



Music, Mediation Theories and Actor-Network Theory

Georgina Born & Andrew Barry

To cite this article: Georgina Born & Andrew Barry (2018) Music, Mediation Theories and Actor-Network Theory, Contemporary Music Review, 37:5-6, 443-487

To link to this article: <https://doi.org/10.1080/07494467.2018.1578107>



Published online: 26 Mar 2019.



Submit your article to this journal [↗](#)



View Crossmark data [↗](#)

INTRODUCTION

Music, Mediation Theories and Actor-Network Theory

Georgina Born  and Andrew Barry 

The concept of mediation in relation to music has a rich history and varied meanings. Its most famous proponent, Theodor Adorno, drew his theory of mediation from ‘a Hegelian interpretation of Marx filtered through Lukacs’ (Paddison 1993, 121). Building on Marx’s account of the antagonisms constitutive of the social totality, he depicts music as a ‘fractured whole’, the locus of a dialectic between history and nature, subject and object, human consciousness and musical materials. In at least three ways, Adorno’s idea of mediation remains relevant to this collection: music’s material and social mediation were among Adorno’s foremost preoccupations; he was relentless and virtuosic in moving analytically across scales—from the analysis of fleeting sonic figures like the ‘galloping of horses’ in three bars of Beethoven’s piano sonata *Les Adieux* (Adorno 2002, 141) to music’s mediation by industrial capitalism and the institutions of mass entertainment and concert life; and his concern was with how mediation diagnoses not only the actual condition of music but its potential transformation. The first two are at work in his rebuke to Walter Benjamin regarding the latter’s study of Baudelaire: ‘your dialectic is lacking in one thing: mediation . . . [T]he materialist determination of cultural traits is only possible if it is mediated through the *total social process*’ (Adorno 10 Nov. 1938). All three convictions remain germane, and they recur, inevitably transformed, in the papers in this collection. Moreover, Adorno’s concept of the constellation—‘a juxtaposed rather than integrated cluster of changing elements that resist reduction to a common denominator, essential core, or generative first principle’ (Jay 1984, 14–15), and which ‘posits a relation on the basis of observable proximity [while having] a certain . . . arbitrary quality’ (Leppert 2002, 64)—prefigures the notion of an assemblage that is central to some of the articles that follow.

Yet Adorno’s writing is shot through with metaphysical currents that today give it an anachronistic feel. This is clear in his reflections on the three bars from *Les Adieux*:

this passage, which is more sublime than words can tell, says that this most transient of things, the ineffable sound of disappearance, holds more hope of return than could ever be disclosed to any reflection on the origin and essence of the form-seeking sound. (Adorno 2002, 141)

Ultimately, in Max Paddison's appraisal, Adorno's 'concept of mediation remains highly elusive and ... was never systematically explored' on a theoretical level (1993, 148).

In this double issue of the *Contemporary Music Review* we focus not on Adorno but on theories of music's mediation that have emerged in the last two decades, offering some systematic reflection. The impetus for the issue came from the research programme 'Music, Digitisation, Mediation: Towards Interdisciplinary Music Studies' (or MusDig).¹ MusDig consisted of a series of comparative ethnographic studies that each addressed, in different ways, how music is being transformed around the world by digitisation and digital media. Studies were located in Cuba, India, Kenya, Argentina, Canada and the UK, but the programme also encompassed ethnographies of music's online consumption and circulation, of internet-mediated music genres, and of the software platform, Max.² As the title announces, questions of music's mediation were central to MusDig from its inception; a core theoretical ambition was, through the combined ethnographic, historical and conceptual work engaged in by the researchers, to further develop those mediation theories that have been emerging in recent years in relation to music. This issue is one of the main vehicles for attaining that goal. It interweaves research from the MusDig programme (articles by Christopher Haworth and Patrick Valiquet, and this introduction) with that of colleagues also working broadly with these ideas.

Through the issue we hope both to give a sense of the 'state of the art' in music and mediation theories and to extend current thinking so as to open up fruitful lines of future development. We intend the issue, then, to make available different sightlines in mediation theory relevant to historical musicology, popular music studies, ethnomusicology and music sociology. Another aim is to make explicit and air the several sources of recent mediation theories addressed to music. Here, the distinctive contributions of Tia DeNora, Antoine Hennion and the editor, Georgina Born, and latterly the musicological take-up of central figures of actor-network theory (ANT), Bruno Latour and (less so) Annemarie Mol and John Law, as well as those of assemblage theory, Gilles Deleuze and Manuel DeLanda, get special mention in the pages that follow. ANT's influence points to the way that some of those mediation theories that have blossomed within music research have intellectual roots in science and technology studies (STS), while also diverging from STS in significant ways. Latour's growing influence within the arts and humanities has been particularly striking in the past decade, with scholarly and artistic activity building on his work extending across a vast disciplinary terrain—from questions of nonhuman agency, to whether 'critique has run out of steam', to 'matters of concern' (Latour 2004). Moreover the concerns of ANT and mediation theories often converge with other theoretical

drifts, notably posthumanism and the new materialism. Yet it is fascinating to reflect on the fact that music was there at the very start of ANT, stimulating discussion alongside such ‘things’ as electric vehicles, baboons, scallops and photoelectric cells in the attic seminar rooms of its home, the Centre de Sociologie de l’Innovation, part of the Ecole des Mines in Paris. Indeed, Latour has noted the strong influence exerted on his thinking specifically about mediation by Hennion, his close colleague at the CSI. The concept of mediation central to ANT came in part, then, from research on music!

From the very start of MusDig, it was obvious that even in an era in which music has been and continues to be profoundly transformed by burgeoning media, technologies and formats, ‘mediation’ could not be reduced conceptually to a concern with the effects of electronic and digital media or communication and transmission technologies.³ As the ethnographic research of MusDig makes plain, in every location, to understand the way that digitisation affects music necessarily entails reading out from the digital-musical object or event (whether MP3 file, track, album, performance or genre) to the political, legal, social, cultural, material, ideological and aesthetic processes in which it is entangled. Our MusDig ethnographies demand, in this sense, a much expanded operationalisation of mediation as an analytical framework—and this is a commitment with which most contributors to this issue concur. The equation of mediation with the effects of ‘new technologies’ of sound production, reproduction and circulation has certainly generated an important subfield of research on music and sound (Pinch and Bijsterveld 2004). Indeed a focus on music’s scientific and technological mediations has become the most obvious ‘off the peg’ derivative of the incursions of science and technology studies into musicology, and has been asked to do a lot of work (Pinch and Bijsterveld 2012).

Yet as shown by this journal issue, as well as the work of DeNora, Hennion and Born, this does not exhaust—indeed, it barely exercises—the analysis of mediation in relation to music. In any case, some of the most innovative early readings of the technological mediation of musical sound—classic examples are Simon Frith’s paper on the co-invention of crooning and the electronic microphone (Frith 1986), and Paul Théberge’s anatomy of the imbrication of the rock ‘sound’, multitrack recording, and the rationalisation both of musical practice and of the spatial layout of the recording studio (Théberge 1989)—hardly needed STS or ANT to become sensitised to the multiple constitutive mediations of popular music aesthetics. Thanks to their influence, as well as to the work of Edward Kealy (Kealy 1979), Hennion (Hennion 1981; Hennion 1983; Hennion and Meadel 1986; Hennion 1989), David Toop (Toop 1984) Dave Laing (Laing 1985), Dick Hebdige (Hebdige 1987), Andrew Goodwin (Goodwin 1988; Goodwin 1992), Steve Jones (Jones 1990; Jones 1992), Tricia Rose (Rose 1994), Albin Zak (Zak 2001), Michael Veal (Veal 2007) and others, the transformations of musical sound by a host of technological processes, and the aesthetic determinants and effects of these processes, became core themes of the emerging field of popular music studies from the 1980s. And even earlier, as film theory and media theory gathered pace from the 1970s, technology’s constitutive

role was identified in developments like ‘apparatus theory’ in film studies (Baudry 1974) and Raymond Williams’ seminal book, *Television: Technology and Cultural Form* (Williams 1974).

Nevertheless, a focus on the contributions of technologies, media and things as ‘nonhuman actors’, in the terms of early ANT, runs through music research today and some of the articles that follow. It may be that the ‘nonhuman actor’ trope has come to act as a synecdoche for closer engagement with the evolution of ANT (and STS). Yet music research has benefited from a range of inventive approaches to the nonhuman, as shown by discussions of music as an assemblage of subjects and objects (Born 2005), of ‘those things that hold us together’ (Hennion 2007), of the social life of musical instruments (Bates 2012), of those objects (such as books, magazines and journals) that enable the circulation of discourses about music (Piekut 2014), and, in Mads Krogh’s article below, of how creative practices in rock and hip hop depend upon studios packed with ‘instruments, amplifiers, cables, pedals, effects units, racks, stands, travel crates, furniture, oriental rugs, computers, coffee cups, tools, acoustic screens’ and so on, a ‘teeming mosaic’ of co-producing artefacts (529). However, if fifteen years ago the idea of taking seriously the contributions of nonhuman actors was cutting edge, perhaps it no longer needs to be laboured. The proposition that technologies and other things—musical instruments, scores, LPs, cassette tapes, fanzines, venues etc—have long played formative parts in music-making and musical experience is coming to be widely established, as shown by a growing wave of post-essentialist, post-formalist, materialist and material-cultural directions in music research. Indeed, in terms of *longue durée*, Gary Tomlinson exemplifies some of these currents in his account of how the deep evolutionary origins of human musicking lie 2.5 million years ago in the mimetic behaviours stoked by hominin stone toolmaking, a mimesis that evidences ‘entraining capacities akin to those that would [come to] underlie the more developed synchronies of musicking’ (Tomlinson 2013, 663).

Despite these developments, the conceptual predicates of ANT’s nonhuman actors—notably that humans and nonhumans should be treated symmetrically and considered to coexist relationally in a ‘flat ontology’, along with a rejection of any assumption of underlying structures that determine surface events, and of both sociological and technological determinism—seem less established. Gavin Steingo in his article in this issue, for example, takes exception to ANT’s relational stance on objects. He finds more propitious, when making sense of his ethnographic material, Graham Harman’s insistence on distinguishing “‘real’ actors or objects’ from those encountered in ANT’s relational networks, because ‘relations do not exhaust the things that relate’ (Harman 2010, 134). Instead, Harman advises, attention should dwell on ‘how individual entities disrupt or resist or withdraw’ from those relations (Harman and Kimbell 2013, 10–11). While from another vantage point, contributor Patrick Valiquet criticises the kind of empiricism fostered by ANT, cautioning against being so blinded by the presence of observable objects and materials in any musical assemblage that the analyst’s sensibility is used up in recounting what is manifestly there. Taking the laptop orchestra as the basis for

critical reflection on mediation, Valiquet comments that even in a performance event like that of the laptop orchestra

rich with the kind of mediators that conform to the common sense [technological] understanding of mediation ... it is not helpful to divide things up into “immediate” presences and “mediated” absences. Presence and absence are equally mediated in this situation, and there is a critical sense in which this observation should extend even to idioms that feature far less technological density. (647)

The question of the nature of the empiricism associated with ANT returns later.

In light of these variances, should mediation theory be *one thing*, and applicable everywhere? A handy directive comes from ANT itself which, according to its own epistemological premises, argues that the theory should change when confronted with new objects and transplanted into new environments. ANT is not, then, a ready-made methodology that can be taken off the shelf and applied—an approach that would, with considerable irony, contradict ANT’s own semiotic foundations. Whether music brings important and intriguing challenges to ANT and other versions of mediation theory, and what these challenges are, is therefore one of the most pressing undercurrents of this issue. In a recent meditation on the entwined double histories of ANT—its developmental journey in relation to the sociology of science, on the one hand, and the sociology of music, art and culture, on the other—Hennion clarifies that

what was the same project came down, in the case of science, to making more social what was seen as objective, whereas the opposite was aimed for in the case of culture: respecting the objectivity of what sociology had reduced to social signs, to markers of differentiation among groups. (Hennion 2016, 293)

‘Sociology’ in this sentence, as so often in ANT’s positioning of itself against what Latour dubs the ‘sociology of the social’ (Latour 2005, 9), is a rhetorical figure standing in specifically for the school’s key antagonist, Pierre Bourdieu, and particularly his work on art and culture.⁴ Hennion immediately elaborates by depicting a pervasive ‘model’ of culture that ‘anthropologists and sociologists’ follow, and against which ANT was posed. In this model,

culture is defined as humans collectively projecting their social relations onto arbitrary objects. Durkheim propped up this view ... , Bourdieu repeated it by reversing the idea ... : [for him] cultural objects are totems, pure signs pertaining to a code, which, on top of everything, doesn’t know itself to be one. (Hennion 2016, 294)

ANT, Hennion continues, ‘rejected this commonsensical notion’.⁵ Instead, ANT proposed that

music does something other than what the humans gathered around it would like it to do, something other than what they have programmed. This is why they listen to it; it is not their double, nor the mirror of their vanity. “Made” the way it is, it has its own capacity to act. *It forges identities and sensibilities; it does not obey them.* (2016, 294, emphasis added)

We will have reason to return to this statement later.

In the same essay, Hennion clarifies the meaning of the term ‘mediation’ that was central to his influential book *La Passion musicale: Une sociologie de la médiation* (1993). Far from its connotations of ‘intercession, filtration, or representation’ (Sterne 2012, 9), or of the passage of something through something else, Hennion stresses that

in the case of music, the artwork had to be reconceived as a heterogeneous tissue (human, material, corporal, collective ...), with its resistances and cumulative effects (a keyboard, a sound, a scale, the body of the instrumentalist, limited space and time ...). To express this resistance of music to sociological reduction without going so far as to turn it into an autonomous object, and to show that these tissues of association “hang together”, without dissolving in a codification of social differences, I had foregrounded the word mediation. (2016, 294)

He continues that, if translation was a productive concept for analyzing science and technology, mediation

is a better word for music because ... it insists on ... not just establishing but also interrupting the relation, making it overflow. A passage is not reduced to the transmission of an object; it does something else. It does not refer back to causes; it is a performance, with unforeseeable effects, that are not deducible from the sum total of causal factors. (2016, 294)

It could not be clearer that mediation in music, as conceived by Hennion, is not mere passage, nor does it refer to an organic whole that hangs together. Rather, through ‘overflow’ and the non-linearity of ‘unforeseeable effects’, Hennion gestures towards how, from another direction, music has come to be theorised as a non-organic and non-linear constellation of mediations, or an assemblage (Born 2005; Born 2011, citing DeLanda 2006)—an approach taken further in several articles in this collection.

Mediation theories, then, can be and have been taken to highlight music’s entanglement with technologies, things, material cultures (Straw 2000; Straw 2012) and infrastructures (Devine and Boudreault-Fournier 2020). But, importantly, this is not all that they bring. Before proceeding, it is worth recalling the larger prospects they have offered to the music disciplines. For they offer a way out of two polar reductionisms characteristic of earlier paradigms in music research: on the one hand, the essentialism and idealism that have dogged approaches to music focused on the autonomous work or the individual composer-genius; on the other hand, the temptation to reduce music to being a ‘reflection’ of extraneous determinations—whether technology, ideology, social structure, political discourse or economic system. If the routes proffered by mediation theories out of these two blind alleys appear to be similar, in fact they answer two quite different challenges.

Answering the first reductionism has meant enriching the analysis of what music ‘is’ by adding back in what has been absented or denied by essentialism, and thus noticing how music’s existence is always constituted by some combination of (and a series of potential mediations follows): sound (itself composed of multiple mediations

(Born 2019, 193–196)), embodied practices, discursive exegeses and interpretations, visual inscriptions, material devices and interfaces, commodity forms, physical location, venue, site or space, socialities and social relations, imagined communities and so on. Some of these mediations will always be present or to the fore in any specific musical experience, others will be less obvious or backgrounded; some mediations are momentary, evanescent or processual and specific to the musical event; others outlive any individual object or event and may endure for years, decades or centuries. Addressing music in these terms has come to involve analyzing which of these multiple potential mediations is present, and how, in any musical experience or musical culture, as well as what may be absent (more below), and how they constellate and produce effects through their multiplicity, their simultaneity and their interrelations—without any assumption of organic totality. Crucially, both the particular mediations and their interrelations cannot be specified in advance: they have to be traced empirically through the analysis of specific musical events and cultures. DeNora, Hennion and Born offer different angles on this method. DeNora emphasises the important principle of the two-way, co-productive relations between musical object and subject, music and social life: ‘just as music’s meanings may be constructed in relation to things outside it, so, too, things outside music may be constructed in relation to music’ (DeNora 2000, 44). Hennion stresses an ontological dimension: ‘mediations are neither mere carriers of the work, nor substitutes that dissolve its reality; they are the [music] itself’ (Hennion 2003, 84). Born argues similarly that music is ‘multiply mediated’, favouring ‘associations or assemblages between musicians and instruments, composers and scores, listeners and sound systems—that is, between subjects and objects’ (Born 2005, 7), adding a new concern both with several distinct planes of music’s social mediation and with music’s temporal mediations.

Tackling the second reductionism—reducing music to being a ‘reflection’ of extraneous determinations—means moving beyond certain styles of explanatory and causal analysis, usually involving ideas of reflection, homology or determination, that have haunted art and music history for decades, critiques of which are increasingly rehearsed (Pinney 2005). The point is that multiplying what music is by identifying its constitutive mediations generates a more complex and distributed object, an assemblage, on the basis of which to trace the conditions and causalities bearing on it. Such a method multiplies the forces and trajectories that converge on or nestle within a musical object or event, yielding subtler modes of explanation that avoid teleology. At the same time, the contingency of the constellated mediations making up any musical assemblage directs us to be alert to such contingency, as well as to non-linearity, when probing why music takes the forms that it does historically—through a two-way analysis (extending DeNora to history) of what affects music and how, in turn, music affects historical processes.⁶ As Celia Lury puts it: this is to be concerned with ‘issues of temporality, of (nonlinear) relations between past, present, and future, and, relatedly, [with] questions of causality and prediction’ (Lury 2016, 238). Such an approach is especially generative in progressing beyond musicology’s standard response to this challenge: analyzing music in ‘context’. The problem with context

is that it leaves untouched a dualism of essentialised musical object, on the one hand, and external forces that impinge on that object, on the other. Benjamin Piekut puts it acutely: ‘the danger of context is that it accepts and uses as explanations those stabilized contingencies that are themselves the formations that need to be explained’ (Piekut 2014, 204–5).

However fertile, those mediation theories that have developed around music have limitations. They tend to be microsocial in orientation, bracketing consideration of the wider historical conditions—social, cultural, material, political and economic—in which musical practices are embedded. They would gain, relatedly, from greater attention to the dynamic, temporal and diachronic dimensions of musical cultures. They can be uncritical, neglecting to probe the operations of power in, and the less than benign or creative features of, the musical cultures being researched, so that their political potential can also be underdeveloped (for alternatives, see the articles by Valiquet and Amy Cimini in this issue). And while theorists of mediation have on occasion attended to aesthetic, affective and formal features of music, this needs to be more developed (see Brian Kane’s and Charles Kronengold’s articles), as should their engagement with aesthetic transformations—with how, for instance, musical practices are mediated by the dynamics of genre (see Kronengold’s and Haworth’s articles). All of this suggests in turn the need for an enhanced empiricism, beyond the confines of ANT, which we later expound. While mediation theories offer highly promising approaches for today’s music research, then, further progress is required. It is to some of these theoretical and methodological challenges that the articles in this double-issue rise.

A last intellectual coordinate relevant to the collection are discussions of mediation within literary, media and communication theory, including John Guillory’s critical genealogy of the terms media, medium and mediation (Guillory 2010) and more characteristic recent writing such as Sarah Kember and Joanna Zylinska’s exploration of mediation and new media. For Kember and Zylinska, mediation should be understood as ‘a key trope for understanding and articulating our being in, and becoming with, the technological world’ (Kember and Zylinska 2012, xv). In their text, in Guillory and in a number of other contemporary media theorists we find similar media-centric tendencies to those exhibited by some writers on music and mediation. Guillory portrays mediation as an alternative to theories of representation and as foregrounding matters of form, genre and medium lacking in them. Despite noting how the idea of mediation comes ‘in and out of philosophical and social theory without establishing until very late a special relation to the field of [media and] communication’ (2010, 344), he insists that in the present ‘it is technical media that press upon us most urgently the need for a theoretical instauration ... of the media concept into a general theory of mediation’ (2010, 361).

The most eloquent alternative to the tendency to equate mediation with technical media in this literature is Richard Grusin’s expansion of the concept, by way of William James’s radical empiricism, to argue that ‘mediation operates not just across communication, representation, or the arts, but is a fundamental process of

human and nonhuman existence' (Grusin 2015, 125), a proposition encapsulated in his idea of radical mediation. Grusin's stance converges in some ways with ideas advanced in this introduction. In his account, 'mediation operates physically and materially as an object, event, or process in the world, impacting humans and nonhumans alike' (2015, 126). He goes on to suggest that mediation itself engenders immediate experiences: 'following James, I refuse to separate mediation from other experienced relations. Mediation does not... prevent immediate experience or relations, but rather transduces or generates immediate experiences and relations' (2015, 138). He cites a passage from James in support: 'the relations that connect experiences must themselves be experienced relations, and any kind of relation experienced must be accounted as "real" as anything else in the system'. James continues that a 'place must be found for every kind of thing experienced, whether term or relation' (James 1904, 534). Grusin points, then, to an understanding of mediation that includes but reaches far beyond technical media, where mediation can take the form of entity, event, process and/or relation, and in which relations (mediations) are themselves both 'real' and 'real' components of experience. While we largely concur, we will later argue, pursuing Valiquet's point cited earlier, that the necessary stress on the immediacy of mediation must be accompanied by a concern for dimensions of mediation that are not immediately present but may be 'hidden', overlooked or denied, and that have to be inferred (through abstraction) from immediate experience, while having powerful effects on that experience.

The next section of this introduction provides overviews of each of the articles. The ethnographic and historical studies contained within them veer productively between more musicological and more cultural-historical and sociological terrain, laying out a generative interdisciplinary space. They do so by reference to a range of musics, locations and conceptual vantage points: the South African electronic music from Soweto at the centre of Steingo's paper; the international cross-over genre, micro-sound, the genealogy of which is traced by Haworth; Kane's anatomy of the ontology of the jazz standard; Nick Prior's close reading of the technological treatments of the voice encapsulated in the Japanese virtual pop idol, Hatsune Miku; the Danish hip hop practices at the core of Krogh's theoretical synthesis; Valiquet's political reading of the laptop orchestra as practised in a Canadian university context; Kronengold's tale of the cross-genre fad for the harpsichord in American and European music of the 1960s and early 1970s; Eric Drott's analysis of the political and social implications of the drum circle, a core element in the Occupy Wall Street movement; and Cimini's inventive remediation of a classic of feminist music theory with respect to the embodied and social mediation of performance. Having taken stock of their contributions, in the third section we pursue a series of key questions and directions emerging from them.

The Papers—From Vocal Assemblages to Performer-Scholars

Nick Prior, in 'On Vocal Assemblages: From Edison to Miku', sets out from the problem of how the technologically-mediated voice should be conceptualised today.

As he states, ‘nowadays, electronic and digital treatments of the voice have brought into sharp relief its ontological plasticity—dramatizing the voice as an abundantly mediated object’ (489). To address the ‘multiple and cross-cutting ways in which musical and non-musical matter are interwoven’, along with the challenge of discerning where the boundaries between human and non-human lie (490), he draws Deleuzian assemblage theory together with insights from posthumanist theorists Katherine Hayles and Donna Haraway. Asking what it means to say that voices are mediated, his answer is to trace, through the case of the Japanese virtual pop idol Hatsune Miku, how the popular music voice is ‘accompanied by a whole machinic infrastructure (electricity, stages, acoustic treatments, amplifiers, microphones, compression and reverb units) which reveals [it] to be radically hybridized’ (495). The panoply of non-human and human mediators of popular music voices (not least those ‘unsung agents’, sound engineers), Prior suggests, favours a shift in analytical attention ‘from *the* voice to vocal assemblages’ (496). If the voice is never pure, and emerges from ‘multiple associations and treatments’, then, he insists, ‘this doesn’t mean that it is fake or inauthentic, merely that it is radically relational’ (496). Using assemblage theory, he argues, brings advantages: it focuses, like its cousin mediation theory, on ‘how things are relayed *with* and *through* one another’ (492); it refuses to privilege human over non-human agency; and it is multi-scalar, irreducible to either macro or micro levels.

Prior then identifies four characteristic modalities of technological mediation in the history of popular music vocal production—synthesis (as in the Vocoder), deconstruction (‘the voice extracted, chopped up [and] recycled’ by samplers such as the Fairlight CMI), auto-correlation (as with Auto-tune), and simulation (as in the Vocaloid software that underpins Hatsune Miku). Prior treats the four modalities, in ethnomethodological terms, as ‘breaching experiments’: ways of uncovering the taken for granted dimensions of everyday life—here, the ‘normal’ operations of the voice. He takes this conceptual framework to Miku’s foundation in software that has animated a participatory culture of vocal simulation and song production among both professionals and fans, a now-global assemblage emanating from the Miku algorithm that encompasses Youtube, ‘live’ performances by the virtual star, karaoke imitations and much more. Reminding us that Miku’s voice retains a human referent in the guise of the actress who provides the phonemes for the Vocaloid database, Prior argues that assemblage theory is required to capture this multi-scalar, hybrid phenomenon, and that all voices should now be conceived of as both ‘distributed and composed’ (503).

Brian Kane’s ‘Jazz, Mediation, Ontology’ addresses, through the case of jazz standards, the problem of how to characterise distinctive ontologies of music, beyond long-standing music-philosophical preoccupations with the ontology of the works of Western art music. It was in the 1990s that the existence and nature of plural ontologies of music became a theme of both historical musicology (Bowen 1993) and ethnomusicology (Bohlman 1999). Subsequent work drew connections between the analysis of ontologies of music and music’s mediation, asking how the relation between mediation and ontology should be conceptualised (Born 2005; Born 2013). Kane much enriches these debates. He takes off from a critique of Stephen Davies’s

‘realist’ account of the ontology of jazz standards, which depicts a hierarchical relationship of works to performances in that ‘works *determine, precede, and are indifferent* to their rendition in performances’ (510). For Davies, jazz standards are ‘thin’ musical works in contrast to the ‘thick’ nature of classical music works. In contrast, building on the work of José Bowen and Born, and analyzing the musical differences manifest in five recordings made between 1938 and 1961 of ‘Body and Soul’ (written by Johnny Green in the early 1930s), Kane develops a non-essentialist account of the ontology of standards, one attentive both to musical features and to their material and social mediation—in material terms, how ‘Body and Soul’ circulated in the early years via inscriptions like ‘Tune-Dex’ cards and fakebooks as well as recordings.

Kane identifies two practices, replication and nomination (acts of naming), as central to the non-essentialist ontology of standards, arguing, contra Davies, that variant performances ‘have the potential to alter works’ (513). In particular, Kane’s analysis of Thelonius Monk’s 1961 recording shows how not every key harmonic progression in the original has to be present for a performance to be accepted as a version of ‘Body and Soul’. He draws the ‘map’ of relations between harmonic features of Green’s original and the five later performances as a network, with each performance a node, such that ‘across an entire network there need be ... no essential property or pattern distributed equally among all its members’ (518). Indeed, Kane contends, ‘when it comes to standards, ... *the musical work is a network*’ (524). He shows, moreover, how central to jazz’s ontology are several forms of social mediation, in that the arbitration of whether a particular performance belongs to the network necessarily involves ‘the larger community of musicians, listeners, critics, producers, composers (and their estates), the legal system, copyright laws, and a slew of other actors and institutions’ (522). Hence, ‘determinations about identity and individuation ... are not independent of the ways that music is socially and temporally mediated’ (521). Interweaving music analysis with that of social and material mediation, Kane breaks new ground. In challenging the hierarchical ontology of the work and proffering a network alternative, his model has wider implications, with the potential to fuel re-evaluations of the relations between score and performance even in classical music (cf. Clarke et al. 2005; Cook 2013).

Mads Krogh’s article ‘A Beat is a Hybrid’ takes its bearings from Tia DeNora’s reworking of Adornian materialism in her influential studies of the ways in which music is mediated in everyday life (DeNora 1999; DeNora 2000; DeNora 2003; Bergh, DeNora, and Bergh 2014). Building on DeNora’s ‘radical environmentalism’, itself influenced by ethnomethodology and symbolic interactionism (DeNora 2014), Krogh expands upon her methodological concept of the ‘musical event’. Taking as his empirical focus the production of beats by Danish hip hop artist Thorbjørn Schwarz (aka DJ Static), Krogh proposes that music should be theorised as a situated and material practice grounded in people’s own definitions of what counts as music. Despite DeNora’s materialism, he suggests, her work is marked by an ‘abiding humanism’ that requires supplementing. He therefore integrates her scheme with two alternative approaches to forge a novel, non-reductive framework: the sociology of

associations of Hennion and Latour, in particular their emphasis on the agency of non-human actors (Hennion 1993; Latour 2005); and Born's account of music's temporal mediation, notably her 'scaling up' of Husserl's concepts of retention and protention to address the multiple temporalities both engendered by music and in which it is enmeshed (Born 2005; Born 2015).

Taking this framework to DJ Static's practice, Krogh explores how Static's material and spatial environment, particularly the contents and layout of his studio, together afford the right vibe and 'momentum' for his beat-making. The studio is 'teeming with stuff: furniture, instruments, computers, turntables, records, CDs and movies, posters, magazines' and so on (541), and each item contributes to his creative practice. His record rack, for example, is Static's 'primary tool for inspiration and the selection of material' (ibid) when making beats. At this point Krogh innovates conceptually by bringing culture into the frame: he employs a Danish concept articulated by Static, *stemning*, to crystallise the cluster of mood, attunement and alignment that the musician finds his studio and 'stuff' afford. *Stemning* conjures up not only linguistic associations but a nexus of embodied and material affect and meaning distributed within 'the material semantic of his work' (544). Yet the things in Static's studio do more, and this is where temporality comes in. Not only do Static's posters, flyers, records and so on act as a 'collective' that reminds him of 'what he likes and the specific sort of hip hop that has marked his career' (545). They also act to forge associations and align his sounds with former producers and DJs whose sounds he admires, sounds that act—through their retention—as a paradigm; while through the life of Static's own beats and albums, the network for which they stand as 'spokespersons' is protended into possible futures. In short, Krogh suggests, Static's practice reveals the 'fundamentally relational constitution of [music's] material and social circumstances'. Genres like the hip hop produced by Static 'do not exist above or behind the musical practice, but through it, and not least in the things with which [musicians] interact' (547).

Thus far, it should be clear how enthusiastically Krogh, Kane and Prior and other contributors respond to ANT's injunction to address the 'notorious human/non-human divide', and to do this by embracing 'the semiotic insight, that of the relationality of entities, ... and [applying] this ruthlessly to all materials' (Law 1999, 4). The next two articles, however, question core premises of ANT, albeit in quite different ways.

Gavin Steingo engages, like Prior, with assemblage theory, taking it to his ethnography of electronic music-making in the South African township, Soweto. Informal musicking in Soweto, he explains, is characterised by constant equipment failures and infrastructural breakdowns (cf. Larkin 2008). The effect is to stimulate a 'patchwork system of technical bricolage in which parts are absent, substituted, exchanged, scrambled, or mismatched' (558), while the musical forms emerging from these circumstances involve 'steadily repeating electronic tracks' over which individuals improvise vocal-melodic phrases. Steingo holds this material up against a series of perspectives, notably two classic papers on the sociology of technology by Madeline Akrich, and by Marianne de Laet and Annemarie Mol. Both papers, he observes, extol a defining methodological principle of ANT by portraying the technologies at

issue as ‘deeply relational’—as ‘entangled ... in a variety of worlds’ (De Laet and Mol 2000, 227).

Steingo finds these approaches unsatisfactory for his ethnography, commenting:

If I learned anything in Soweto, it is precisely the extent to which an entity can move or shift relations and still remain what it is. For example, a hard drive is lent to a friend and filled with new MP3s and then lent again to someone else ... In spite of its movement and transmutation, the hard drive remains the very same device. (564)

Seeking an alternative to ANT, he turns to Graham Harman (Harman 2010), who proffers ‘an ontology in which relations are external to self-constituting objects’ (563). Steingo’s contention is that to explain the tinkering with and mobility of technologies necessitated by constant breakdown in Soweto, it makes more sense for such objects ‘not to be constituted by [their] relations, but, instead, to hold something of [themselves] in reserve’ (563). Indeed, his interlocutors themselves ‘de-prioritize relations [in favour of] a flexible relation to component parts, which may be selectively substituted or withdrawn’ (566). It is DeLanda’s assemblage theory (DeLanda 2006) as developed by Ana Maria Ochoa and Carolina Botero (Ochoa and Botero 2009) and Born (Born 2011)—with its conception of assemblages as constituted by ‘relations of exteriority’ such that their component elements (mediations) have a certain autonomy and may be detached and plugged into other assemblages—that for Steingo best captures his interlocutors’ song forms and technological practices. If a hallmark of ANT is to insist on the pliability of relations between subjects and objects, Steingo suggests, then this fails to register instances in which relations are secondary to the productive fixity of objects. Indeed, he hints at a certain tyranny in both ANT’s and Harman’s analytical ontologies: both may at times have value, but neither always captures the empirical realities at issue, nor are they sensitive to the ontologies of the subjects or cultural worlds being studied—an issue to which we return in the final pages. Ultimately, Steingo advocates a framework ‘capable of accounting for both relationality and the non-relational perdurance of autonomous objects’ (554).

Charles Kronengold’s objections to ANT have a different cast, arising from his interrogation of the fad for harpsichords that swept across a range of Euro-American music genres in the 1960s and early 70s. Kronengold takes the harpsichord to be a litmus test for actor-network theory. On the one hand,

The harpsichord is a perfect example of the Latourian non-human actor: it’s a node in networks that include people, texts, bits of discourse, social conventions, institutions, objects, and spaces ... [and is entangled] with pop, rock, jazz, and Western art music, record companies, and universities [as well as] materials science, freight-delivery services, political protests, American high-school students, and do-it-yourself culture. (577)

On the other hand, Kronengold points to four ways in which the harpsichord eludes conceptual capture in these terms. Its affordances can be difficult to define, so ‘there

are situations in which we can say little more than that the harpsichord affords harpsichordiness' (577). How 'the harpsichord' can be defined as an ANT-ish actor is also elusive:

would the relevant class include *every* harpsichord that sounded in the 1960s? Might we do better to focus on a *kind* of harpsichord, like the "modern" metal-framed instruments that drove the 60s boom? Or would we need to treat every actual instance of 1960s harpsichord-use as a discrete analytical object?

Moreover, the fad itself was highly contingent, entangled not only with 'historical, technological, institutional, and economic processes' but with 'matters of taste, with various modes of aesthetic experience, and with a host of specifically musical processes' (578)—thus highlighting aesthetic, subjective and temporal dimensions largely ignored by ANT. And finally, the very significance of the harpsichord as an actor is hard to pin down: 'no one in and around this fad ever said the harpsichord was important ... Indeed, in the unstable genres this article focuses on, the harpsichord is a frequent but often *superfluous* element' (579).

For Kronengold, it is the very problem of defining an actor that compels us to attend to the harpsichord's human stakeholders: 'Precisely because we have trouble assessing the harpsichord's nature and impact, we have to ask who cared about this instrument, and how, and why' (579). We therefore need a method 'that allows a dynamic, unruly multiplicity of people, objects, ideas, and relations, including social relations, to remain in play' (581). To achieve this, Kronengold proposes a framework combining political economy, musical economy and ethical economy—the latter focused on human labour, intelligence and care (Dewey 1988). He elaborates through analyses of music by Ligeti, Cage and Hiller, Luc Ferrari, James Brown and Stevie Wonder, each situating the harpsichord utterly differently. Informed, once again, by Born's (Born 2015) call for analysis of the multiple temporalities produced by and producing music, Kronengold's analysis of Ligeti's 1968 *Continuum*, for example, draws out both Ligeti's engagement with the harpsichord's material capacity to be played 'almost fast enough to reach the level of continuum' (Ligeti 1983, 22) and the piece's entanglement in a series of 'music-historical rhythms', among them Ligeti's biography and the harpsichord revival's place in the 'history of revivals'. Analysis of the harpsichord boom, he concludes, leads ineluctably 'back to the aesthetic' and to the 'temporalities, meanings, socialities, and interiorities ANT has no patience for' (1983, 598).

Christopher Haworth is also keen to discern the uses and limits of ANT's approach to mediation and adds, like Kronengold, a focal concern with time. His article centres on microsound, an experimental electronic music genre that emerged in the late 1990s. Haworth begins by appraising the productive aspects of ANT's concern to multiply the types of actors at work and to recognise 'the human capacity to externalize knowledge in objects, texts, scores, [and] archives' (609), noting ANT's debt in this regard to a lineage of French thinkers including Leroi-Gourhan, Simondon and Derrida. Haworth embraces ANT's flat ontology, its refusal to assume any a priori asymmetry between human and non-human actors, so avoiding 'reducing the latter to mere

passive vehicles of human intention' (608). Indeed, in relation to real-time interactive systems or generative art, Haworth notes, such a stance approaches common sense. And yet, he asks, how can ANT account for mediations of a much larger scale or longer duration 'than the microsocial associations and interactions that are [its] typical focus?' (618). When analyzing microsound and other genres in historical terms, he suggests, ANT's limits are reached, and other theoretical resources attuned to the analysis of temporalities are required. He finds them in Born's elaboration of the work of Alfred Gell, and specifically their cumulative reworking of Husserl's concepts of retention and protention (Gell 1998; Born 2005; Born 2010a; Born 2015). Making original use of this framework, Haworth traces how microsound emerged through retentions of aspects of the work of both Xenakis and Cage by later musicians, notably Curtis Roads, Barry Truax and Kim Cascone, with the inheritance from Xenakis stronger and more specific than that from Cage.

Haworth extends the way that Born 'scales up' the analysis of retentions and protentions to address art and music historical processes, including the formation of genealogies and genres. He remarks on the novelty of the conceptual translations entailed in these moves—'from Husserl's internal time consciousness, to Gell's theorization of ... oeuvre and style, ... to Born's expansion to art and music history'—arguing that they point to the 'recognition that not only does the protending work *modify* the future, but it may subsequently be *modified by*' later retentions' (618). In this inventive vein, he shows how

Xenakis and Cage are themselves transformed through their retroactive "summoning" by Roads and Cascone. For just as the inheritors ... carry microsound forward, ... there is a sense in which microsound, in "hearing" the past a certain way, *configures its forebears*, positioning them as retrospective antecedents to an aesthetic formation that is actively being assembled. (616)

These temporal mediations characteristic of art and music history are therefore, once again, bidirectional, but also asymmetrical in the ways he brings out. Haworth deepens this finding through a reading of Foucault's concept of the 'author-function' (Foucault 1984), and specifically the idea of 'founders of discursivity': those authors who generate 'continual returns to [their work] which "never stop modifying" (1984, 116) the discourses they participate in' (Haworth, 619). In taking ANT to music and art, he concludes, questions of time, aesthetics and genre must necessarily be foregrounded.

The remaining three articles all in some way address questions of politics, both in the world and in terms of the methodological and epistemological implications of certain styles of mediation theory and the interventions they make possible in existing regimes of knowledge.

Eric Drott frames his article 'Musical Contention and Contentious Music; Or, the Drums of Occupy Wall Street' as a contribution to how social movement and activist studies approach the role of music in political protest. Drott notes that music's significance in the recent evolution of these fields lies in how it has drawn attention to the

cultural, affective and performative dimensions of activism, which were often previously overlooked. Drawing on Hennion, DeLanda, Born and others, he sets out three original premises: that both music and political protest are multiply mediated; that the Deleuzian concept of assemblage is productive as a way of conceiving of both music and social movements, since both are best figured not as organic totalities but as ‘constellations of heterogeneous mediations ... each having a certain autonomy’ (Born 2011, 377); and that the relationship between music and social movements sets ‘in motion a process of reciprocal transformation’ (Drott, 632). Drott, like Steingo, finds DeLanda’s assemblage theory especially productive: ‘Unlike the elements comprising an organic whole, which “are constituted by the very relation they have to other parts”, those constituting an assemblage “may be detached from it and plugged into a different assemblage”, without altering their being’ (Drott, 632; citing DeLanda 2006, 10–11).

Drott takes as an empirical case study the controversies that arose within and beyond the Occupy Wall Street (OWS) movement over the drum circle that emerged as a focal musical-and-social component of the movement during its encampment in Liberty Park, New York City, in autumn 2011. The drum circle’s jam sessions became a key ‘means by which a political public was fashioned’ (634); at the same time, the socialities set in motion by the drumming paralleled the radically participatory, leaderless social organisation espoused by OWS as a direct democratic movement. Yet the drum circle also became a source of conflict, its constant loud thrumming not only antagonising local residents but charged by other activists with drowning out the political speech that they took to be definitive of OWS as a movement. Entwined with these tensions were others, to make sense of which Drott develops an analytical framework attentive to social mediation as he notes how ‘macrosocial divisions [of] race, class, and political persuasion were expressed microsocially’ (638) in a growing rift between distinct spatial and social groupings within the Liberty Park encampment. Given that the drummers were largely people of colour, while ‘college-educated white activists’ clustered in the opposite corner of the camp, the soundscape itself ‘became a site where latent and not-so-latent antagonisms traversing the movement were made palpable’ (639). Drott concludes that drumming ‘performed not one but many mediations of the movement’, while ‘among the varied elements mediating the drum circle one stands out: the occupation itself’ (641). These two-way mediations between drum circle and movement produced a series of feedback loops with both mutually beneficial and mutually detrimental effects.

Patrick Valiquet’s ‘A Managed Risk: Mediated Musicianships in a Networked Laptop Orchestra’ sets an ethnography of Concordia University’s laptop orchestra, CLOrck, in dialogue with innovative theoretical and political contributions. He points to the considerable challenges posed by the way ‘mediation’ seems to defer ‘questions of meaning and power in a present situation’ (646) to relations, times and places that are elsewhere or ‘hidden’. He notes, too, the limitations of the tendency to equate mediation with technological media. In expounding his ethnography,

Valiquet proposes first, as noted before, that ‘it is not helpful to divide things up into “immediate” presences and “mediated” absences [for] [p]resence and absence are equally mediated in this situation’. And second, he argues that understanding a CLORck performance event in terms of mediation ‘is not just analytically correct, but has an underlying political potential’, one that requires him to revive a dialectical materialist reading of mediation entirely missing from recent theoretical discussions (647). His ethnography opens inside the classroom during rehearsals for a fiercely technologically-complex networked performance between three remote university centres, in which technical troubleshooting is so preoccupying that it squeezes out musical reflections. And indeed, for listeners to the performance, he reports, the spectacular set-up yielded little musical interest, indicating a disconnect between technical and musical ambitions.

To make sense of why, despite the risk of such a disconnect, the laptop orchestra has become a global idiom, Valiquet turns to the history of electronic music’s dominant academic form, electroacoustic music, identifying a series of ways in which the laptop orchestra promises to revive this tradition and attract new generations of students raised on laptops. These include how group laptop improvisation is seen to re-inject live, embodied expression and social interaction into electronic music; how it favours a ‘tolerant aesthetic pluralism’ (655) by gesturing towards popular music tropes (beats and loops), invariably shunned by academic electroacoustic music, that teachers imagine will draw students; how it is thought to embody the much-heralded ‘democratisation’ believed to be afforded by laptops; and yet, paradoxically, how it translates laptop performance and its ‘participatory’ ethos into a high-status, established concert idiom: the orchestra. Locally, at Concordia, these forces work in synergy with other ‘hidden’ institutional and ideological ones, notably the university’s mandate as an art-and-technology centre that ‘transgresses genres’, and the music department’s desire to attract non-music students through the ‘transferable skills’ inculcated by live electronics. Returning to theory, Valiquet argues powerfully for mediation as a point of convergence between analysis and critical intervention, building on Fredric Jameson’s idea of mediation as a process of transcoding—of bringing into alignment ‘two very different structural levels of reality’ (Jameson 1981, 40) (PV 15–16). In this vein, citing Born’s framework of four planes of social mediation (Born 2011, 2012), he advocates the need to identify ‘the wider political and institutional forces that structure power relations in musical practices’ (661). Such a perspective on mediation, Valiquet concludes, implicates both the object and the act of interpretation, disclosing how mediation is not just a better means of tracing non-linear causalities in history, but provides ‘the means to enact the critical cuts necessary for political change’ (662).

In the final article, Amy Cimini’s ‘Music Theory, Feminism, the Body: Mediation’s Plural Work’, politics and mediation-as-critical-intervention meet the conceptual challenge of reconciling music’s corporeal and social mediation. The article turns on a reading of Suzanne Cusick’s 1994 essay, ‘Feminist Theory, Music Theory, and the Mind/Body Problem’. Cimini finds in it a prescient statement of the need to depart

from music theory's 'mind-mind' paradigm—composer and music theorist communing in the elaboration of musical meaning—in favour of the performer's embodied mediation of the score, a move that places the body at the heart of musical experience. Yet if Cusick initiated these moves 25 years ago, they remain 'suspiciously incomplete' (669). Cimini lists a series of failures consequent on this incompleteness:

a failure to cultivate modes of description that discern the sounds of bodies and voices in a range of relations ... ; a failure to legitimate experimental methodologies; a failure to inquire deeply into mind-body connection along theoretical, historical and political lines; a failure to diversify music theory; [and] a failure to serve students by changing conservatories and music departments. (669)

Cimini then pursues the expansive implications of Cusick's essay, which highlights performers' epistemic authority with respect to their embodied knowledge of the music they play, as well as the 'vast semiotics that separates and distinguishes creative from reproductive work' (669)—a core theme of the gender politics of labour, and one with particular resonances for musical labour. Above all, Cimini contends, Cusick points to an understanding of embodied performance that recognises how it is always mediated both by the microsocialities created by the performance event and by macrosocial formations such as those of gender, race and class as they enter into those microsocialities.

Haunting Cusick's essay by analogy, Cimini suggests, is Haraway's political metaphor of the cyborg, which points to the need to take 'responsibility for the social relations of science and technology' (Haraway 1985, 100). Like Haraway, Cusick coins a hybrid political metaphor—the 'performer-scholar'—which upturns prevailing epistemic hierarchies and divisions of labour in music. Particularly ingenious, Cimini suggests, is Cusick's methodological experiment as both music-theorist and performer in which she charts reflexively through 'vivid and granular' descriptions and 'experimental self-narration' her own corporeal experience of performing. In a powerful reading of Cusick's experience of playing a Bach chorale, Cimini brings out how the organ part disarticulates the body: 'The organist's ordeal dramatizes this passage's supplication with a stark disjunction of musical meaning—a meaning that is aural but not embodied and embodied but not aural' (676). Through her experiment, Cusick also destabilises the hierarchy immanent in music departments and conservatories, 'where the work of analyzing, teaching and performing music are power-differentiated in that order' (677). The figure of the performer-scholar is productive, then, in condensing 'a complex field of mediations that work across various registers of analysis: the aesthetic, the institutional, the political, the cultural and so on' (679). Building on feminist-standpoint epistemology, and admitting the ongoing nature of the musico-political experiment that through Cusick she has re-energised, Cimini calls for composers and music theorists to 'acknowledge their own situated embodiment' (678) and for inventive practices that 'make new subjects and objects of knowledge visible and audible' (679).

What is To Be Learned?

In the remainder of this introduction we take stock, asking: what has been learned from the articles gathered here? How do they augment and redirect the mediation theories that have developed around music in recent years? And what implications do these directions have for the best-known school, ANT? To orient our discussion, we begin by opening a dialogue with an influential essay, a key ‘passage point’ for translating ANT into musicology: Benjamin Piekut’s ‘Actor-Networks in Music History: Clarifications and Critiques’ (Piekut 2014).

In his essay, Piekut makes the case that ANT offers a methodology for the study of music history. Rather than draw on Hennion, Piekut turns mainly to a version of ANT espoused by Latour. In opposition to those approaches that focus narrowly on the music itself, or the contributions of canonical composers, ANT provides, for Piekut, ‘a methodology that helps us to attenuate normative assumptions about our object of inquiry, to put aside vague or reified concepts such as “music”, “society”, or even “network”’ so as to generate ‘an empirically justified description of historical events, one that highlights the controversies, trials, and contingencies of the truth’ (2014, 193). If music is a ‘strong entity precisely because of the many entanglements that it is necessarily caught up within’ (2014, 192), then ANT offers an empirical ‘approach to studying all kinds of tangles’ (2014, 193). In the 1980s and 90s, Latour and Michel Callon argued that the actor-network theoretical approach provided an antidote to what Latour called the purification of the objects of scientific research from the hybrid tangles of relations within which they came to exist—a purification propounded particularly by idealist philosophies of science. Sociologists of scientific knowledge, argued Latour and Callon, needed to understand purification not as a given but as a process that creates ‘distinct ontological zones: that of human beings on the one hand; that of nonhumans on the other’ (Latour 1993, 10–11). In other words, the distinction between humans and nonhumans, and between culture and nature, was forged and reforged through scientific practices that demanded to be empirically researched. In this light, sociologists were obliged to trace the practices of translation performed by scientists that ‘create mixtures between entirely new types of beings, hybrids of nature and culture’ (1993, 10). In Latour and Callon’s account, then, scientific objects such as climate change or electricity are mediated, hybrid and in process—caught up, as Piekut puts it, in ‘all kinds of tangles’.

In later work, however, both Latour and Callon moved in different ways beyond their original preoccupation with scientific practice and what Latour called the construction of scientific facts. Callon turned to the analysis of economic expertise and the constitution of markets (Callon 1998), his work making links to arguments in post-Marxist and poststructuralist political economy (e.g. Gibson-Graham 1997; Mitchell 2002; Barry and Slater 2005), while Latour turned his attention to the study of politics, law and religion. The changing focus of ANT and its expansion beyond science and technology pulled its arguments in two contrary directions, both of which are exemplified by Latour’s work from the early 2000s on.

The first direction is apparent in *Reassembling the Social: An Introduction to Actor-Network Theory* (Latour 2005). In this much-cited book, Latour makes ANT appear to offer a general social theory relevant to the study of any domain. Drawing on both semiotics and the microsociology of Gabriel Tarde, Latour presents ANT as a theory that dwells less on its famous ‘actors’ than on mediators. ‘What’s wrong with the word [actor]’, he observes, ‘is not that it is often limited to humans—this limit we have learned to encroach upon—but that it always designates a *source* of initiative or starting point, the extremity of a vector toward some other end’ (Latour 2005, 216). Rather than focus on sources—or ‘influences’ (Piekut 2014, 202)—ANT should direct attention, Latour proposes, to the mediators that enable any entity (music, for example) to come to exist ‘by its many ties’ or—and he cites Hennion on this point—‘attachments’ (Latour 2005, 217, citing Gomart and Hennion 1999). Moving decisively beyond the ‘actor’, Latour waxes lyrical: ‘the more *attachments* it has, the more it exists. And the more mediators there are the better . . . [Indeed,] an actor-network is what is made to act by a large star-shaped web of mediators flowing in and out of it’ (2005, 217). Note that this ‘star-shaped web of mediators’ seems to be Latour’s equivalent of what in discussions of music and mediation had by this point been identified as a constellation of mediations or an assemblage. Note also how Latour depicts mediations as actor-like through his use of the term *mediator*—an entity with the agency to transform—as opposed to *mediation*—a concept that ambiguously, and generatively, implies either or both a transformative relation with respect to an object (music), as a process or practice, and an entity or event—which may itself be a relation or a composite of relations—that is contributing to such a transformative process or practice.

Latour’s 2005 reversioning of ANT, which is partly indebted to Hennion, resonates with Piekut’s argument. Piekut is especially concerned with tracing how ‘agency was manifest in [a] historic moment’ (2014, 198)—yet Latour places strict and very particular limits on talk about agency: ‘if you mention agency, you have to provide the account of its action, and to do so you need to make more explicit which trials have produced which observable traces’ (Latour 2005, 53). This empirical commitment to ‘observable traces’ along with an opposition to social theories that posit the existence of unobservable forms or structures runs through Latour’s work. It is picked up by Piekut, who at one point dwells in his article, as an exemplar, on the significance of the circulation of a book (John Cage’s *Silence*) that was purchased by the guitarist Fred Frith from Heffers bookshop in Cambridge (Piekut 2014, 199). Note that while the book (Cage’s ‘spokesperson’) and the result of its movements were ‘observable’, its production and circulation were not; they and their significance have to be inferred from Frith’s ownership of the object—and inference will return later on. Moreover, the question of the relative importance for Frith’s music of, on the one hand, his ownership of the book and, on the other, the book’s discursive contents—Cage’s philosophy and aesthetics—as well as Frith’s engagement with those contents is one that perhaps Piekut does not probe as much as might be desired. Indeed, in several places Piekut focuses attention on an object in circulation (a Viennese text,

Neue Zeitschrift für Musik (2014, 196), an issue of *Down Beat* magazine (2014, 197), Ali Akbar Khan's album *Music of India: Morning and Evening Ragas* (2014, 202)), elevating this object-hood—'the inscription that does the work' (2014, 197)—over the substantive contents being 'transported' by these objects (Hegelian music criticism, an interview with Bill Dixon, the aesthetic qualities of Khan's music). Circulation has certainly been a neglected topic in cultural theory (Gaonkar and Povinelli 2003; Straw 2010), and Piekut's emphasis makes sense in as much as his arguments are 'directed at some specific problems for music history writing' (2014, 194) and particularly how, in musicology, contents are invariably accorded more significance than the diverse mediations through which they are experienced. Nonetheless, the relative weighting of these aspects of Piekut's analysis is curious—and at odds with Latour's own interest in the contents as well as delivery mechanisms of discourse. The nature of the empiricism advocated by ANT is, then, a critical question and one to which we shortly turn.

The second direction taken by ANT, contrary to Latour's presentation of ANT as something like a generalised methodology in *Reassembling the Social*, was its increasing fragmentation after the mid-2000s. This is obvious in differences between the work of Latour and other actor-network theorists such as Annemarie Mol and John Law. But it is also apparent in Latour's own work from this period, including his collaborative exhibition about politics, *Making Things Public* (Latour and Weibel 2005), his study of French law in the guise of the Conseil d'Etat, *The Making of Law* (Latour 2010), and his book on religious speech, *Rejoicing* (Latour 2013b). What is clear from these texts is that Latour is interested less in Piekut's 'tangles' of mediation or the hybrid forms that different practices generate than in the *differences* between science and politics, law and religion—domains that Latour initially characterises as distinct 'enunciation regimes' (Latour 2003, 145) and later 'modes of existence' (Latour 2013a; Maniglier 2014). In contradiction to *Reassembling*, Latour makes plain that his remarkable analysis of scientific practice, most clearly articulated in *Science in Action* (Latour 1987), cannot be extracted as a methodology and applied to the study, for example, of politics. As he recognises, political speech and practice are less concerned with the problem of reference that preoccupies scientists (e.g. 'what is climate change?') than with the question of how it is possible to mobilise or assemble groups or movements (e.g. 'how is it possible to mobilise a coalition to act on climate change?') (Latour 2003). In this light, while Latour has collaborated extensively with artists in recent years, it is worth noting that he has not written on art (or music)—on what he might call artistic or aesthetic modes of existence. If music historians, music sociologists and ethnomusicologists have drawn on Latour's early work on science and technology, the challenges posed by his later work are of a different kind: to address the *specificity of music* and the particular conceptual problems it poses.

There are both strengths and weaknesses in Latour's approach to specificity, however. An obvious strength is to become attuned to the distinctive nature of institutions and fields of practice—religion, law, politics—that have their own properties, while stretching the techniques of ANT to encompass a broader, and by implication comparative, terrain. Yet in contrast to his emphasis in his early work on science

and technology on the heterogeneity of actor-networks, on hybridity and entanglement, Latour loosens or even abandons these commitments in his work on law and politics. For in the process of depicting the distinctiveness and autonomy of these fields, he resorts to their purification, representing them as utterly unentangled through their most elite institutions and quintessential discourses. Thus, Latour's work on politics, posed against 'the ideal conditions of communication invented by Jurgen Habermas' (Latour 2003, 155), homes in on what he takes to be the essence of politics, a form of enunciation: political talk. At the heart of political talk, Latour avers, lies Socrates's *autophuos* or 'self-begetting' (2003, 154), where 'autophuos and autonomy are terms related in such a way that only the former makes it possible to achieve the latter'. Political talk, he continues, works by 'the slow distillation of autonomy' (2003, 154); it is 'invaluable and fragile, [surviving] only with meticulous care by a culture as delicate as it is artificial' (2003, 162). Specificity here conjures worlds that in their autonomy are involuted, fragile and under threat, their heterogeneity and hybridity effaced.

Latour's *The Making of Law* has a similar cast. It focuses on an elite national body, the Conseil d'Etat, rather than on those hybrid areas of legal practice where, for example, law and economy are profoundly entangled, such as intellectual property law. In his discussion of the book, the legal anthropologist Alain Pottage comments on how characteristic this purification is of the later Latour: 'Law as it emerges from the study of the Conseil ... , like other [of Latour's] modes of existence, ... comes into being by detaching or differentiating itself from within the "sociality" of assemblages, hybridizing inflections, delegations, and human/non-human associations' (Pottage 2012, 173). Pottage notes, too, Latour's reduction of the materiality of law to discursive practices, 'a mode of binding or concatenating statements' (2012, 174, note 26). He comments,

Although law as a regime of enunciation is supposed to emerge from the sociality of actor-networks, ... Latour's analysis of law often proceeds as though there were actually nothing more to law than a process of enunciation. The effect is to suggest that law is not a material world in the same sense as science or technology. (2012, 170)

In effect, the law is represented not only through its purest institution but boiled down further to its quintessential discursive forms. In his turn towards specificity, the surprise is that Latour draws back from the earlier commitments and insights of ANT.

What is striking is therefore the extent to which, in bringing ANT to music or pursuing theories of music's mediation, we cannot take Latour as a guide to specificity. In the remainder of this introduction we want to register a series of more propitious approaches to mediation signalled by our contributors that redress certain limits of ANT as well as responding to the demands posed by music's specificity. They are: the need to pursue a subtler form of empiricism in ethnographic and historical research on music—an overarching argument; the need to cross scales in analysis,

and this with reference to music's social, temporal and material mediations, linked to questions of power; the challenge of theorising subjectivities and aesthetic and affective processes; and the question of ontology.

With regard to empiricism: Piekut, along with other humanists interested in ANT, seems broadly to take ANT as a guide to ethnography and indeed to empiricism *per se*. Yet as we have seen, in so far as ANT is conceived as a generalised methodology, it is characterised for Latour by a particular kind of empiricism: a focus on the 'observable traces' of mediators. In this way both Latour and Piekut (as mentioned earlier) criticise those analysts who purport to know the 'context' in advance of any ethnographic or historical enquiry. This is an important, perhaps uncontroversial point. But all turns on the quality of the empiricism undertaken in its name. And it certainly does not follow that it is necessary to adopt a narrowly empiricist stance, as Latour implies with his insistence on identifying agency through 'observable traces'.

In fact, ethnographic research is often at its most insightful when it probes the limits of what is readily discernable by interrogating not just what is observably present—as in Latour's formulation of ANT—but also what is hidden, as Valiquet puts it, as well as what is excluded, marginalised, denied, invisible, secret, present only through its absence or detectable only by inference or abduction.⁷ As Anna Tsing contends when criticising the limits of Callon's (Callon 1984) 'guidelines for the "sociology of translation"' (i.e. ANT): certain realities demand that attention be paid to those 'gaps, misunderstandings, and omissions' that Callon dismisses in his analysis as 'irrelevant to the alliances that matter' (Tsing 2010, 48).⁸ While Michel Foucault, whose (hidden) influence is arguably woven through ANT, develops the concept of a *dispositif* (his closest term to assemblage) through a variant of the same methodological point:

an essentially heterogeneous ensemble, composed of discourses, institutions, architectural formations, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral, and philanthropic arguments; these are the elements of a *dispositif*—in short, *what is said as much as what is unsaid* ... The *dispositif* itself is the network that might be established between these elements. (Foucault 1977, 299, emphasis added, quoted by Pottage 2012, 181)

For these writers, and for ethnographic method, what (and who) can be inferred on the basis of evidence to be marginalised, absented or denied is as exigent as what is observable, and analysis needs to take both, and their relations, into account.

A linked principle of ethnographic method is that what occurs in practice and what humans say or write about this are not identical, necessitating that research should attend to both practice and discourse and the relations between them. Such an injunction is, again, absent from Latourian ANT. Yet, courtesy of anthropological ethnography it is, perhaps, the Ur formulation of a research method sensitive to mediation, since it rests on the conviction that practices and discourses cannot be researched through any presumption of their unity or identity, but must be probed, rather, in terms of their complex interrelations and mutualities; how they hang together (as an assemblage) and affect (mediate) one another—including, potentially, through

relations of difference or non-relation (Born 1987, 56; Born 1995, 28, 282). This principle immediately stimulates questions: is there a gap, a tension, a contradiction between discourse and practice, and if so, what does this imply analytically? Are some things that are observable in practice omitted in discursive accounts?

The ethnographic principle of the non-identity of discourse and practice can do more. It can be scaled up and multiplied, becoming a method by which to examine the relations between the components of an assemblage. Taking this scaled up method to music prompts us to ask: how are the sonic, discursive, corporeal, material and social mediations articulated in any musical assemblage? Are some elements of music's material or social mediation discursively acknowledged while others are routinely overlooked (cf. Born 2005; Born 2013, 141–148; Devine 2015)? Are certain social relations manifest in a musical event not registered discursively, or do they exceed what is articulated in discourse (Born 2012)? When analyzing music, discourse therefore becomes just another element of the assemblage along with others, with no privileged status, and the relationship between it and music's sonic, corporeal, material or social mediations cannot be assumed in advance. It has to be examined. This approach to mediation prompts subtle empirical research, proceeding in two stages: first, tracing which mediations are present in any musical assemblage, and the forms they take; and second, analyzing the relations between them, as well as their relative primacy in the assemblage, without assuming in advance that, say, discourse is a full or reliable guide to actuality, or that the material always trumps the discursive (e.g. that the existence of a book or CD in circulation is more significant, or 'acts' more 'powerfully', than their respective discursive or sonic contents) or vice versa. All of this can be ascertained only through ethnographic observation or its evidential equivalent in historical research. Cimini's article, in exhorting us to analyze music and musical experience as hybrid and embodied, where the musical body is mediated by social relations of gender, race and class, provides a vindication of this approach. For in proposing this as an alternative to the purified accounts of music theory, Cimini not only underlines how embodied practice and music-theoretical discourses are non-identical, but she highlights the disjuncture between them, showing how the discourses of music theory invariably absent not only the musical body but the gendered/raced/classed musical body.

Tsing also acknowledges the non-identity of discourse and practice, as well as its methodological significance. In a paper on the fragile ecology of the matsutake mushroom that probes ANT's powers and limits, she notes how American and Japanese matsutake scientists tend discursively to 'deny national difference despite the fact that it is apparent in their practices' (Tsing 2010, 52). She adds a further critique of ANT that is productive for our purposes. She compares the 'worlding'—the creation of contexts through either or both discourse and practice—performed by the American and Japanese matsutake scientists and finds that it takes very different forms. The American scientists see the threat to matsutake as resulting from too much human 'impact' on the species, pursuing an approach focused on 'management for sustainability' in which 'nonhuman species should be preserved for themselves', and where 'the larger set of human-nonhuman interactions that make up the forest [host] ... were not ...

included in this research frame' (2010, 60). For the Japanese matsutake scientists, in marked contrast, the problem comes down to 'too little human impact'. Their understanding of the problem of the declining mushroom turns instead on a conception of the host forests 'as anthropogenic in their very nature' and 'sites of traditional harmony between humans and nature' (2010, 61), the product of longstanding, village-based coppicing and shifting cultivation. Tsing comments that the two ecological regimes are 'incommensurable' (2010, 62) and, crucially, that ANT cannot grasp such a difference. In comparing the two regimes she finds it necessary to pursue their distinctive histories in order to diagnose their discourses and practices: another feature of anthropological ethnography absent from ANT. In this way Tsing brings out, through comparison, what could be summed up as either cultural or ontological differences (cf. Carrithers et al. 2010). If the basis of Latour's refusal to employ culture as a conceptual element of ANT's methodology is his depiction of the culture-nature dualism as foundational for those he calls 'moderns' (Latour 1993), then what is striking is precisely Tsing's analysis of how *differently* the nature-culture relation is imagined and empractised by Japanese and American matsutake scientists.⁹ For our purposes, her lesson is that, as for the mushrooms, attention to culture and ontology, and to cultural and ontological differences, must be central among the analytical tools deployed in the analysis of music's mediation (Born 2005; Born 2013)—a stance variably rehearsed in the articles by Kane, Krogh and Steingo.

If history is a necessary correlate to ethnography,¹⁰ this returns us to how mediation theories answer the second reductionism (see 448–449 above) that plagued earlier research on music: that of reducing music to being a reflection of extraneous determinations. Here the challenge is not descriptive but explanatory: how to explain process and change in musical cultures, and the argument made earlier was that identifying music's constitutive mediations yields a more complex and distributed object (an assemblage) on the basis of which to trace the conditions, trajectories and forces that converge on a musical object or event, engendering subtle forms of explanation. Explanation, however, is a term little used within the conceptual armory of ANT, limiting the kinds of analyses ANT offers as well as its purchase on the reflexive nature of our world. As David Berliner, Laurent Legrain and Mattjis Van de Port ask, rhetorically, when reviewing Latour's impact in anthropology:

what about our desire to build explanatory models from/for social life? Epistemologically, what is a social science that aims at tracking chains of humans and non-humans, but at the same time refuses all kinds of models that are out of the agents' conscious reach? (Berliner, Legrain, and van de Port 2013, 11)

Symptomatic of this problem is how Latour elides two general contributions made by theories of mediation, identified earlier through the two reductionisms to which these theories answer (see again 448–449). The first of these contributions is broadly about how things hang together, a synchronic analytical ontology concretised in the idea of an assemblage—in Latour's terms, the actor-network as a 'large star-shaped web of

mediators'. The second contribution, however, is less ontological than epistemological. It has to do with explanation, and comes into view when time enters the analysis. This is to analyse things in the terms of mediation's processual, temporal qualities, leading in short steps to inferential enquiries into such diverse transformative processes as causation, catalysis, imitation, amplification, differentiation or resistance. Latour dismisses any 'strong' explanations that have recourse to notions of determination and related metaconcepts ('Capitalism, Empire, Norms' and so on), advocating instead the prospect of what he calls 'weak' explanation' through ever-more detailed description (Latour 1988, 159; Latour 2005, 137). It is as if the 'star-shaped web of mediators' and their generalised, micro-transformative properties—given that mediators are defined by Latour as 'any thing that [modifies] a state of affairs by making a difference' (Latour 2005, 71)¹¹—are deemed sufficient for understanding how, why and when either change or stasis occur at any scale: that is, for explanation. Of course, being agnostic about scale is a foundational premise for Latour; the question is how adequate this stance is for understanding and explanation. We return to scale and time below.

Following on, there is a final point to make about the limits of ANT's empiricism, to do with the awkward relationship between ANT's methodological injunctions and theory. With his critique of sociological reductionism and of, well, critique (Latour 2004), Latour remains indifferent or opposed to broad areas of social and cultural theory. At the same time, his particular debt to semiotics and ethnomethodology limits the extent to which his ethnographic research can feed into the further development of theory. For example, his ethnography of law, in conceiving of law as a regime of enunciation, as mentioned earlier, leaves much else unexamined—to take an obvious social-theoretical problem, law's relationship to the state, its contributions both to upholding state power and to its contestation (McBarnet 1983). As an alternative, we elsewhere advocate a post-positivist empiricism in which empirical research, by engaging with theory, can have inventive conceptual effects (Born 2010a, 27–28). As Deleuze puts it, empiricism analyses 'the states of things, in such a way that non-pre-existent concepts can be extracted from them' (Deleuze 1987, vii).¹² Rescuing empiricism from narrow understandings of the term, the strength of ethnography is that it throws up findings that cannot be incorporated into existing theoretical frameworks and thereby demand that they be refined. In sum, Latour's injunction to follow 'observable traces' represents a limited account of ethnographic method as it may also be applied to history (via history-as-ethnography).¹³ There is a danger that in opposing sociological reductionism, ANT ends up by itself promoting a restrictive empiricism, and one that shies away from ethnography's powerful theoretical potentials.

The second broad theme regarding ANT's limits that we want to develop concerns Latour's injunction against crossing scales in analysis, with its roots in ethnomethodology's account of how 'the macro is generated within micro-social action' (Callon and Latour 1981, editors' comments 278). Latour writes in *Reassembling*:

It is not by accident that ANT started with the study of science. Whenever one looks for a telling example of what it could mean for a social theory to do away with the

micro/macro distinction, scientific arrays offer an excellent template. [For they provided the most extreme examples of how small innovations could, in the end, become a “macro” feature of the “whole” world. (Latour 2005, 180)

Scale, then, becomes an effect produced by actor-networks. He continues,

As long as we do not ferret out the places where “up”, “down”, “total” and “global” are so convincingly staged, the temptation to jump to the “context” will not be alleviated ... People will go on believing that ... society is something that can stand without being produced, assembled, collected, or kept up. (2005, 184)

This is an important move, in the sense that Latour is importing into sociology the process ontologies elaborated in diverse philosophies from Tarde and Whitehead to Deleuze. The call is: ‘do not reify! Do not overlook the processes and practices whereby all aspects of life emerge, are made and put together!’.

Latour’s caution about reaching for macro explanations too quickly is well judged. And yet much is left out of the analytical and explanatory possibilities available if we are forbidden to think across scales and restrict our ethnographic (and historical) imaginations to the ‘micro’ and ‘local’ as they forge what may come to appear ‘macro’ or ‘global’. The fact is that ethnography can rarely access directly the large-scale processes that impinge on localised ethnographic experience. Instead, such processes are often glimpsed or overheard at the margins, leaving no alternative but for research to proceed by inference from that which is available (including ‘observable traces’). The anthropologist Marilyn Strathern clarifies this point when articulating the epistemological basis of any research method based on observation. She asks: ‘how do [anthropologists] know what they know?’ when what they study, notably social relations, are not directly observable as such. Her answer is that *inference* is central to any knowledge-making concerned, like anthropology, with deciphering relations:

Relation is in and of itself an abstract concept. It refers to a state of coexistence imagined as a link or tie, entities and entailments unspecified. It is not just that *social* relationships have to be inferred: *any* statement of relation proceeds by inference. (Strathern 2018, 171)

If discerning any kind of relation (including mediation) necessarily involves inference and abstraction, this casts doubt on Latourian claims that relations are there to be uncovered simply through observation and description. It casts doubt too on Latour’s methodological dictum about scale, as though deciphering micro relations is somehow less contaminated by abstraction, by social theoretical predicates, than macro ones.

Strathern departs decisively from Latour in these regards, pointing to the facility to cross scales as a central property of the relation (as an abstraction). She depicts the relation as (at least) two-dimensional, in that relations exist both as abstractions (e.g. ‘social relations’) that can, however, be identified concretely on the ground and

that may themselves enter into further relations (e.g. when social relations enter into relation with music by transforming (mediating) it, and vice versa, when music enters into relation with social relations and transforms (mediates) them—these two-way potentials captured in the idea of music’s social mediation (Born 2005, 2012)), and as a way of inferring and imagining links (relations) between micro and macro entities, entities that may themselves be relations. She comments: ‘to the extent that an abstract principle [like relation] makes a concrete appearance, then what is abstract and what is concrete fold into each other: that which is inferred from observation comes to have its own “observable” characteristics’ (Strathern 2018, 173–4). Note how Strathern’s depiction here of the two-way movement between the concrete (empirical observation) and abstract (the inference of relations) recapitulates the model of post-positivist empiricism outlined before.

In sum, Strathern argues, ‘the relation as a model of complex [and non-linear] phenomena ... has the power to bring dissimilar orders or levels of knowledge together while conserving their difference’ (Strathern 1995, 19), and she gives the example of how archaeologists are tasked with tracking processes ‘along several quite different temporal and spatial scales’ all at once (1995, 21). Moreover, ‘at whatever level or order, the demonstration of a relationship, whether through resemblance, cause and effect or contingency, reinforces the fact that through relational practices—classification, analysis, comparison—relations can be demonstrated’ (18). Central to Strathern’s epistemology of relations is therefore the capacity to think through *the relations (mediations) between relations (mediations) of different scale, while ‘conserving their difference’*.¹⁴ With the addition of notions of relations of exteriority, of ‘reciprocal forms of determination’, and of the non-organic, non-linear and emergent (DeLanda 2006, 21 & Chapter 1), we arrive at a version of assemblage theory—central to the papers by Prior, Steingo and Drott.¹⁵

Several articles in this collection take what might be identified as a Strathernian rather than a Latourian course, analyzing music’s mediation at different scales through inference and abstraction. They do this with regard to both the social and temporal mediation of music. Indeed, we will suggest, one facet of music’s specificity may lie in how music dramatises the need to cross scales in the analysis of mediation.

To begin with the social: the importance of conceptualising different scales of social relations and social formations as they mediate and are mediated by music is apparent in the articles by Drott, Cimini and Valiquet. Each writer infers music’s social mediation from concrete ethnographic and/or historical material. As Born has shown (Born 2005, 2011, 2012), music has the peculiar property both of generating social relations—in the guise of the socialities engendered by live music-making, and the musically-imagined communities that emerge among all those with a common passion for a certain music—and of being mediated by social formations that are far from limited to music—the social stratifications and hierarchies attached to differences of gender, race and class, as well as the characteristic political-economic and institutional forms by which music is produced and reproduced, including late capitalism, the neoliberal university and, indeed, the social movement. Drott and

Cimini draw out how social relations of race, class and gender, and the antagonisms that may attach to them, get played out in the socialities of live performance (in the Occupy Wall Street movement's drum circle, and in the musical division of labour) in ways that have previously been overlooked or denied. Valiquet addresses, in turn, the institutionalisation of the laptop orchestra within North American universities, and how it is legitimised by a discourse of democratisation, which fuelled its global diffusion, that is contradicted in practice by its hierarchical performance socialities. Each writer finds it necessary to cross scales, drawing out the relations between micro and macro social mediations, while also being interested in their autonomy—in 'conserving their difference'. If, for Hennion, music 'forges identities ... ; it does not obey them' (Hennion 2016, 294), then this recognises just one side of the two-way mediation between music and social identities, neglecting how class, race, gender and other facets of identity get entangled in music, whether through their reproduction or transformation (Born and Devine 2015; Born and Devine 2016; Stirling 2019).

Crossing scales in the analysis of music's social mediation has other benefits, too. It offers conceptual tools with which to address not only a range of forms of social, institutional and political-economic power that are manifest in music, but also how these types of power can foment resistance, generating a diversity of politics of music. All of this contrasts with Latour's limited account of both power and resistance. Criticisms of these shortcomings have long been voiced by feminist social theorists and STS scholars: how ANT offers 'no path back into social analysis, into questions of domination, exclusion, resistance and transformation—the stuff of politics—once its work of mapping is done' (Sterne and Leach 2005, 192); or, in Donna Haraway's pointed rebuke:

Either critical scholars in antiracist, feminist cultural studies of science and technology have not been clear enough about racial formation, gender-in-the-making, the forging of class, and the discursive production of sexuality *through the constitutive practices of technoscience production themselves*, or the science studies scholars aren't reading or listening—or both. (Haraway 1997, 35, emphasis in original; Barry 1998, 877)

Emily Martin argues, in turn, that science is among those 'institutions that are exerting particularly brutal forms of power in the contemporary scene. Scientific institutions are implicated in large-scale political economic forces that can be universal in their scope and ... often damaging in their effects' (Martin 1998, 25). And although influenced by ANT, Kristin Asdal and colleagues address the political responses arising from these conditions, insisting that any account of the institutions of contemporary science must encompass such initiatives as the Radical Science Movement, which reformulated 'existing theories of the relationship between science, technology and society ... [while] creating alliances with social movements outside the universities' (Asdal, Brenna, and Moser 2007, 10–12). More generally, they point out that 'resistance and critique, the user or the citizen, have played a crucial part in shaping politics, but have been excluded from [ANT's] analysis' (2007, 45; cf. Barry 2013).

Given these criticisms, Latour's defenders might reply that to develop a framework that can, where relevant, accommodate the analysis of gender, race and class as social mediations—whether of science or music—is merely to capitulate to a 'preformatted' identity politics. But this would be an error, since the point is that in countering earlier sociological reductionisms, Latour is not empirical enough. The challenge is not, first and foremost, an ethical or political one to do with a critique of power. It is to develop an empirically adequate account of the social—in science and music—one that will help both to explain actualities and, as Valiquet observes, to unleash political possibilities

Turning to the need to cross scales in the analysis of music's temporal mediations, the articles by Kane, Krogh, Haworth and Kronengold all make distinctive contributions. Time in music has generally been addressed in terms of how musical sound conveys internal, micro-temporal senses of movement. Jonathan Kramer, for example, opens his rich discussion of musical time by noting how 'the quintessential expression of [linear time] is the tonal system ... [which] coincides with the height of linear thinking in Western culture' (Kramer 1981, 539). He contrasts this with the music of 'nonlinear cultures' whose music is cyclical and 'not oriented toward climax' (1981, 540), before identifying the appearance of what he calls 'nondirected linear' time as well as the 'aesthetics of discontinuity' in twentieth century Western art music (1981, 542, 544). Yet this and other original approaches to analyzing music's 'inner' time have not yet been matched in historical musicology by awareness of recent innovations in theorising time and temporality such as those that have arisen in art history and social theory (Born 2015).

When we turn to ANT and Latour, neither time nor history feature as preoccupations (Piekut 2014, 205). The idea of the network, after all, is a spatial rather than a temporal one. It is possible to see ANT, in its Deleuzian vein, as proffering a theory of emergence on a micro-temporal scale, given that the very definition of an actor rests on the emergent nature of agency: that it is discernible only after the event. Alternatively, the anthropologist Roger Sansi argues that Latour develops a non-Deleuzian concept of events, which have transformative effects and 'make truth happen' (Sansi 2013, 453). Harman pursues similar ideas, suggesting that Latour offers a philosophy of 'occasions' (Harman 2010, 82) underpinned by an unresolved tension between events and trajectories; in Latour, he suggests, 'events are effectively frozen into their own ... specific location and set of relationships ... [Whereas] when considering a trajectory, we never find a thing in a single time or place, but get to know it only by following its becomings' (2010, 65). Regarding macro temporalities, the archaeologist Ian Hodder criticises ANT for its inability to conceptualise the cumulative historical effects of the long-term entanglement of humans and things (Hodder 2014). When analyzing the changing forms of this entanglement, Hodder points to the need to acknowledge its irreversible directionality and path-dependence over 70,000 years—a challenge posed to Latour by his evident interest in the Anthropocene (Latour 2014). Despite such prompts, ANT has not yielded conceptualizations of time and history that are particularly suggestive, for music or in general.

Against this background, several contributors to this issue make imaginative inroads into the analysis of music's multiple temporal mediations of different scale: how music both produces temporalities and is itself formed by temporal processes. Time enters repeatedly into Kane's inventive analysis of the emergent relations between five versions of 'Body and Soul' between 1930 and 1960, manifest in harmonic changes between performances. He visualises these relations as a network, foregrounding mediation's transformative qualities: how each performance 'relays some properties forward, adds new properties of its own, and excises others ... [the standard] *is transformed at the same time that it is transmitted*' (523–524). In this way Kane infers causal connections between intramusical form and how the performances create a 'thick musical network', the 'work', as it comes to be distributed over three decades. Although musical sound is focal for Kane's study, it recalls approaches in material culture studies to the 'life histories of objects' and how things are involved in the 'making of time' (Hicks 2010, 82). As Arjun Appadurai puts it in *The Social Life of Things*: to grasp 'the concrete, historical circulation of things ... we have to follow the things themselves, for their meanings are inscribed in their forms, their uses, their trajectories' (Appadurai 1986, 5).

Haworth and Krogh focus their theorizations of time, like Kane, on the relations between musicians, musical events and works, adding a concern with genealogy and genre. To do this they draw on Born's expansion of Husserl's concepts of retention and protention as mediated by the anthropologists Alfred Gell and Nancy Munn (Gell 1992, 1998; Munn 1992; Born 2005, 2015). In Krogh's reading, DJ Static retains the sounds of those producers he admires, while his beats and the things that go into their making protend musical events to come. Haworth takes this much further with reference to microsound, arguing that any analysis concerned with the emergence of such a genre, and with music-historical process, demands a focus on music's temporal mediation: how music produces time beyond the scale of the individual work. In particular, he shows how the idea of protention breaks decisively with the teleologies immanent in the analysis of 'influence'. Haworth unfurls a series of conceptual insights, bringing out counter-intuitively how, through the protentions of their music and writings, earlier artists—Xenakis and Cage—open up possibilities that 'modify the future', while they themselves come to be positioned retrospectively as 'forebears' by later artists. A first crucial gain of this temporalizing move is to de-essentialize both composers—Xenakis, Cage—and their works—*Analogique B*, *Cartridge Music* and so on—so as to bring out their multiplicity. There can be no assurance, then, that the 'Cage' retained by later musicians and writers is the 'same' 'Cage'—and indeed a cursory reading of the burgeoning literature on Cage, as well as exposure to the many musical objects, events and genres that claim descent from Cage, demonstrates this in abundance. A corollary, pursuing the anti-essentialist vein, is that not all that is protended is retained. A third gain, following on, is to affirm the underdetermined, non-linear rather than inevitable, linear nature of influence, and how attributions of influence and the genealogies they portend—whatever the realities of the retentions at issue—are invariably coloured by other interests and forces,

notably perceptions of the relative status, legitimacy and prestige of forebears, so that influences may be either overlooked and denied, or claimed, when it is politic to do so. There is, then, a contingency and a politics to retention, attribution and the genealogies they construct, and not all that is retained is necessarily acknowledged—just as what is acknowledged may not be what is actually retained.¹⁶ Note how these predicates propel us far beyond the outworn concept of influence.

Kronengold makes an ambitious contribution to crossing scales in the analysis of music's temporal mediations, drawing out how micro and macro temporalities—and all scales in between—enlivened and were enlivened by the harpsichord fad of the 1960s and early 70s. Indeed, the fad 'doesn't have an identity separable from the continual effects of the other-than-musical forces that co-constituted it' (578) (cf. Connolly 2011; Born 2015). Through a series of music examples he tracks the mutual mediation between the sonic temporalities arising from the harpsichord's material functioning, developments in genre, wider cultural, material and social histories, and the biographies and contributions of composers and audiences. In each case the articulation is distinctive. Ligeti's *Continuum* (1968) amounts to a 'specific assemblage of temporalities' (587), its 'speeds—of articulation, changing densities, timbral transformations, emergent melodies ... larger-scale formal unfolding, composition and score-design, rehearsal, performance, and recording—are all mediated by the harpsichord. But they work relationally, with the orchestra, the electronic-music studio, and the piano as foils' (588). These temporalities, for their part, are caught up in 'other time-strands', among them 'shifts in harpsichord design; the processes of harpsichord maintenance and repair; personal, cultural, and muscle memories; and *longue-durée* history'. Overall, *Continuum*'s 'singularity as a concept-driven work' stems from how the whole assemblage is grounded 'in a sharply delineated concept of what the instrument was good for' (588–589).

In Cage and Lejaren Hiller's *HPSCHD* (1969), in marked contrast, the fad itself, and faddism, emerge as key frames of reference as the harpsichord floats 'free, largely disconnected from its histories, cultural meanings, mechanisms, and the genres and practices it's associated with'. Instead, *HPSCHD* is shaped by 60s fads like 'live-instrument-and-tape pieces, twenty-minute made-for-LP pieces, densely pitchy synthesiser polyphony, microtonality after Harry Partch ... , intensive spatialization ... , [and] the fashion for small musical objects popping in and out of stratified textures', while all of this is entangled in extra-musical trends like those 'for artworks that emphasized mathematical-sublime accumulation, popularizations of the computer ... , or space exploration' (590–591). Temporal mediation also works outwards from the instrument itself. Thus, in the opening song of Stevie Wonder's first 'self-directed' LP, *Where I'm Coming From* (1971), it is the harpsichord's 'non-touch-sensitive keyboard, quick decay, historicity, and capacity to cut through a texture' that work to accumulate meaning, catalysing shifts in 'the soul LP, keyboard/voice relations in black music, soul-music harmony, [and] the fad for echo effects'. The track 'ends with just the electronic harpsichord, still spiked by the slapback-echo effect—a small, fad-inflected musical object asked to bear the weight of an opening song, a whole concept album,

the lyrics' injunction to "look around", Wonder's genius, audiences asking for more from a genre, and a fraught historical moment' (598). When the harpsichord appears at such moments, Kronengold concludes, it 'creates social, aesthetic and semiotic effects that can't be reduced to one another, or disentangled from the material objects that produce them' (598). With Kronengold's virtuosic reading of the multiple temporalities of radically different scale immanent in the harpsichord fad, this property of music's mediation is surely affirmed as a defining feature of music's specificity—although it holds promise, too, for the analysis of other domains of cultural and social life.

If the analysis of both time and the social gain from crossing scales, there are benefits, too, when analyzing music's material mediation—beyond the privileging of individual objects (hard drive, Vocoder, *Silence*) and milieux (drum circle, teeming studio, Vocaloid software) when scrutinising those now-familiar nonhuman actors. Recent work indicates the importance of extending our material sensibility to such large-scale and long-term material forces as sonic media, formats (Sterne 2012) and infrastructures (Devine and Boudreault-Fournier 2020). As Born suggests,

to acknowledge the significance of medium time ... [is not] to fall into a crude medium determinism. It is, rather, to locate changing media, and material infrastructures, as but one among the multiple interacting systems in the nexus of temporalities both affecting and themselves enlivened by music. (Born 2015, 380)

By crossing scales in the analysis of music's material mediation, questions of power 'hidden' by ANT's micro focus come, once again, into view. For media, formats and infrastructures are deeply imbricated in those cross-sectoral mechanisms of profitability and the control of markets—notably standardisation and churning obsolescence—that drive the interrelated music recording, consumer music technology, IT and telecommunications industries.¹⁷ Media, formats and infrastructures are, then, central to the ways in which 'all complex societies ... use materials to manage time, space, and power' (Peters 2015, 36).

It follows that the focus on music's large-scale and long-term material mediation also ignites a politics. As Kyle Devine has argued, advocating a 'political ecology of music', a concern with the rampant waste economies thrown up over the *longue durée* by the materials—shellac, plastic and data—that form the backbone of the music industries points not only to an analytical framework 'adequate to the complexities of the global material-cultural flows in which the recorded music commodity is constituted and deconstituted' (Devine 2015, 367), but towards ecological critiques of their human and environmental costs. To attain both ends—analytical framework, politics—means crossing scales: moving analytically between the music commodity and raw materials, supply chains and global divisions of labour, between the vinyl LP or cassette tape and the plastics and petrochemical industries, between the MP3 format and electricity-devouring server farms. The effect is a 'topology of musical materiality in which the question of disposal is immanent in desire and manufacturing'

(Devine 2015, 370). Arguing similarly for the importance of addressing material mediation across scales, Grusin adds that we should not understand the ‘extractive industries for the minerals and other materials from which media devices are built ... simply as economic or industrial supports ... , but as mediations themselves’ (Grusin 2015, 145). Once again: this orientation is not simply about revealing ‘hidden’, large-scale forms of material mediation, nor about fuelling political responses to these epochal realities—although it is about both of these. It is also to produce better empirical accounts of the socio-material components of global musical assemblages (cf. Ong and Collier 2005), and means of explanation adequate to our times.

If we turn to subjectivity, aesthetic and affective processes, several authors in this collection raise the question of how such matters can be addressed when theorising music’s mediation. ANT’s concept of the actor sets itself against any notion of subjectivity that centres on intentionality. This is achieved through the retroactive definition of actors, thereby avoiding any assumption of the primacy of the intentional human subject in engendering action. In undermining the subject-object dualism, this can be a productive analytical maneuver. But in ANT it becomes the premise for evacuating entirely the question of how to theorise human subjectivity. Into this vacuum, however, steps a very particular, Machiavellian figure of the human (and nonhuman), evident in ANT’s fixation in its early studies of science on ‘victors’—the most ‘successful’ actors. This figure is repeatedly invoked accompanied by a surreal lexicon of militarist tropes: war, conflict, defeats, allies, winners, enlist, enroll, strength, territories, partitions and so on (Callon and Latour 1981). As Martin notes: Latour’s ‘scientists always seem to behave in the same way [They] are stripped down to ... simple forms— ... the competitive, aggressive, accumulating individual’ (Martin 1998, 27).

Two observations follow. On the one hand, despite the disavowal of intentionality, and even stripped of the Machiavellianism, Latour’s emphasis on actors, action, acts and agency retains through its links to American ethnomethodology a troubling echo of the sovereign individual subject of liberal humanism—a dubious universal. On the other hand, ANT chooses to ignore and offers no replacement for the long history of diverse frameworks concerned with theorising subjectivity, whether phenomenological, psychoanalytic, poststructuralist or connected to theories of ideology. When addressing music’s specificity, however, we have to ask: is it really sufficient to theorise the musical assemblage without reference to subjectivity (Cumming 1997), consciousness (Clarke and Clarke 2011) and their material correlate, the sensing body (Eidsheim 2015)? Even at the level of the perception of sound, embodied processes are formative mediators of sound waves—the bones of the skull, eardrum, hair cells of the inner ear and auditory nerve transducing acoustical energy into mechanical and electrical energy. And even physicalist theories of sonic perception that abjure theorising subjectivity in favour of embodied cognition are compelled to acknowledge the importance of imagination, emotion and memory in mediating (musical) sound (Grimshaw and Garner 2015).

As Kronengold and Cimini argue, and Haworth, Drott and Krogh suggest, a theory of mediation attuned to music’s specificity must include matters of aesthetic

experience, music's affective qualities and even intentionality within its scope—albeit having learned the lessons of those theories of the subject that have displaced sovereign intentionality from centre stage. Genre theory and how it decentres the musical subject while retaining a focus on aesthetic and affective processes would be one fertile guide (Brackett 2005; Born 2011; Drott 2013; Brackett 2016). Novel approaches to aesthetics that encompass mediation (Born 1991; Born 2017), including 'pleasure in mediation' (Guillory 2010, 357) and 'aesthetic investments ... directed far beyond the frame of the artwork' (Dolan 2015), would also be productive, as would engagement with ideas of affective objects (Navaro-Yashin 2009) and theories of musical affect predicated on the intimate bond between affect and mediation (Stirling 2019). Given that human actors' explanations are not infallible guides, since they may 'betray the workings of an ideology that has receded into the background of thought' (Piekut 2014, 210, fn 76), a concern with the articulation of subjectivity and ideology might also be fruitful. Another feature of music's specificity, in this light, would be to install questions of affect, aesthetics, subjectivity and ideology at the heart of theories of mediation. Surely, our contributors imply, it is possible to learn from posthumanism while retaining a concern with subjectivity (Born 2019). Must this be a zero-sum game? Why must we take sides in a post-dualist world?

A final contribution made by some of our authors to the existing state of mediation theories is to help clarify questions of music and ontology. Here a brief excursus is in order to compare recent anthropological debates and Latour's approach to ontology. Latour's thesis that 'we have never been modern' entails the creation of an analytical framework, as we outlined before, to ground his portrait of the ways in which scientific modernism depends upon practices of purification and mediation that result in the separation of nature from culture, subject from object and so on. Hence 'the link between the work of purification and the work of mediation had given birth to the moderns, but they credit only the former with their success!' (Latour 1993, 41). Latour makes his case by resorting to an ironic dualism, as when, citing Lévi-Strauss, he claims: 'the premoderns are all monist in the constitution of their nature-cultures' (1993, 41). Yet ultimately he is less interested in this dualism than in etching the contours of 'nonmodern worlds' (1993, 48). In the words of Amiria Henare et al, editors of a volume that precipitated anthropology's ontological turn: Latour 'has exposed the lie of our modernist leanings, and in so doing has offered a new ontology, which he would claim [as universal], ... *a new meta-theory*' (Henare, Holbraad, and Wastell 2007, 7, emphasis added).

The leading proponent of anthropology's ontological turn, Eduardo Viveiros de Castro, is engaged in quite a different exercise. His work stresses the radical alterity of Amerindian cosmologies, opposing a Western 'mononaturalist-multiculturalist' ontology to Amerindian 'multinaturalism', the latter embodied in what he calls 'Amerindian perspectivism'. Thus, Western

(multi)cultural relativism supposes a diversity of subjective and partial representations, each striving to grasp an external and unified nature ... Amerindian thought proposes the opposite: a representational or phenomenological unity

which is ... applied to a radically objective diversity. One single “culture”, multiple “natures”—one epistemology, multiple ontologies. (Viveiros de Castro 2012, 112)

Heated debates are ongoing about whether Viveiros de Castro’s stance results in an extreme and debilitating relativism (Bessire and Bond 2014), mistakes epistemology for ontology (Graeber 2015), or involves the projection of the Deleuzian concepts underlying his own analytical ontology (see the next paragraph) onto his Amerindian ethnographic subjects (Born 2010b, 232; Graeber 2015). Nonetheless, as David Graeber, a critic, puts it: one virtue of the ontological turn is to encourage ‘a stance of creative respect towards the object of ethnographic inquiry’ (Graeber 2015, 21).

At this point it is possible to draw out the differences between Latour’s position and that of the anthropologists. Latour offers an *analytical ontology* embodied in the premises of actor-network theory and its later variants. The evolution of his work shows him honing this ‘meta-theory’ and applying it to the worlds that are the focus of his enquiries; one result is his traffic in crude categories like moderns, premoderns and nonmoderns. In contrast, Viveiros de Castro and other anthropological exponents of the ontological turn are engaged in deciphering an array of diverse ontologies *among the peoples with whom they engage*. A central problem in this area has been the tendency to elide or confuse the two: analytical ontology and the ontology of the people/culture/music that are the focus of research. A related problem is that of the analyst projecting ‘an analytical ontology that occludes the ontologies of those we study’ (Born 2010b, 232), with the effect of obscuring or misidentifying their ontologies. This is the criticism made by Tsing when she charges ANT with failing to register cultural and ontological differences in the worlds it studies—even (or especially) between those well-known ‘moderns’, Japanese and American matsutake scientists (see 466–467 above). Returning to music: one of the achievements of how the question of ontology has been raised in relation to music has been to uncover and sensitise us to the existence of diverse ontologies of music—without this dissolving into an unproductive relativism. This process has entailed grasping the profound differences not just in how particular musics are represented and conceptualised—a theme of historical musicology, which has been especially drawn to epistemologies of music—but in how these musics are embodied, empractised and lived, notably through their material, corporeal, social and temporal mediations (Bohlman 1999; Born 2005). The result is to enhance our awareness of music’s global historical diversity (Irving 2016; Strohm 2018), fostering ‘creative respect towards the object of ethnographic [or historical] inquiry’.

In this issue, Steingo’s attempts to discern which theory—ANT? Harman?—best ‘fits’ with his Soweto material and his subjects’ ontology speaks to the problem of projection. To avoid that projection Steingo concludes by arguing for methodological pluralism: for adopting the theory—or analytical ontology—that captures optimally the musical scene at hand. For his part, Kane’s investigation of the ontology of the jazz standard focuses firmly on the jazz scene c. 1930–1960, and progress is achieved by bringing intramusical analysis together with an account of the music’s material and social mediations. His portrait of the ontology of standards therefore corrects the

tendency in music-philosophical accounts to ignore all but the intramusical, while suggesting that ethnomusicological and sociological accounts can no longer bracket the intramusical. Both writers attend to the ontology of the musical culture at issue. Both also indicate conceptually how mediation and ontology are articulated, since they are not the same (Born 2013, 141–8). Analysing the former (mediation) proceeds by way of teasing out—whether through ethnography or history—the salient forms of mediation manifest in a particular musical culture, mediations that compose a musical assemblage. Analysing the latter (the ontology of the musical culture being studied) proceeds by grasping through the evidence of language and practice (where the two will not be identical) how these diverse mediations are freighted ontologically: the relative primacy, prominence or, on the contrary, insignificance or denial of a particular mediation in the way the musical assemblage is experienced, inhabited and lived (cf. Born 2005, 26–28; Born 2013). Steingo draws out the ‘lived’ through the circulation of hard drives and the musical sounds and forms performed, Kane through the formative social mediation of a dispersed ‘community of listeners’ who, if left to ‘observable traces’, might be missing from the analysis. As Kane puts it, questioning the tendency to universalise any analytical ontology and project it onto different musics: ‘an ontological theory that automatically provides a rule for the discrimination and differentiation of musical works cannot be a theory that is sensitive to the actual performance practices of improvising musicians, arrangers, and performers’ (522).

Ontology is not, of course, an exclusive or ‘final’ orientation. It takes its place among the several methodological proposals we have identified arising from music’s specific demands on mediation theories. Yet we could do worse than end by transposing into music the following statement by anthropologists committed to the ontological turn, for whom it holds out the promise that anthropology could become ‘an attempt experimentally to “do” difference as such: [sustaining] the politics of... the possible, the “could be” ... [while generating] vantages from which established forms of thinking are put under relentless pressure ... and perhaps changed’ (Holbraad and Pedersen 2017, 297). Such a speculative ‘politics of the possible’ must not preclude the concrete and pressing concerns set out in this introduction both with analyzing existing forms of power operative within music and with elucidating and joining a variety of actual musical politics. Nevertheless, together, these suggestions provide suitable aspirations for the future of mediation theories in music, as they evolve in promising directions through contributions such as those gathered together in this *Contemporary Music Review*.

Acknowledgments

Our thanks to Kyle Devine, Charles Kronengold and Peter Nelson for comments on this introduction.

Disclosure Statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by H2020 European Research Council: [Grant Number 249598].

Notes on Contributors

Georgina Born is an anthropologist, a musician and Professor of Music and Anthropology at Oxford University. In 2018–19 she is a Fellow of the Institute of Advanced Studies at Aarhus University. She chairs the Culture, Media and Performance Section of the British Academy.

Andrew Barry is a political geographer, a social theorist and Professor of Human Geography at University College London, where he is Head of the Department of Geography.

Notes

- [1] MusDig received funding from the European Research Council Advanced Grants scheme under the EU's Seventh Framework Programme, ERC grant no. 249598. The MusDig programme was directed by Georgina Born and ran from 2010–15 based at the Faculty of Music, University of Oxford.
- [2] Two volumes containing the results of the MusDig programme will be published by Duke University Press. See also, inter alia: Eisenberg 2012; Eisenberg and Perullo 2014; Valiquet 2014; Baker 2015; Born and Devine 2015; Born and Haworth 2017; Durham 2017.
- [3] We take the concept of mediation to refer to the bidirectional transmission, translation and/or transformation of one relatum (eg musical sound) by another relatum (eg technologies, discourses, social relations, sites and spaces). Musical sound is both constituted by and enmeshed in specific constellations of mediations (Born 2019). The concept may initially be clarified by Latour's distinction between intermediaries, 'what transports meaning or force without transformation', and mediators, which 'transform, translate, distort, and modify the meaning or the elements they are supposed to carry' (Latour 2005, 39). Citing Hennion (Hennion 1991), Latour suggests that 'a mediator ... creates what it translates as well as the entities between which it plays the mediating role ... The layering of intermediaries is replaced by chains of mediators' (Latour 1993, 78).
- [4] And especially Bourdieu's magisterial work, *Distinction* (English translation 1984).
- [5] Suffice it, for now, to note that this reified account of the antagonist 'model' universalises now-archaic Durkheimian elements of French sociology. Moreover, the stretching of this influence to anthropology is questionable: British social anthropology owed certain debts to Durkheim, but this was true mainly from the 1940s to 1960s.
- [6] See Born 2015, drawing on Connolly 2011, for how a method attentive to contingency, emergence and non-linearity can aid in the avoidance of teleology in historical analysis.
- [7] Abduction is defined by C. S. Pierce (1934) as a special case of causal inference. It 'can be understood as a form of inference that, rightly or wrongly, draws the addressee or audience towards the existence of ... causal agencies from which the object or action derives' (Barry 2013, 84).
- [8] See also Barry 2013 on ANT and translation. Tsing goes on to suggest that Callon offers a corrective to his tendency to overlook 'gaps, misunderstandings, and omissions' when in a later text he attends to 'framing-overflow relations' (Tsing 2010, 65, note 2). In that essay Callon defines overflow as a byproduct of the framing of markets, suggesting 'the term "overflowing" to denote this impossibility of total framing. Any frame is necessarily subject to overflowing' (Callon 1998, 18). While this is an important methodological move when writing about how economics frames markets, it does not resolve the more general problem we are identifying: that of ANT's reduction of the complexities of social, cultural and material life to 'observable traces'.

- [9] For an earlier anthropological critique of the absence in Latour's oeuvre of a concern with how culture and cultural processes enter into science and technology, see Martin 1998.
- [10] This widely accepted methodological principle is concretised in the journal *History and Anthropology* (1984–present), which states among its founding convictions 'that the formerly dominant ahistorical perspectives within anthropology severely restricted interpretation and analysis' (<https://www.tandfonline.com/action/journalInformation?show=aimsScope&journalCode=ghan20>). See also James and Mills 2005; Ortner 2006; Hann 2012; Tsing 2017, and on music, Born, *Forthcoming*.
- [11] Yet the obvious questions raised by this definition are not addressed: how is difference to be defined or identified? When is a difference a difference, and according to which and whose criteria? As Valiquet comments in his paper, 'the question of which [thing] "makes a difference" in the present situation always brings questions of perspective, power, and scale into play' (661–662).
- [12] For a comprehensive account of Deleuze's contributions to this approach, see Stirling 2019, Ch. 1.
- [13] Kronengold's article in this issue might be taken as an example of history-as-ethnography.
- [14] Of course, rather than relations and mediations being equivalent, mediation is but a subset of the general category of relation—the latter taking a vast diversity of forms.
- [15] For Manuel DeLanda, whose account of assemblages has been especially influential on theories of music's mediation (Ochoa and Botero 2009; Born 2012), assemblages, like Strathern's relations, can also be differently scaled, individual assemblages becoming 'component parts of others which, in turn, become parts of even larger ones' (DeLanda 2006, 18).
- [16] It is amusing, and ironic, that just such a politics of attribution arises when Hicks (2010, 76–7) attributes innovative aspects of Gell's *Art and Agency* to his retention of Latourian ideas. Not only is there no reference to Latour in Gell's book, but Gell's Durkheimian and humanist concerns with cognition, intentionality and collective consciousness are utterly incompatible with Latour. It is as if the contingent convergence of two traditions of thought on the significance of objects in circulation, and how they relay social relations (conceived very differently), is overlooked by those intent on finding similarities. Kronengold touches in his paper on the politics of attribution, now akin to a politics of recognition, when stressing the ethical imperative of 'simply hearing a record's many stakeholders' (596): the need to trace 'who is credited, who's mentioned, who's addressed, who's represented' (593).
- [17] See Hesmondhalgh and Meier (2018) on the role of cross-sectoral competition and cooperation between these industries in driving successive waves of 'innovation' over the twentieth century. Each wave was 'imposed on consumers via marketing and the strategic withdrawal of "outdated" goods' (7).

ORCID

Georgina Born  <http://orcid.org/0000-0002-4056-9053>

Andrew Barry  <http://orcid.org/0000-0002-7632-9334>

References

- Adorno, T. W. 10 Nov. 1938. Letter to Benjamin. *Adorno and Benjamin: The Complete Correspondence, 1928–1940*. Cambridge, MA: H. Lonitz.
- Adorno, T. W. 2002. "On the Contemporary Relationship of Philosophy and Music." In *Essays on Music: Theodor W. Adorno*. Selected, with introduction, commentary, and notes by R.

- Leppert; new translations by S. H. Gillespie, 134–161. Berkeley, CA: University of California Press.
- Appadurai, A. 1986. *The Social Life of Things: Commodities in Cultural Perspective*. Cambridge: Cambridge University Press.
- Asdal, K., B. Brenna, and I. Moser, eds. 2007. *Technoscience: The Politics of Invention*. Oslo: Unipub.
- Baker, G. 2015. “Cumbia, Digitisation and Post-Neoliberalism in Buenos Aires’s Independent Music Sector.” *Popular Music* 34 (2): 175–196.
- Barry, A. 1998. “Modest Witnesses: Donna Haraway, Science, and International Relations.” *Millennium: Journal of International Studies* 27 (4): 869–883.
- Barry, A. 2013. “The Translation Zone: Between Actor-Network Theory and International Relations.” *Millennium: Journal of International Studies* 41 (3): 413–429.
- Barry, A., and D. Slater, eds. 2005. *The Technological Economy*. London: Routledge.
- Bates, E. 2012. “The Social Life of Musical Instruments.” *Ethnomusicology* 56 (3): 363–395.
- Baudry, J.-L. 1974. “Ideological Effects of the Basic Cinematographic Apparatus.” *Film Quarterly* 28 (2): 39–47. Translated by A. Williams.
- Bergh, M., T. DeNora, and M. Bergh. 2014. “Forever and Ever: Mobile Music in the Life of Young Teens.” *The Oxford Handbook of Mobile Music Studies* 1: 317.
- Berliner, D., L. Legrain, M. van de Port. 2013. “Bruno Latour and the Anthropology of the Moderns.” *Social Anthropology* 21 (4): 435–447.
- Bessire, L., and D. Bond. 2014. “Ontological Anthropology and the Deferral of Critique.” *American Ethnologist* 41 (3): 440–456.
- Bohman, P. 1999. “Ontologies of Music.” In *Rethinking Music*, edited by N. Cook, and M. Everist, 17–34. Oxford: Oxford University Press.
- Born, G. 1987. “On Modern Music Culture: On Shock, Pop and Synthesis.” *New Formations* 2: 51–78.
- Born, G. 1991. “Music, Modernism and Signification.” In *Thinking Art: Beyond Traditional Aesthetics*, edited by A. Benjamin, and P. Osborne, 157–176. London: Institute of Contemporary Arts.
- Born, G. 1995. *Rationalizing Culture: IRCAM, Boulez, and the Institutionalization of the Musical Avant-Garde*. Berkeley, CA: University of California Press.
- Born, G. 2005. “On Musical Mediation: Ontology, Technology and Creativity.” *Twentieth Century Music* 2 (1): 7–36.
- Born, G. 2010a. “The Social and the Aesthetic: For a Post-Bourdieuian Theory of Cultural Production.” *Cultural Sociology* 4 (2): 1–38.
- Born, G. 2010b. “On Tardean Relations: Temporality and Ethnography.” In *The Social After Gabriel Tarde: Debates and Assessments*, edited by M. Candea, 232–249. London: Routledge.
- Born, G. 2011. “Music and the Materialization of Identities.” *Journal of Material Culture* 16 (4): 1–13.
- Born, G. 2012. “Music and the Social.” In *The Cultural Study of Music*, edited by M. Clayton, T. Herbert, and R. Middleton, 261–274. London, Routledge.
- Born, G. 2013. “Music: Ontology, Agency, and Creativity.” In *Distributed Objects: Meaning and Mattering After Alfred Gell*, edited by L. Chua, and M. Elliot, 130–154. Oxford: Berg.
- Born, G. 2015. “Making Time: Temporality, History, and the Cultural Object.” *New Literary History* 46 (3): 361–386.
- Born, G. 2017. “After Relational Aesthetics: Improvised Music, the Social, and (Re)Theorizing the Aesthetic.” In *Improvisation and Social Aesthetics*, edited by G. Born, E. Lewis, and W. Straw, 33–58. Durham, NC: Duke University Press.
- Born, G. 2019. “On Nonhuman Sound—Sound as Relation.” In *Sound Objects*, edited by R. Chow, and J. Steintrager, 185–207. Durham, NC: Duke University Press.
- Born, G. *Forthcoming*. “On Genre, History and Invention in the Analysis of Creative Processes in Music.” In *The Oxford Handbook of the Creative Process in Music*, edited by N. Donin. Oxford: Oxford University Press.

- Born, G., and K. Devine. 2015. "Music Technology, Gender, and Class: Digitization, Educational and Social Change in Britain." *Twentieth Century Music* 12 (2): 135–172.
- Born, G., and K. Devine. 2016. "Introduction: Gender, Creativity and Education in Digital Musics and Sound Art." *Contemporary Music Review* 35 (1): 1–20.
- Born, G., and C. Haworth. 2017. "From Microsound to Vaporwave: Internet-Mediated Musics, Online Methods, and Genre." *Music and Letters* 98 (4): 601–647.
- Bowen, J. A. 1993. "The History of Remembered Innovation: Tradition and its Role in the Relationship between Musical Works and their Performances." *The Journal of Musicology* 11 (2): 139–173.
- Brackett, D. 2005. "Questions of Genre in Black Popular Music." *Black Music Research Journal* 25 (1/2): 73–92.
- Brackett, D. 2016. *Categorizing Sound: Genre and Twentieth century Popular Music*. Oakland, CA: University of California Press.
- Callon, M. 1984. "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay." *The Sociological Review* 32 (Suppl 1): 196–233.
- Callon, M. 1998. "Introduction: The Embeddedness of Economic Markets in Economics." *The Sociological Review* 46 (S1): 1–57.
- Callon, M. 1998. *The Laws of the Markets*. Oxford: Blackwell.
- Callon, M., and B. Latour. 1981. "Unscrewing the Big Leviathan: How Actors Macro-Structure Reality and How Sociologists Help Them to Do So." In *Advances in Social Theory and Methodology: Toward an Integration of Micro- and Macro-Sociologies*, edited by K. Knorr-Cetina and A. V. Cicourel, 277–303. London: Routledge & Kegan Paul.
- Carrithers, M., M. Candea, K. Sykes, M. Holbraad, and S. Venkatesan. 2010. "Ontology is Just Another Word for Culture." *Critique of Anthropology* 30 (2): 152–200.
- Clarke, D., and E. Clarke. 2011. *Music and Consciousness: Philosophical, Psychological, and Cultural Perspectives*. Oxford: Oxford University Press.
- Clarke, E., N. Cook, B. Harrison, and P. Thomas. 2005. "Interpretation and Performance in Bryn Harrison's être-temps." *Musicae Scientiae* 9 (1): 31–74.
- Connolly, W. E. 2011. *A World of Becoming*. Durham, NC: Duke University Press.
- Cook, N. 2013. *Beyond the Score: Music as Performance*. Oxford: Oxford University Press.
- Cumming, N. 1997. "The Subjectivities of 'Erbarne Dich'." *Music Analysis* 16 (1): 5–44.
- De Laet, M., and A. Mol. 2000. "The Zimbabwe Bush Pump: Mechanics of a Fluid Technology." *Social Studies of Science* 30 (2): 225–263.
- DeLanda, M. 2006. *A New Philosophy of Society: Assemblage Theory and Social Complexity*. London: Continuum.
- Deleuze, G. 1987. "Preface to English Language Edition." In *Dialogues*, edited by G. Deleuze, and C. Parnet, vii–x. London: Athlone.
- DeNora, T. 1999. "Music as a Technology of the Self." *Poetics* 27 (1): 31–56.
- DeNora, T. 2000. *Music in Everyday Life*. Cambridge: Cambridge University Press.
- DeNora, T. 2003. *After Adorno: Rethinking Music Sociology*. Cambridge: Cambridge University Press.
- DeNora, T. 2014. *Making Sense of Reality: Culture and Perception in Everyday Life*. London: Sage.
- Devine, K. 2015. "Decomposed: A Political Ecology of Music." *Popular Music* 34 (3): 367–389.
- Devine, K., and A. Boudreault-Fournier, eds. 2020. *Audible Infrastructures: Music, Sound, Media*. Oxford: Oxford University Press.
- Dewey, J. 1988. *Human Nature and Conduct*. Carbondale, IL: Southern Illinois University Press.
- Dolan, E. I. 2015. "Musicology in the Garden." *Representations* 132 (1): 88–94.
- Drott, E. 2013. "The End(s) of Genre." *Journal of Music Theory* 57 (1): 1–45.
- Durham, B. 2017. "Regulating Dissemination: A Comparative Digital Ethnography of Licensed and Unlicensed Spheres of Music Circulation." DPhil thesis, University of Oxford.

- Eidsheim, N. S. 2015. *Sensing Sound: Singing and Listening as Vibrational Practice*. Durham, NC: Duke University Press.
- Eisenberg, A. 2012. "The Kenyan Recording Industry in the Digital Age". <https://hcommons.org/deposits/objects/hc:13474/datastreams/CONTENT/content>
- Eisenberg, A. J., and A. Perullo. 2014. "Musical Property Rights Regimes in Kenya and Tanzania After TRIPs". In *Sage Handbook of Intellectual Property*, edited by M. David and D. Halbert, 148–164. London: Sage.
- Foucault, M. 1977. "Le jeu de Michel Foucault" (interview with D. Colas, A. Grorichard, G. Le Gaufey, J. Livi, G. Miller, J Miller, J-A Miller, C. Millor, G. Wajeman, originally in *Ornicar? Bulletin périodique de champ freudien*, 10, juillet 1977, pp. 62–93). In *Dits et Ecrits, vol. III*, edited by M. Foucault, D. Defert, and F. Ewald, 298–329. Paris: Gallimard.
- Foucault, M. 1984. "What is an Author?". In *The Foucault Reader*, edited by P. Rabinow, 101–120. Harmondsworth: Penguin.
- Frith, S. 1986. "Art Versus Technology: The Strange Case of Popular Music." *Media, Culture & Society* 8 (3): 263–279.
- Gaonkar, D., and E. Povinelli. 2003. "Technologies of Public Forms: Circulation, Transfiguration, Recognition." *Public Culture* 15 (3): 385–398.
- Gell, A. 1992. *The Anthropology of Time: Cultural Constructions of Temporal Maps and Images*. Oxford: Berg.
- Gell, A. 1998. *Art and Agency: An Anthropological Theory*. Oxford: Oxford University Press.
- Gibson-Graham, J. K. 1997. "The End of Capitalism (As We Knew it): A Feminist Critique of Political Economy." *Capital & Class* 21 (2): 186–188.
- Gomart, E., and A. Hennion. 1999. "A Sociology of Attachment: Music Amateurs, Drug Users." In *Actor Network Theory and After*, edited by J. Law and J. Hassard, 220–247. Oxford: Blackwell.
- Goodwin, A. 1988. "Sample and Hold: Pop Music in the Digital Age of Reproduction." *Critical Quarterly* 30 (3): 34–49.
- Goodwin, A. 1992. *Dancing in the Distraction Factory: Music Television and Popular Culture*. Minneapolis, MN: University of Minnesota Press.
- Graeber, D. 2015. "Radical Alterity is Just Another Way of Saying 'Reality': A Reply to Eduardo Viveiros de Castro." *HAU: Journal of Ethnographic Theory* 5 (2): 1–41.
- Grimshaw, M., and T. Garner. 2015. *Sonic Virtuality: Sound as Emergent Perception*. New York: Oxford University Press.
- Grusin, R. 2015. "Radical Mediation." *Critical Inquiry* 42 (1): 124–148.
- Guillory, J. 2010. "Genesis of the Media Concept." *Critical Inquiry* 36 (2): 321–362.
- Hann, C. 2012. "Big Revolutions, Two Small Disciplines, and Socialism." In *Archaeology and Anthropology: Past, Present and Future*, edited by D. Shankland, 19. London: Berg.
- Haraway, D. 1985. "A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s." *Socialist Review* 15 (2): 65–107.
- Haraway, D. 1997. "Modest_Witness@Second_Millennium.FemaleMan@_Meets_OncoMouseTM." In *Modest_Witness@Second_Millennium.FemaleMan@_Meets_OncoMouseTM: Feminism and Technoscience*, edited by D. Haraway, 23–45. New York: Routledge.
- Harman, G. 2010. *Prince of Networks: Bruno Latour and Metaphysics*. Melbourne: re.press.
- Harman, G., and L. Kimbell. 2013. "The Object Strikes Back: An Interview with Graham Harman." *Design and Culture* 5 (1): 103–117.
- Hebdige, D. 1987. *Cut'n'mix: Culture, Identity, and Caribbean Music*. London: Routledge.
- Henare, A., Martin Holbraad, and Sari Wastell, eds. 2007. *Thinking through Things: Theorising Artefacts Ethnographically*. London and New York: Routledge.
- Hennion, A. 1981. *Les professionnels du disque: une sociologie des variétés*. Paris: AM Métailié.
- Hennion, A. 1983. "The Production of Success: An Anti-Musicology of the Pop Song." *Popular Music* 3: 159–193.

- Hennion, A. 1989. "An Intermediary Between Production and Consumption: The Producer of Popular Music." *Science, Technology, & Human Values* 14 (4): 400–424.
- Hennion, A. 1991. "La médiation musicale." Doctoral thesis, Ecole des Hautes Etudes en Sciences Sociales.
- Hennion, A. 1993. *La Passion musicale: une sociologie de la médiation*. Paris: Métailié.
- Hennion, A. 2003. "Music and Mediation: Toward a New Sociology of Music." In *The Cultural Study of Music: A Critical Introduction*, edited by M. Clayton, T. Herbert, and R. Middleton, 80–91. London: Routledge.
- Hennion, A. 2007. "Those Things That Hold Us Together: Taste and Sociology." *Cultural Sociology* 1 (1): 97–114.
- Hennion, A. 2016. "From ANT to Pragmatism: A Journey with Bruno Latour at the CSI." *New Literary History* 47 (2): 289–308.
- Hennion, A., and C. Meadel. 1986. "Programming Music: Radio as Mediator." *Media, Culture & Society* 8 (3): 281–303.
- Hesmondhalgh, D., and L. Meier. 2018. "What the Digitalisation of Music Tells Us about Capitalism, Culture and the Power of the Information Technology Sector." *Information, Communication & Society* 21 (11): 1555–1570.
- Hicks, D. 2010. "The Material-Culture Turn: Event and Effect." In *The Oxford Handbook of Material Culture Studies*, edited by D. Hicks and M. Beaudry, 25–98. Oxford: Oxford University Press.
- Hodder, I. 2014. "The Entanglements of Humans and Things: A Long-Term View." *New Literary History* 45 (1): 19–36.
- Holbraad, M., and M. A. Pedersen. 2017. *The Ontological Turn: An Anthropological Exposition*. Cambridge: Cambridge University Press.
- Irving, D. 2016. "Music and Empire." *The Encyclopedia of Empire* (online). John Wiley. <https://onlinelibrary.wiley.com/doi/abs/10.1002/9781118455074.wbcoe181>
- James, W. 1904. "A World of Pure Experience." *The Journal of Philosophy, Psychology and Scientific Methods* 1 (20): 533–543.
- James, W., and D. Mills. 2005. "Introduction: From Representation to Action in the Flow of Time." In *The Qualities of Time: Anthropological Approaches*, edited by W. James, and D. Mills, 1–18. Oxford: Berg.
- Jameson, F. 1981. *The Political Unconscious: Narrative as a Socially Symbolic Act*. Ithaca, NY: Cornell University Press.
- Jay, M. 1984. *Adorno*. London: Fontana.
- Jones, S. 1990. "The Intro and the Outro: Technology and Popular Music Practice." *Popular Music & Society* 14 (1): 1–6.
- Jones, S. 1992. *Rock Formation: Music, Technology, and Mass Communication*. London: Sage Publications.
- Kealy, E. R. 1979. "From Craft to Art: The Case of Sound Mixers and Popular Music." *Sociology of Work and Occupations* 6 (1): 3–29.
- Kember, S., and J. Zylinska. 2012. *Life After New Media: Mediation as a Vital Process*. Cambridge, MA: The MIT Press.
- Kramer, J. 1981. "New Temporalities in Music." *Critical Inquiry* 7 (3): 539–556.
- Laing, D. 1985. *One Chord Wonders: Power and Meaning in Punk Rock*. Buckingham: Open University Press.
- Larkin, B. 2008. *Signal and Noise: Media, Infrastructure, and Urban Culture in Nigeria*. Durham, NC: Duke University Press.
- Latour, B. 1987. *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press.
- Latour, B. 1988. "The Politics of Explanation: An Alternative." *Knowledge and Reflexivity: New Frontiers in the Sociology of Knowledge* 10: 155–176.

- Latour, B. 1993. *We Have Never Been Modern*. Cambridge, MA: Harvard University Press.
- Latour, B. 2003. "What if We Talked Politics a Little?" *Contemporary Political Theory* 2 (2): 143–164.
- Latour, B. 2004. "Why Has Critique Run Out of Steam? From Matters of Fact to Matters of Concern." *Critical Inquiry* 30 (2): 225–248.
- Latour, B. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
- Latour, B. 2010. *The Making of law: An Ethnography of the Conseil d'État*. Cambridge: Polity.
- Latour, B. 2013a. *An Inquiry into Modes of Existence*. Cambridge, MA: Harvard University Press.
- Latour, B. 2013b. *Rejoicing: Or the Torments of Religious Speech*. Cambridge: Polity.
- Latour, B. 2014. "Agency at the Time of the Anthropocene." *New Literary History* 45 (1): 1–18.
- Latour, B., and P. Weibel. 2005. *Making Things Public: Atmospheres of Democracy*. Cambridge, MA: The MIT Press.
- Law, J. 1999. "After ANT: Complexity, Naming and Topology." *The Sociological Review* 47 (1_suppl): 1–14.
- Leppert, R. 2002. "Introduction." In *Essays on Music: Theodor W. Adorno*. Selected, with introduction, commentary, and notes by R. Leppert; new translations by S. H. Gillespie, 1–83. Berkeley, CA: University of California Press.
- Ligeti, G. 1983. *György Ligeti in Conversation*. London: Eulenberg.
- Lury, C. 2016. "Postscript: Beside(s) the Empirical." In *Affective Methodologies*, edited by B. T. Knudsen, and C. Stage, 237–246. London: Palgrave Macmillan.
- Maniglier, P. 2014. "A Metaphysical Turn? Bruno Latour's An Inquiry into Modes of Existence." *Radical Philosophy* (187): 37–44.
- Martin, E. 1998. "Anthropology and the Cultural Study of Science." *Science, Technology, & Human Values* 23 (1): 24–44.
- McBarnet, D. J. 1983. *Conviction: Law, the State and the Construction of Justice*. London: Macmillan.
- Mitchell, T. 2002. *Rule of Experts: Egypt, Techno-Politics, Modernity*. Berkeley, CA: University of California Press.
- Munn, N. D. 1992. "The Cultural Anthropology of Time: A Critical Essay." *Annual Review of Anthropology* 21, 93–123.
- Navaro-Yashin, Y. 2009. "Affective Spaces, Melancholic Objects: Ruination and the Production of Anthropological Knowledge*." *Journal of the Royal Anthropological Institute* 15 (1): 1–18.
- Ochoa, A. M., and C. Botero. 2009. "Notes on Practices of Musical Exchange in Colombia." *Popular Communication* 7 (3): 158–168.
- Ong, A., and S. J. Collier. 2005. *Global Assemblages: Technology, Politics, and Ethics as Anthropological Problems*. Oxford: Blackwell.
- Ortner, S. B. 2006. *Anthropology and Social Theory: Culture, Power, and the Acting Subject*. Durham, NC: Duke University Press.
- Paddison, M. 1993. *Adorno's Aesthetics of Music*. Cambridge: Cambridge University Press.
- Peters, J. D. 2015. "Infrastructuralism: Media as Traffic between Nature and Culture." In *Traffic: Media as Infrastructures and Cultural Practices*, edited by M. Näser-Lather and C. Neubert, 31–49. Leiden: Brill Rodopi.
- Piekut, B. 2014. "Actor-Networks in Music History: Clarifications and Critiques." *Twentieth Century Music* 11 (2): 191–215.
- Pierce, C. S. 1934. "Pragmatism and Abduction." In *The Collected Papers of Charles Sanders Peirce*, edited by C. Hartstorn and P. Weiss, Vol. 5. Cambridge, MA: Harvard University Press.
- Pinch, T., and K. Bijsterveld. 2004. "Sound Studies: New Technologies and Music." *Social Studies of Science, Special Issue on Sound Studies: New Technologies and Music* 34 (5): 635–648.
- Pinch, T., and K. Bijsterveld. 2012. *The Oxford Handbook of Sound Studies*. Oxford: Oxford University Press.

- Pinney, C. 2005. "Things Happen: Or, From Which Moment Does That Object Come?" In *Materiality*, edited by D. Miller, 256–272. Durham, NC: Duke University Press.
- Pottage, A. 2012. "The Materiality of What?" *Journal of Law and Society* 39 (1): 167–183.
- Rose, T. 1994. *Black Noise: Rap Music and Black Culture in Contemporary America*. Middletown, CT: Wesleyan University Press.
- Sansi, R. 2013. "The Latour Event: History, Symmetry and Diplomacy." *Social Anthropology* 21 (4): 448–461.
- Sterne, J. 2012. *MP3: The Meaning of a Format*. Durham, NC: Duke University Press.
- Sterne, J., and J. Leach. 2005. "The Point of Social Construction and the Purpose of Social Critique." *Social Epistemology* 19 (2-3): 189–198.
- Stirling, C. 2019. "Orbital Transmissions: Affect and Musical Public-Making in London." DPhil thesis, University of Oxford.
- Strathern, M. 1995. *The Relation: Issues in Complexity and Scale*. Cambridge: Prickly Pear Press.
- Strathern, M. 2018. "Afterword: Becoming Enlightened about Relations." In *An Anthropology of the Enlightenment: Moral Social Relations Then and Today*, edited by N. Rapport and H. Wardle, 171–188. London: Bloomsbury.
- Straw, W. 2000. "Exhausted Commodities: The Material Culture of Music." *Canadian Journal of Communication* 25 (1): 175–185.
- Straw, W. 2010. "The Circulatory Turn." In *The Wireless Spectrum: The Politics, Practices and Poetics of Mobile Media*, edited by B. Crow, M. Longford and K. Sawchuk, 17–28. Toronto: University of Toronto Press.
- Straw, W. 2012. "Music and Material Culture." In *The Cultural Study of Music*, edited by M. Clayton, T. Herbert, and R. Middleton, 227–236. London: Routledge.
- Strohm, R., ed. 2018. *Studies on a Global History of Music: A Balzan Musicology Project*. London and New York: Routledge.
- Théberge, P. 1989. "The 'Sound' of Music: Technological Rationalization and the Production of Popular Music." *New Formations* 8: 99–111.
- Tomlinson, G. 2013. "Evolutionary Studies in the Humanities: The Case of Music." *Critical Inquiry* 39 (4): 647–675.
- Toop, D. 1984. *The Rap Attack: African Jive to New York Hip Hop*. Boston, MA: South End Press.
- Tsing, A. 2010. "Worlding the Matsutake Diaspora, Or, Can Actor–Network Theory Experiment with Holism?" In *Experiments in Holism: Theory and Practice in Contemporary Anthropology*, edited by T. Otto, and N. Bubandt, 47–66. Oxford: Wiley-Blackwell.
- Tsing, A. 2017. "What is History? Or, The Life and Times of the Water Hyacinth." The Marett Lecture 2017, Institute of Social and Cultural Anthropology, University of Oxford.
- Valiquet, P. 2014. "'The Digital is Everywhere': Negotiating the Aesthetics of Digital Mediation in Montreal's Electroacoustic and Sound Art Scenes." DPhil thesis, University of Oxford.
- Veal, M. 2007. *Dub: Soundscapes and Shattered Songs in Jamaican Reggae*. Middletown, CT: Wesleyan University Press.
- Viveiros de Castro, E. B. 2012. *Cosmological Perspectivism in Amazonia and Elsewhere*. HAU Masterclass Series, Vol. 1. https://monoskop.org/images/e/e5/Viveiros_de_Castro_Eduardo_Cosmological_Perspectivism_in_Amazonia_and_Elsewhere.pdf
- Williams, R. 1974. *Television: Technology and Cultural Form*. London and New York: Routledge.
- Zak, A. 2001. *The Poetics of Rock: Cutting Tracks, Making Records*. Berkeley, CA: University of California Press.