also argue for the obverse: that a Beethoven symphony, for example, compressed into a half-second sonic pellet, would retain its essential Beethovenness, like one of George Jetson’s red-and-yellow food pills in aural form (Stockhausen, 1991 : 47). Thanks to granular synthesis, dreams of an arbitrarily elongated music have become mundane studio reality, exemplified by works such as *9 Beet Stretch* by Leif Inge, who one-ups Stockhausen by stretching a recording of Beethoven’s Ninth Symphony to a full 24 hours (Inge, www.expandedfield.net/), and *j-biebz-u-smile-800-slower*, in which a mid-tempo pop ballad is extruded into a narcotised, Lynchian dreamscape (Lyons, 2010; <https://bit.ly/2R98xCR>). Time *compression*, however, is arguably a less compelling prospect. Despite Stockhausen’s assertion (1991 : 92) that the rhythmic content of the original work audibly informs the spectral DNA of the vacuum-packed end-product, one can’t help wondering how much of the “hymn-like profundity and calm” (Latham *et al*, 2002 : 118) of a Beethoven slow movement would survive such a radical foreshortening.

In truth, music without time is all around us: it can be found in the seismographic peaks and troughs of a sonogram (Roads, 2015 : 39); it is there in the piano keyboard’s blend of geometry and eleventh-century musical theory, its embodiment of an entire set of cultural assumptions around reading and colour (Chanan, 1994 : 182; Kelly, 2015 : 72). Above all, it exists in the “timeless, spatialised present” of musical notation, transferred out of the “uni-directional continuum of experiential time ... into the spatialised, perfectly reversible ... time of the printed page” (Wishart, 1996 : 38). These abstracted metaphors describe the lived experience of music in the same way that the famous rubber-sheet metaphor for relativistic space-time (Overduin, 2007) captures the experience of falling off a step-ladder.

For the composer and writer Trevor Wishart (1996 : 39), a page of printed music raises an important question: “what *is* music? The time-based experience in sound? Or an essentially abstract entity existing outside time, a Platonic conception of music?” Like the rubber-sheet metaphor, sheet music is a shadow on a cave wall, stripped of a vital dimension. Instead of the relativistic model’s bowling balls nestling heavily in their rubbery pockets of space-time, sheet music has tone-masses, notes of varying time-values, that bend the virtual fabric of sound in an analogous way, their effects articulating the ‘empty’ spaces surrounding them. The danger for composers and critics, in Wishart’s view, lies in coming to see the two-dimensional metaphor as “project[ing] something more permanent and more ‘real’ than the direct, but fleeting, experiences of the sound as a musical performance” (Wishart, *ibid*).

The Conquest of Time

"Space and Duration are one." —Edgar Allan Poe, *Eureka* (1848)

Music is time; music is space. Music exists in three dimensions within the elastic mediums through which it propagates as sound waves (Berg, 2019). Sound passes like gossip from one excitable molecule to another; when the molecules are packed tightly together, as in a solid, it moves with the speed of a bomb scare on a crowded subway. In a gas it travels more slowly, Chinese whispers carried by lonely dispatch runners on tired legs.

Music is space, and space is political: the domesticity of a chamber piece articulates the social relations of the drawing room; the showy spectacle of a symphony those of the concert hall (Chanan, 1994 : 49). The ostentatiously bare monophony of plainchant and the rococo eloquence of *Spem in Alium* are self-evidently not intended for the same church.

In his book *Critique de la Vie Quotidienne*, the Marxist philosopher Henri Lefebvre wrote about the power of the space inside a rural church, "this space which can never be just like any other space" (Elden, 2004 : 138). Lefebvre recognised that, as the only public building in the village, the church also warped the space around it, drawing significance to itself (Elden, *ibid*). Transplanted to the far-flung outposts of Empire, the church was calculated to inspire awe and obedience. Yet the building and its symbols alone were not enough to civilise the grassy veld, for what use was the word of God

if the local population, indifferent to advances in European chronometry, didn't turn up at the appointed hour to hear it (Nanni, 2012 : 97)? If Lefebvre's pen had led him up the narrow steps into the church tower he would have come upon the solution, another symbol of great power and significance: the bell.

"The conquest of space," wrote the philosopher Dan Thu Nguyen (quoted in Nanni, 2012 : 29) "is intrinsically tied to the mastery of time." It is apt therefore that bell casting was frequently a profitable side-line for cannon foundries (Eno, 2008 : 407), because the mission bell was the shock trooper of empire, and, in particular, that aspect of the imperial project concerned with prising indigenous peoples away from their customary conceptions of time. European geographical expansionism was "paralleled by, and premised upon, control over the manner in which societies abroad related to time" (Nanni, 2012 : 2). The mission bell's measured tolling regularised what until now had been irregular, inexact, local, ungovernable; while its audible range defined the limits of the mission, its "sphere of temporal influence" (Nanni, 2012 : 165).

European time – alienated from nature and sliced up into equal packets – was "a revolution in human time-consciousness", facilitating long-distance trade and introducing a new concept: punctuality (Nanni, 2012 : 40). The first mechanical clock (the word derived ultimately from the Latin *clocca*, meaning 'bell' [Nanni, 2012 : 39]) was built in 1283 in Bedfordshire, England (Andrewes, 20016). As Europe ballooned into a global mercantile power, newly prosperous towns began installing clocks in their town squares, each eventually with a set of tuned bells to fill the public space with the sonorous but insistent carillon of incipient capitalism (Eno, 2008 : 408). Churches hung sets of bells whose myriad permutations, or 'changes', were conscientiously worked through in an act that was part worship, part combinatorics and part calisthenics (Eno, 2008 : 411). Here was the officially sanctioned music of time.

Unsurprisingly, perhaps, analogous developments were occurring in music notation. Published c. 1322 (Latham *et al*, 2002 : 65), the treatise *Ars Nova*, attributed to Philippe de Vitry, codified a system by which musical durations could be expressed as sets of mathematical ratios (Kelly, 2015 : 154). Over the next three centuries, time signatures, bar lines and tempo markings would parcel up musical time with ever greater precision (Roads, 2015 : 144). Until now, musical durations had been notional, malleable: the thirteenth-century composer Petrus de Cruce was renowned for cramming as many semi-breves as he felt like into the space of a single breve (Kelly, 2015 : 136). The new temporal exactitude allowed for more elaborate rhythmic structures, which in turn led to a blurring of the distinction between sacred and secular music that reflected the wider shift in time measurement from a monastic to a mercantile imperative (Latham *et al*, *ibid*; Nanni, 2012 : 39).

Around the start of this century, Brian Eno and Danny Hillis devised a set of changes for a chime of ten bells that, at one change per day, would last for ten thousand years (Eno, 2008 : 413). The bells were to be installed in Hillis's project the 10,000 Year Clock, under construction in a mountain in western Texas. The idea behind the clock, and other projects of Hillis's Long Now Foundation, was to "[get] people thinking past the mental barrier of an ever-shortening future" (longnow.org/about/, undated). Short-sightedness, a belief that things "probably just keep getting better" is, Eno writes in an essay on the Long Now website, "our peculiar form of selfishness, a studied disregard of the future" (longnow.org/essays/big-here-long-now/, undated).

For David R. Loy, the problem is not blind optimism but despair. In an essay, 'Saving Time', Loy contrasts the "future-directedness" of earlier, linear conceptions of time – premised on dangled promises of eventual salvation or enlightenment – with the present, in which "our inability to respond adequately to the many environmental crises, among other things, signifies the collapse of

our collective faith in the future” (Loy, 2001 : 264). The result is a sense that time has been “hollowed out into a meaningless continuum” (Loy, *ibid*).

As in society, so in music. The musicologist Robert Fink has noted the way in which repetitive genres such as dance music and minimalism “reconfigure a fundamental phenomenological aspect of the Western listening experience: the sense that the music has a coherent *teleology*”, that it is “‘going somewhere’ (and that it makes you, the listener, want to go there too)” (Fink, 2005 : 31). Fink quotes the composer and theorist Leonard Meyer’s not-disapproving characterisation of the output of the early avant-garde as music that has “no goals toward which to move, [that] arouses no expectations, except presumably that it will stop”, stripping the artist of her accustomed place at the universe’s top table, her “egocentric notions of past, present and future” (Fink, 2005 : 32).

While one can find this sense of existential futility reflected in, for example, the performative nihilism of certain genres of heavy-metal music (Stevens, 2006), some music chooses still to articulate with optimism the “connection between us and the most distant past and future” (Rehding, 2015); to ask, as Robert Macfarlane did when contemplating a Finnish nuclear-waste dump, “not what we will make of the future, but what the future will make of us” (Macfarlane, 2019 : 409). Arguably, two such works are currently underway: one is a performance in Halberstadt, Germany of a John Cage piece called *As Slow as Possible* (*Organ²/ASLSP*) that is planned to continue for 639 years (www.aslsp.org/de/das-projekt.html, undated). The other is *Longplayer*, an original work by Jem Finer at the Trinity Buoy Wharf in London with an anticipated end date in 2999 (<https://longplayer.org/about/overview/>, undated).

Works on this scale are, in effect, offerings to the future; at any given present, both exist more fully as ideas than as direct experience (Roads, 2015 : 285), as “abstract entit[ies] existing outside time” (Wishart, 1996 : 39). Both pieces ‘happen’, musically speaking, inconceivably slowly, making use of

sustaining or highly reverberant, organ- or bell-like sonic morphologies to cohere their sparse materials. And, despite the ideal of continuity embodied in their conception and production (the Halberstadt project is described on its official website as a “musical apple tree” and “a symbol of confidence in the future” [www.aslsp.org/de/das-projekt.html, undated]) their historical scale makes both works vulnerable to historical-scale discontinuities. These will undoubtedly include the kinds of cultural and linguistic earthquakes the US Department of Energy attempted to forestall when, in 1981, it set up a panel of semioticians to establish universal signifiers of danger in the architecture and signage of nuclear-waste storage facilities, whose lifetimes are measured, not in centuries, but millennia (Oberhaus, 2017; Benford, 2000).

The Department of Energy panel was pessimistic about the prospects of finding any such eternal signifier. Instead, it recommended the foundation of an “atomic priesthood” to hoard critical information as “an artificially created and nurtured ritual-and-legend” (Sebeok, 1984). At these distances, it turns out, industrial time falls to pieces; we are back in the world of ritual, of mythic events re-lived according to natural cycles, creating “order out of chaos ... meaning out of meaninglessness” (Loy, 2001 : 267). In this deep time, history is “never allowed to become ‘past’ in the way that we understand the word, as ... superseded by the present” (Loy, *ibid*), but is instead suspended within a kind of “active communication system”, allowing “retellings and adaptations to occur across generations” (Macfarlane, 2019 : 412).

Abstract, ritualistic and amenable to interpretation, long-scale musical experiments such as *Longplayer* and the Halberstadt *As Slow as Possible* (*Organ²/ASLSP*) embody the same eternity; music as myth bequeathed to our distant descendants. The Halberstadt project in particular, from its ruined-church setting to the regular tithing of its adherents and the elaborate, ritualistic preparations for each chord change (Wakin, 2006), has many of the trappings of religious

observance: the characteristic opacity of avant-garde music raised to the level of mysticism, and its custodians to a kind of holy order.

When we talk about music and time, we are also, by extension, talking about its “opposite and necessary coexistent”, silence (Cage, 1968 : 63). The ethnomusicologist Nomi Dave, discussing the apoliticism of musicians living under absolutist rule in Guinea, has observed the polyvalency of social and political silence, its function as both the muting of voices by a dominant mode of expression and a form of transgression, an ironic distancing from those same dominant structures (Dave, 2014). Similarly, Ferguson (2003) notes the power of silence’s “social function of self- or group-withdrawal as a resistance” against societal norms and coerced speech, illustrated by Alessandro Simari’s first-hand account of an incident in which an audience member’s tacit withholding of engagement during an interactive performance of *Richard III* becomes an aggressively political act that destabilizes the entire production (Simari, 2019).

The same dualistic construction can be placed on the uses of silence in music. John Cage welcomed silence as a source of unintentionality (Nyman, 1999 : 62), warning that “when silence ... is not in evidence, the will of the composer is.” For the composer and writer Jennie Gottschalk, however, silence can be “filled with intention, it can be measured, and it can have character” (Gottschalk, 2016 : 30). In some contexts – for example, the hush between movements of a symphonic performance – such silence is communally sanctioned and enforced (Ferguson, 2003).

Cage’s 4’33” broke music apart by situating the audience’s complicit silence, as much as the performer’s labour, at the heart of the piece. The audience, Cage believed, should understand that “they themselves are doing [the work], and not that something is being done to them” (quoted in

Nyman, 1999 : 24). Post-Cage, a number of contemporary composers have attempted to find new ways to centre silence in their practice. Bernhard Günter, for instance, posits silence as a kind of time machine, a “projection surface for the listener’s recollections of what he [sic] has heard so far, and his extrapolations as to what he will hear as the piece goes on” (quoted in Gottschalk, 2016 : 25). Silence, Gottschalk writes (2016 : 32), can thus be a necessary space for “retrospective listening”, during which the listener becomes fully aware of what Rhodri Davies calls the “presence and density of a sound after it [has] stopped” (quoted in Gottschalk, *ibid*).

Cage, of course, realised that there is no such thing as true silence, having once been distracted in an anechoic chamber by the sounds of his own bodily processes (Cage, 1968 : 13; 23). The composer Michael Pisaro has described silence as “a different sound, one with more density than those sounds made by instruments”; not so much an absence as, in Gottschalk’s words, a “floor of sonic activity” (2016 : 31). The distinction is exploited by contemporary composers such as Günter and Jakob Ullmann to create extremely quiet music that blurs the threshold between foreground and background sound (Gottschalk, 2016 : 24). Shimmering on the cusp of near-silence, in the psychological space between refuge and resistance, the work is a benign irritant, gently nudging us out of our comfortable passivity, making us “lean forward, sharpen [our] attention, and try to really enter the sound universe proposed to [us]” (Ullman, quoted in Gottschalk, *ibid*). Such irritation, Christian Wolff once wrote (Cage, 1968 : 54), is “at least preferable to soothing ... and it alone, perhaps, is truly moving.”

The Sense of Time

“Time moves differently here in the underland. It thickens, pools, flows, rushes, slows.” —Robert Macfarlane, Underland (2019)

When US President Donald Trump and France’s Emmanuel Macron shook hands for the first time on 25 May, 2017, what ensued was a brief but intense contest that was as gripping – literally and figuratively – as it was uncomfortable to watch. For onlookers, part of the discomfort lay in the duration of the handshake itself: at around six seconds long, it violated an unspoken, three-second window that quietly governs our communications, perceptions, bodily motions and, yes, handshakes (Wittmann, 2017 : 50; Nagy *et al*, 2019). This “building block of our experience of time” (Wittmann, *ibid*) corresponds to the ‘specious present’ of philosophy, defined by William James as “the short duration of which we are immediately and incessantly sensible” (Le Poidevin, 2015). It is the brief sliver of time during which everything in existence appears to be happening *now*, before it slides over the horizon into the past. It is the length of a thought captured in a line of verse (Wittmann, 2017 : 46); it is the metre and rhyme of our motor, sensory and cognitive functions (Fraisie, 1955, 1971; London, 2006; Repp, 2011).

Drilled into us from the start by our mother’s somatic rhythms pulsing through the amniotic sac (Wittmann, 2017 : 134; Toop, 1995 : 154), this temporal present determines the length of a hug, the

rhythm of our conversations and the expansion and contraction of our lungs (Wittmann, 2017 : 50; 58). Unsurprisingly, therefore, it also plays a large part in how we make and hear music; music is in and of the tempo and swing of our bodies (“Go dancing at least once a week,” Stockhausen would exhort his students [Stockhausen, 1991 : 170]). We have seen how the human ability to follow a beat starts to break down around 1500 ms; beyond three seconds, it is all but gone (Wittmann, 2017 : 47). Groups of pulses that fit into the three-second window are heard as coherent rhythmic units, while beats that fall outside the window are perceived to be unrelated (Wittmann, *ibid*). Consciously or unconsciously, we structure music around three-second rhythmic or melodic motifs – the opening volley of Beethoven’s Fifth, for example – and it is through this “sliding window” of time that we as listeners experience music as it passes by into short-term memory (Wittmann, 2017 : 77).

Beyond this brief aperture, humans are unreliable judges of duration. There is no special “time organ” in the human body, and the mechanism of temporal perception remains opaque to science (Wittmann, 2017 : 123; Cossins, 2019 : 33). Nor is there a temporal equivalent of absolute pitch, leaving our subjective sense of time at the mercy of musical effects, mental and emotional states – excitement, boredom, anxiety, stress (Roads, 2015 : 140–141; Wittmann, 2017 : 133; 135) – or hallucinogens such as LSD (Kenna *et al*, 1964; Yanakieva *et al*, 2019). Moreover, here in the cities of the post-industrial West – less so in rural and equatorial regions; this is a geographically delimited condition (Wittmann, 2017 : 62; May *et al*, 2001 : 18) – our relationship with time is best described as unhealthy.

As clock-tower bells gave way to factory sirens, and capitalism wrestled with the logistics of choreographing vast, hierarchical and increasingly specialised labour forces (compared by both Marx and Boulez to the massed ranks of the classical orchestra [Chanan, 1994 : 11]), we entered an era of “time-space compression”, of “shock and disorientation” (Stein, 2001 : 106) where, as David Harvey has written, “the world ... seems to collapse inwards upon us” (quoted in Stein, *ibid*). “Subjective

time accelerates,” the psychologist Marc Wittmann notes in *Felt Time*, “as routine increases” (2017 : 83); accordingly, new technologies and increasing time-discipline situated speed as the dominant experience of modernism (May *et al*, 2001 : 19). This situation led to some unforeseen side-effects, one of which was that, despite the increased use of time-saving solutions such as washing machines and computers, any time thus saved was quickly consumed by more and more tasks (Wittmann, 2017 : 116).

A less predictable incongruity stems from the fact that one cannot comprehend acceleration without its opposite, slowing down: the advent of the railway, for example, may have sped up long-distance travel, but “this very sense of speed [made] other forms of transportation seem much slower than they had once appeared” (May *et al*, 2001 : 19). When everything moves quickly, Wittmann writes, “mere seconds prove irritating” (Wittmann, 2017 : 60). This is the great paradox of modern time, the temporal equivalent of Hitchcock’s famous dolly-zoom from *Vertigo* (Truffaut, 1978 : 308): the faster time gets, the slower it feels. We live in a “culture of acceleration” (Wittmann, 2017 : 117), yet our experience of time is likely to be one of boredom or rage: tasks pile up even as they become individually quicker to perform, while tiny delays drive us to distraction. Time has become something visceral, emotional: we feel it in our gut as anger or frustration (Wittmann, 2017 : 61).

The natural response to living in a moment of such extreme rapidity is the desire for slowness. The Slow Food movement, founded in Paris in December, 1989 (Lim, 2014 : 2), promoted values of localism and artisanship over globalization and speed, and soon spread to other cultural sectors, such as travel, fashion and film (Lim, 2014 : 4). This was nothing new: nineteenth-century industrialisation and urbanisation led Britain’s middle classes to develop “a marked taste for the pastoral” and, in particular, the “slower moving rural world” of Constable (May *et al*, 2001 : 19). A genuine Slow Music movement has yet to coalesce, although the success of the late-twentieth century ‘holy minimalists’ Górecki, Tavener and Pärt, along with more recent, so-called ‘new

classical' artists such as Max Richter and Jóhann Jóhannsson suggests an appetite exists for music of "slow tempi and static harmonies" (Rutherford-Johnson, 2017 : 25). The most-streamed classical music in 2018 was not the unsettling volcanic landscapes of Anna Thorvaldsdóttir or the disorienting jump-cuts of Olga Neuwirth (Kilbey, 2019), but the soothing tonality of Ludovico Einaudi (Parr, 2019).

Part of the problem for 'slow music' lies in determining what, in music, constitutes 'slow'. Although studies of the psychological and physiological effects on humans of slow music are almost too numerous to count (see e.g. Liu *et al* 2018; Navarro *et al*, 2018; Eroglu *et al*, 2005), slowness as a metric is not well defined, with at least one study (Birnbaum *et al*, 2009) using music of around 114 bpm, or *moderato* in standard tempo marking. Furthermore, as Roads (2004 : 11) notes, "the perception of time flow ... depends on the objective nature of the musical materials" as well as the listener's attentiveness, understanding and enjoyment of the piece. Messiaen, for example, showed that "a brief sound followed by silence appears longer than a sustained sound of the same duration" (Roads, 2015 : 141). Neither example is 'slower' than the other in a narrow technical sense; the nature of music, it appears, is to resist such easy labelling.

When thinking of slow music, we might be tempted to consider a work such as La Monte Young's continuous drone piece *Composition 1960 No. 7* its *ne plus ultra*. But, absent the reference events that typically mark the passage of musical time (Roads, 2004 : 11), such a work might more accurately be described as merely static. The quality of slowness depends on the perception of forward progression from one musical event to the next (Roads, *ibid*); such progression occurring, according to Roads's hierarchy of musical timescales, at the mesostructural or macrostructural scales: corresponding to, respectively, divisions of form and overall musical architecture (Roads, 2004 : 3). Armed with this knowledge, we can at least say of Steve Reich's *Music for 18 Musicians* (Reich, 1976), that it is both rapid (204–210 bpm, or *prestissimo*) at the mesostructural scale and rather slow at the higher, macrostructural scale at which it painstakingly works through its phases.

“Music, in its articulation of the time-continuum of concrete experience,” Trevor Wishart wrote, “corresponds directly with the continuum of our experiencing” (Wishart, 1996 : 17). But if what we are experiencing is very little (and slowly), time reaches “a standstill, a stasis, from which both past and future are evacuated” (Belton and Priyadharshini, 2007). We are “trapped in time” (Wittmann, 2017 : 114); we are, in a word, bored.

In a 2010 editorial in *Sight & Sound*, the magazine’s then-editor Nick James denounced what he called the “passive-aggression” of a Slow Cinema of arty longueurs and extreme duration that demanded “great swathes of our precious time to achieve quite fleeting and slender ... effects” (James, 2010). For James, such implicit boredom was a threat; for others, it is a strategy. The psychologist Jerome Bruner (quoted in Belton and Priyadharshini, 2007) wrote that “boredom ... is rather a benign stimulant in small doses,” while the Fluxus composer Dick Higgins observed that “implicit within extreme boredom is extreme danger, and thus extreme excitement” (Fink, 2005 : 5). Higgins also noted the “dialectic between boredom and intensity” in the music of John Cage (Nyman, 1999 : 36): aptly, the German word for boredom, *Langeweile*, translates as ‘long time’ (Belton and Priyadharshini, 2007), and few works of art make us feel time more intensely, or uncomfortably, than 4’33”. By contrast, the glacial uncoiling of an Indian classical rāga can induce a meditative state (Clarke and Kini, 2011) that might be described as a kind of creative boredom: that is, boredom without its characteristic self-absorption (Wittmann, 2017 : 114).

For Indian classical musicians, rāga is often akin to devotional practice, “a metaphysical quest pursued as much practically as intellectually” (Clarke and Kini, 2011). Mastery of the form doesn’t happen overnight: “It is necessary to remain one hundred years with the guru, then practise for one hundred years,” the *kirana* singer Pandit Pran Nath once said, “and then you can sing for one

hundred years" (Toop, 1995 : 164). Meanwhile, here in the time-sick West, Stockhausen's injunction to "play a vibration in the rhythm of the universe" was met with incomprehension by his players (Stockhausen, 1991 : 117).

Extremely slow music can be a test of a performer's physical and psychological endurance (Richardson, 2009); an Iron Man event for the indoorsy. Attempting to play Takehisa Kosugi's *Anima 7*, "a work which consists of performing any action as slowly as possible," the pianist John Tilbury found himself paralysed by indecision, every "simple reflex action turn[ed] into an inhibiting dilemma" (Nyman, 1999 : 15). In a similar vein, Kunsu Shim's two-hour piece for solo violin, *expanding space in limited time*, requires the player to move the bow with almost superhuman circumspection – sometimes as little as half a bow length in five minutes (Pisaro, 2009). One is reminded of Schoenberg's definition of a musical phrase as something "one could sing in a single breath" (Schoenberg, 1967 : 3); extended works like these break this intimate connection between music and our bodies, throwing up "unforeseen, near-crippling problems" and drawing performers "outside the universe of [their] known physical functioning" (Nyman, 1999 : 81).

Conclusion

“Where are you hurrying?” —Shinichi Suzuki (quoted in Fink, 2005)

If the last century or so can be, at least partly, defined by the disintegration of our traditional understanding of time (and the quasi-deification of relativity’s poster-boy, Einstein), then music has been scampering around the table legs, feeding voraciously on the fragments. Time is a *sine qua non* of music, and its transformation from a universal, objective quality to a local, subjective condition opened the door for adventurous composers to introduce temporal granularity and discontinuity into their work, breaking with centuries of formal structure and practice. At the same time, the human brain still perceives time as a flowing stream – indeed, our sense of selfhood is defined by the linear time-flow of our personal narrative (Wittmann, 2017 : 51) – and fractured, discontinuous music can appear difficult or unnerving (Ross, 2010). The fast pace of our lives pushes us to seek out music, such as holy minimalism, that reaches back to a simpler, pre-industrial system of time – a time before music, in the form of the dulcet but disingenuous church bell, was enlisted as an advance guard in the war against nature-derived and cosmological time systems.

There is still much we don’t know about time, and our perception of time; but, partly thanks to composers such as Cage, Stockhausen and Roads placing time and duration at the centre of their practice, we are more conscious than ever of the varieties of time experience: the feeling of time moving over and through us, dragging us backwards, speeding up or stretching out to infinity,

creeping in silence or arriving in a cacophony of glitches and disordered pulses. Music can gaze into the deep future of our distant descendants; it can deconstruct its own durations even as it plays. It can articulate a longing to slow down time's passage, or the desire for instantaneous thrash-metal annihilation. Always, music is a window through which we glimpse the inner clockwork of time: a hand winds (but whose hand?), a spring tightens, the escapement begins its inscrutable dance; and we sit, and listen.

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