On Style in Electroacoustic Music

ANDREW HUGILL

Bath Spa University, Centre for Creative Computing, Corsham Court Campus, Corsham, Chippenham, SN13 0BZ, UK
Email: a.hugill@bathspa.ac.uk

This article argues for the habilitation of a concept of style in electroacoustic music. It surveys the reasons for the neglect of style, looking in particular at the modernist embedding of electroacoustic theory and the consequences of postmodern genre formations. It considers the extent to which academic understanding of the materiality of music has moved from the analysis of sound to the analysis of media. It offers a critique of notions of sonic inclusivity and the differentiation of electroacoustic music from instrumental music.
It emphasises the importance of comparative analysis and understanding the elements of style in electroacoustic music. It critically examines a number of techniques and frameworks for stylistic analysis. It concludes by encouraging the electroacoustic music community to engage more fully with notions of style.

1. INTRODUCTION

This article argues for the habilitation of a concept of style in electroacoustic music. Understanding style would tell us much about electroacoustic music practice: its composition, reception, cultural and historical position, in fact all the things that set it apart from other forms of music. Through a focus on style, we will be able to detect the patterns and variations that situate it within various fields, be they artistic, philosophical, historical, geographical, societal, ethnographical and so on. Stylistic analysis would meaningfully expose the artistic fingerprints of individual composers or groups of composers. The advance of globalisation, which has been so unfettered during the past few decades, would be subjected to a more detailed critical scrutiny.

However, style seems to be a topic that is largely ignored by electroacoustic music studies. If a full understanding of why that is the case can be achieved, then a flowering of musical appreciation of electroacoustic works could be the result. Knowing about style will offer readers and listeners a coherent framework through which to approach electroacoustic music itself. This has proved to be one of the major challenges for a music that is widely perceived as difficult. The constant blandishments to 'open your ears' and to accept sounds and their transformation in place of notes have often resulted in an oppressive atmosphere for audiences, who may feel inadequate to the task before them and disappointed when they make the effort.

2. GENRE FORMATION

> Few genres in Western music have leapt fully fledged from the heads of their creators. (Emmerson 1986: 1)

As electroacoustic music has steadily moved from a marginal position as a form of hybrid practice somewhere between *elektronische Musik* and musique concrète (Manning 2013: 203 *et seq*.) to incorporate 'any music in which electricity has had some involvement in sound registration and/or production' (Landy 1999: 61), so genres have begun to appear everywhere, like fake Georgian facades in the remnants of a 1960s concrete jungle. In flagrant contradiction of Simon Emmerson's opening premise in *The Language of Electroacoustic Music*, genres nowadays tend to form and dissolve at a dizzying rate.[1] This challenges some of the fundamental precepts of electroacoustic music, undermining its supposed neutrality and its global ambitions (Truax 2008: 104; Wishart 2008: 137). The way the electroacoustic concept has been fashioned over the decades (including in the pages of this esteemed journal) is contributing to its own disintegration.

For most people, the *genre* of electroacoustic music is recognisably different from electronic dance music, or soundscape, or sonic art. The term 'electroacoustic' is used (sometimes interchangeably with 'acousmatic') to refer to a tradition of predominantly academic composition that has blazed a trail of innovation but which nevertheless remains largely out of reach to the wider public, despite the promises made by digital technology to place sophisticated sound manipulation tools in the hands of everyone. The jargon of the electroacoustic genre ironically self-defines its own exclusivity: 'ironically' because its intention is exactly the opposite. Terms such as 'acousmatic', 'spectromorphology', or indeed 'electroacoustic' itself, set out with universalising aims, but end up defining a narrow field of practice and theory.

Now, there is no reason to be unduly concerned about the fate of terminologies: words come and

[1]The Internet provides numerous musical genre generators; for example, the *Musical Genre Name Generator™* at SnarkMarket (2007). The humour of these generators resides in the fact that their results are by no means as improbable as they initially sound.

Organised Sound **21**(1): 4–14 © Cambridge University Press, 2016. doi:10.1017/S1355771815000333

https://doi.org/10.1017/S1355771815000333 Published online by Cambridge University Press

words go. Indeed, it is one of the pleasures of language that it is seen to evolve to reflect the character of the times and the changing world around us. People will continue to make 'electroacoustic' music regardless of what it is called and genre classification is largely a ruse by commercial interests to increase sales of whatever seems to be the hottest property of the moment. However, the commitment of the practitioners and analysts of electroacoustic music to these terms is more than just a matter of semantics. They embody a whole set of cultural assumptions, musical and practical conventions, aesthetic and technical values.

'Acousmatic', for example, purportedly describes a listening situation which could in theory be created anywhere but which, just like a laboratory, requires specialist equipment and a certain enlightened attitude on the part of those sharing in the experiments. The poetic supposedly transcends the medium in acousmatic music. By suppressing the visual apparatus of live performance in order to focus exclusively upon the sounds themselves, the enlightened listeners[2] are able to savour in full the beauties of *écoute reduite* (reduced listening).[3] Yet the medium is paradoxically here at its most present, usually in the form of an unseen and highly sophisticated loudspeaker configuration. Acousmatic music has become a genre, defined by a common sense of purpose among its practitioners and underpinned by a set of values that are both aesthetic and technical:

> Pythagoras' curtain is not enough to discourage our curiosity about causes, to which we are instinctively, almost irresistibly, drawn. But the repetition of the physical signal, which recording makes possible, assists us here in two ways: by exhausting this curiosity, it gradually brings the sonorous object to the fore as a perception worthy of being observed for itself; on the other hand, as a result of ever more attentive and more refined listenings, it progressively reveals to us the richness of this perception. (Schaeffer 2004: 78)

'Spectromorphology' digs deeper into the technical means by which this perceptual richness may be brought about and musically exploited. The word apparently describes nothing more than the shape of spectra, but has come to denote a particular kind of musical composition whose mannerisms are so well known as to be clichés. These begin with a palette of 'real world' sounds that are subjected to an array of spatial effects, diffusion practices, processing techniques and so on. As hundreds of PhD students emulate the methods and practices of the masters of spectromorphological music, so the lexicon of its gestures has become solidified: praiseworthy, prize-worthy and instantly recognisable.

'Electroacoustic', the grandparent of such genre-defining/genre-resisting terms, describes a collision between the electronic and the acoustic that is eel-slippery in its ambiguity. It began life as an engineering term: an electro-acoustic transducer is either a transmitter that converts electricity into sound or a receiver that changes acoustic energy into electrical signals. This solid-state device became a metaphor for a kind of music that could mix electronic and acoustic impulses, whether live or pre-recorded. The omnipresent microphones and loudspeakers that embody this concept define the medium in much the same way as two violins, viola and cello define the medium known as 'string quartet'.

So, we arrive at a situation in the twenty-first century where one still encounters works for 'instrument and tape', since the recording medium is actually so unimportant as to require no further signal than that of its inclusion, yet the music is called 'electroacoustic' because of that very presence. Composers categorise their works as electroacoustic (as distinct from orchestral or instrumental) but also focus this into a subset of a larger vision. This is presumably because traditional descriptors reflect the detail of the instrumental combinations or number of performers, whereas this is much harder to specify in electroacoustic music. Even a description as precise as 'octophonic sound system' fails to capture the full detail of speaker locations or spatialisation set up, and implies a standardisation which is anything but agreed. There are as many octophonic configurations as there are electroacoustic arrays, each of which tends to embody its own particular style of music. Thus the BEAST system in Birmingham, UK, has a different configuration from the Acousmonium in Paris, France. Works may be performed on either system, but they differ in character when that happens.[4] There is an element of interpretation of performance *style* in these differences that is not simply a result of variations in the configurations of speaker systems or the physical properties of the concert hall, but rather the deep embedding of a set of historical and aesthetic cultural practices.

3. ELECTROACOUSTIC PERFORMANCE STYLE

Perhaps the nearest historical equivalent to this situation is the position of the organ in the seventeenth and eighteenth centuries. The various non-standard tunings that were commonly in use at that time meant that music which worked well in one particular church could sound markedly different when played elsewhere. This lack of standardisation produced much

[2]Pythagoras, according to Iamblichus, divided his followers into the *akousmatikoi* (listeners) and the *mathematikoi* (teachers).

[3]'Pierre Schaeffer gave the name *reduced listening* to the listening mode that focuses on the traits of the sound itself, independent of its cause and its meaning' (Chion 1994: 29).

[4]Nor is the acousmatic concert the only electroacoustic performance situation. Several writers have challenged the move away from radio and fixed media towards the values and rituals of the concert hall (e.g. Radford 2014, and elsewhere).

https://doi.org/10.1017/S1355771815000333 Published online by Cambridge University Press

local variation, which hampered the wider spread of musical communication. The consequent adoption of equal temperament, which was heralded by Bach (amongst others) nevertheless met with lingering resistance. In England, for example, S. S. Wesley famously refused to use equal temperament until the middle of the nineteenth century. His organ works consequently contain some harmonically ambiguous passages that are clearly intended for another tuning system (Thistlethwaite and Vebber 1998: 51).

Part of the pleasure of attending an acousmatic concert is the observation of the way in which the sound system is configured and used. This focus on the means of delivery may even extend as far as the music itself, giving rise to a kind of 'technological listening' identified by Denis Smalley: 'Technological listening occurs when a listener "perceives" the technology or technique behind the music rather than the music itself, perhaps to such an extent that true musical meaning is blocked' (Smalley 1997: 110). This kind of listening appears not only at the level of the use of any particular software package or sound processing technique, but also in the way the diffusion is handled and the speakers are arranged. Spatialisation techniques are often the focus of this kind of attention, and the musical intentions of a particular gesture may be lost in favour of the search for technical novelty.

Lack of standardisation means that an acousmatic work may sound very different when performed on a sound system other than the one for which it was conceived. Part of the skill in sympathetic performance of such works therefore relies on an understanding of the style of the music. The musical style is embodied not just in the content of the soundfiles, but also in the performance practice of electroacoustic music. Performance interpretation is a real skill in this field that extends well beyond the generally perceived fader adjustments. The sound diffusion must accurately reflect the intentions, or rather the perceived intentions, of the creator(s) of the music. But how are these intentions understood? The appreciation of musical style derives from the specificity of the electroacoustic content, its gestures and methods, its techniques and aesthetics. Set against this is the aspiration to a universal 'umbrella' term discussed earlier. Herein lies the elusiveness: 'electroacoustic' wants to be as specific as 'string quartet', but simultaneously wants to contain *everything.* This contradiction, coupled with its general unintelligibility, is one reason for its neglect of style as a concept.

4. THE MYTH OF INCLUSIVITY

The desire to include everything in electroacoustic music extends to the sounds themselves. There is a myth, which is repeated time and again in the literature, that electroacoustic music may use *any sound you can imagine.* Of course, that is hypothetically possible, just as tonal music could in theory use any pitches at any time. But the reality is that electroacoustic music is highly selective about both the sounds it chooses to incorporate and the processes to which they are subjected. One may even go so far as to observe a consistent lingua franca of such sonic manipulation, which changes at a fairly slow rate as the collective musical language advances. The plain fact is that the vast majority of sounds offer little interest to the electroacoustic composer. Even Cage eventually seemed to accept this, finding mechanisms to exclude unwanted sounds in works such as *Roaratorio* (1979), which used all the sonic and musical references in *Finnegans Wake* as a filter, or homing in on delightfully unpredictable sounds with evocative power in *Inlets* (1977) for amplified water inside conch shells. Natural sounds vie with urban sounds to make their way onto the composer's palette, but an unidentified sound with no distinguishing sonic or rhetorical characteristics is most likely to get rejected. What composer genuinely wants to work with unwanted sounds? Even those who supposedly fetishise such practices, such as the noise and glitch composers, are rightly very careful about their choices.

The myth of inclusivity has profound consequences for electroacoustic music analysis, which has moved away from stylistic considerations in part because it appears that the potential presence of any sound renders the notion of style meaningless. Yet all the analyses that have so far been done are of *pieces*: bounded objects whose sonic selections negate the myth of inclusivity through their exclusivity. However, it is not the choice of sounds, but the *way that they are treated* that constitutes the style. When one puts together analyses of several pieces, one observes recurring patterns relating to sounds and their transformations. The same sounds are used time and again. What is different is the *way* that they are used; in other words, the style. One may consequently speak not just of individual styles, but also of an electroacoustic *genre* style. One may even assert that electroacoustic music is all style, just as its substance is all sound. But no such assertions are being made.

5. THE COLLAPSE OF STYLE

The electroacoustic use of sound consciously differentiates itself from the 'notes' that constitute contemporary classical instrumental music. A fundamental aspect of electroacoustic music's claim to modernity and continued relevance is that it has supplanted the obsolete practices of 'dots' music. Schaeffer's *objet sonore* has today given way to concepts of 'sound-based music' in which 'the sound […] not the musical note, is its basic unit' (Landy 2007: 17). In this vision, notes are seen as hopelessly outmoded units of a musical orthography that is too limited to convey much about actual sounds and is linked to a performance practice that does not really accommodate electronic means of production.

https://doi.org/10.1017/S1355771815000333 Published online by Cambridge University Press

A written note conveys so little about the actual sound that is heard, and in any case over-emphasises pitch above timbre.

However, an approach that is open to 'noises' and thus removes both the aesthetic connotations and the historical baggage that goes with the privileged status afforded to notes ignores the resulting paradox: that notes are also sounds. Perhaps it is partly for that reason that electroacoustic music analysis struggles with notions of 'style', since the term itself is so redolent of note-based music. Landy bemoans 'the general lack of engagement of most musicologists with sound as opposed to note organisation' (2007: 18) and indeed the discipline of musicology itself has become increasingly restricted to instrumental musical practice. Within that constraint, 'style' is still a viable concept, but beyond it, style collapses in the face of a general lack of ability to understand how sound may be organised. One consequence of the myth of inclusivity is, apparently, stylistic neutrality.

The collapse of style becomes particularly evident when beat-based music is introduced into the electroacoustic domain. Since it must be called 'electroacoustic' under the terms of most of the theoretical definitions that exist today, it has every reason to be considered on an 'equal' footing with the more academic works which generally lack (or at least shy away from) regular beats. Electroacoustic music theory has struggled with this problem and has overcome it by extending the limits of its own genre classifications. This is despite the fact that much beat-based music is created on sequencers that treat timbres as notes, and that most beat composers use tonal (or, more often, modal) harmonic processes, albeit often without reference to their traditional functions. The kind of music that frequently becomes incorporated through this relaxation of genre conventions ranges from glitch and electronica (e.g. Autechre, Aphex Twin) to dance music, with a special place for that dance music which seems to understand the principles of electroacoustic music, such as Amon Tobin, The Chemical Brothers. Here, at first listening, the beat is apparently subservient to an interest in timbral manipulation that is related to the theoretical constructions of spectromorphology. Analyses of this kind of music that have been made in these terms have told us a great deal about both its structural rigidities and the occasionally innovative use of electroacoustic techniques.[5]

If we consider, for example, a track such as 'Under the Influence' from The Chemical Brothers' album *Surrender* (1999), we can hear several techniques that sound as if they come from electroacoustic music. These techniques are used intelligently and to great effect, but it is still hard to argue that this is a piece of electroacoustic music as understood in genre terms. In fact, it is quite clear where The Chemical Brothers' genre aspirations lie: the presence of the insistent motoric beat, and the slightly too fast pattern-making that could only be executed by a sequencer, place this squarely within an electronic dance music genre that offers little in terms of the kind of sonic contemplation provided by electroacoustic music. It is none the worse for that: its strengths lie elsewhere. The function of the electroacoustic style in this music is allusive. The Chemical Brothers are ex-university students who are certainly not ignorant of the techniques they reference. The music is enhanced by the electroacoustic content in much the same way that a rock band might be enhanced by the addition of a string orchestra. In other words, The Chemical Brothers are adopting a style in their music that is instantly recognisable and conveys a whole set of assumptions about artistic purpose and cultural context. Making such distinctions between artistic/academic and commercial/popular electroacoustic music could be an illuminating preliminary way in which to determine style.

6. MODERNISM AND THE GROWTH OF MEDIA ANALYSIS

Electroacoustic music is deeply rooted in modernist ideology. Its supreme early example, Edgard Varèse's *Poème électronique* (1957), was the result of an architectural collaboration with Le Corbusier (via Iannis Xenakis). Both men believed there is a deep and close relationship between music and architecture (Mattis 2006: 310). Le Corbusier defined architecture as 'visual acoustics' (Le Corbusier 1956: viii) and declared 'I am a musician at heart' (Le Corbusier 1958: 330). Varèse was inspired throughout his life by the architecture of the abbatial church of Saint-Philibert in Tournus, Burgundy (Varèse 1972: 67) and conceived of music as 'blocks of sound, calculated and balanced against each other' (Schuller 1965: 34). Le Corbusier's Modulor set out his vision of universal forms and proposed that 'music, like architecture, is time and space. Music and architecture are alike a matter of measure' (Le Corbusier 1954: 330). This sense of universalism is written into the very structure of the film (or, rather, slide sequence) he created for *Poème électronique*:

0–60″	Genesis
61–120″	Spirit and Matter
121–204″	From Darkness to Dawn
205–240″	Man-Made Gods
241–300″	How Time Moulds Civilization
301–360″	Harmony
361–480″	To All Mankind

[5]See, for example, Ben Ramsay's analysis of 'Internal Clock' by Monolake (Ramsay 2012), or Robert Ratcliffe's analysis of 'Chime' by Orbital (Ratcliffe 2013).

https://doi.org/10.1017/S1355771815000333 Published online by Cambridge University Press

Varèse's music follows this structure carefully. Gary Kendall points out how his architectural approach takes the form of non-motion: juxtapositon of 'musical ideas that contradict each other and that deny a sense of progress through time' (Kendall 2006: 159). He asserts that *Poème électronique* is 'the bridge between early twentieth-century modernism and electro-acoustic music' (ibid.). What Le Corbusier had earlier identified as a 'primary sensation', which is expressed in forms such as the sphere, cube, or cone, may here be musically understood as a sounding element, a pure timbre, or even a 'sonic object' (Schaeffer 1966). The cultural or personal significance of such objects are 'secondary sensations [which vary] with the individual because they depend upon his cultural or hereditary capital' (Le Corbusier and Ozenfant 2000: 62). Given this foundation, it is easy to see how notions of style may be eradicated from the aesthetic debate. Style is redolent of precisely those secondary sensations which run counter to the modernist project. Universalism implies not only the suppression of personal expression in creativity but also the immanence of collective understanding.

The postmodern rejoinder to this is the rehabilitation of 'secondary sensations', which may accumulate to become new genres. The struggle of electroacoustic music studies to accommodate this phenomenon reflects the wider struggle in critical and cultural theory. The solution it often adopts is to try to throw up a unifying frame around every type of music. Most music is electroacoustic music today, since it is always electronically mediated somehow. Javanese death metal? Aphex Twin? Tuvan throat singing? Denis Smalley? These very different musics may all be analysed with the same tools to reveal the same range of spectromorphological features which tells us, repeatedly, that they are variations on a theme of a globalised electronica. The spectrogram in its various manifestations can reveal in astonishing detail exactly what happens, when, and even where it is located in 'space' (real or virtual). What it cannot tell us is *why*, even though notions of causality are embedded in electroacoustic composition in much the same way as tension-release is embedded in tonality.

The 'why' question is most commonly answered not by reference to the sounding materials of the music itself, but rather through a critical framework that situates music within cultural or media analysis. The steady growth of ethnomusicology, media studies, cultural studies and associated areas of the social sciences has had an enormous impact on music analysis and has brought about a concurrent change in the nature of musicology. The process of change has been helped along by an ancient debate about 'absolute' and 'programme' music which persists in academic circles to this day. The 'new musicology' has an earnest desire to avoid the trap of treating music as divorced from its social and historical context. It defines music as 'a medium that participates in social formation by influencing the ways we perceive our feelings, our bodies, our desires, our very subjectivities – even if it does so surreptitiously, without most of us knowing how' (McClary 1994: 211). In this argument, to attempt to address the 'why' question without reference to social context is wilfully 'academic' at best and downright imperialist at worst.[6] One apparently unintended consequence of the strength of this argument has been a concession on the very stuff of music. The materiality of music is increasingly seen to be embodied not just in ourselves but also in the media by which it is conveyed to us: vinyl, tape, radio, CDs, downloads and so on. A large amount of musicological analysis is now directed towards theorising these materials, while neglecting the organised sound and silence that makes up music itself.

Defining music by its medium is one way of deferring questions of style, judgement and taste. Sound has no material existence, being merely a disturbance in a medium, a mechanical pressure wave, a vibration. If we wish to analyse the disturbance rather than the medium itself, we must develop strategies that bypass this problem of immateriality. In the days before recorded sound, the main method was analysing musical notation. As the notated object became increasingly substituted for the sounding object, especially in academia, this practice created the conditions for the modern divorcing of music from its effects. The problem was that while notational analysis could reveal a great deal about musical style, it could also miss some crucial details about sound. To take a simple example, Bach's various chorale settings of *Jesu, meine Freude* present relatively few challenges in terms of stylistic and harmonic analysis when approached through notation or at the keyboard, but listening to them sung by a congregation (as intended) reveals some astonishing moments, such as the point at which the tenor line hits a unison with the sopranos in BWV227. The *sound* of this being sung would have greatly impressed all listeners, but this is generally missed in paper analyses. The arrival of recording seemed to offer a corrective to such omissions, by enabling analysts to focus purely upon sounds. However, it has also resulted in the shift in our perception of the materials of music as described above. All this has coincided with an enormous growth within the academy of a media-driven theory of music. As music departments have closed down, so media departments have expanded to incorporate music analysis. The evolution of such a thoroughgoing materialism leads to

[6]There is general agreement in musicological circles about the inherently imperialist nature of Western musicology. 'Some of us realise that both the claiming of a fictional pan-European, "Western" musicality for our own and the implicit denigration of non-European musics as exotic raw material constitute acts of cultural imperialism' (Cusick 1997: 199).

https://doi.org/10.1017/S1355771815000333 Published online by Cambridge University Press

the postmodern framework within which music is the product of a given society that may best be analysed socio-culturally.

7. THE NEGLECT OF STYLE

The reasons why 'style' is such a neglected topic in electroacoustic music are partly historical and partly a complicated but fundamentally self-defensive reaction to the kind of existential threats outlined above. They have their roots in Jean-Jacques Nattiez's celebrated identification of a 'neutral level' that resides somewhere between the aesthesic and the poietic:

> On the neutral level, it would be easy enough to identify and describe the sound-objects that make up these works, to describe the laws governing their succession and their integration into various syntactic arrangements, on various levels. We would then, from this *arrested* description of the material, *proceed to extract* those constituent traits that account for a sense of continuity within the succession of isolated moments that make up the work. But this essentially aesthesic explanation (we perceive a 'sense of continuity') will never be possible unless one first has access to a material description of the work; that is to an analysis of its neutral level. (Nattiez 1990: 101)[7]

The 'material description of the work' thus explicitly separates itself from the stylistic content, which must reside only at the aesthesic and poietic levels. This idea did not spring unexpectedly from one mind, but is rather the consolidation of a tradition of analytical thinking in electroacoustic music that goes back at least to Jean Molino and Pierre Schaeffer, and persists to this day. The tradition mirrors a neutralised, engineering-derived, concept of electroacoustic music creation. The great attraction of the neutral level is the scientific objectivity it appears to offer to the analyst, by replacing the inconveniently subjective and, all too often, flowery and descriptive writing of traditional music analysis with something altogether more factual, verifiably accurate and generally useful.[8] Furthermore, the concept of the neutral level offers the potential for a globalised and standardised form of analysis, since all music must possess such a level. Electroacoustic music should be easy to analyse in these terms, not least because the tools of creation and the tools of analysis are now so closely related, both being computer software. The precision of spectrographical analysis is not just available to the analyst: it is part of the toolset of the composer. Electroacoustic music, at least in part, auto-analyses during its creation. It is a decision for the composer how much or how little of this instant analysis to incorporate into the compositional process, but the tools are there.

However, recent years have seen some dissatisfaction with the concept of the 'neutral level'. Part of the problem is to do with its lack of representation. Stéphane Roy observes that listening scores, or evocative transcriptions, cannot represent the neutral level (Roy 1998: 166). Lelio Camilleri goes further, arguing that analysis of electroacoustic music can only be based on perception – 'the only text that we can analyse is the sound text' (Camilleri 1993: 2; Reed 2008: 45). There have also been more philosophical objections. Simon Emmerson has complained that 'to describe the musical process as two cognitive processes sandwiching a material object is to make too overt a distinction between substance and its apprehension' (Emmerson 1982: 48) and David Osmond-Smith ridiculed the neutral level as 'a last resting-place for Kant's 'thing in itself' (Osmond-Smith 1989: 94).

At the same time, there has been a steady growth in more phenomenological approaches to electroacoustic music. These have included investigations rooted in cognitive studies of aspects of perception, ranging from auditory scene analysis (Bregman 1999) to behavioural analysis (Delalande 1998) to music perception (McAdams 1996, 2015) and emotional responses (Kendall 2014). There is also a strongly emerging interest in *affect*, informed by the theoretical frameworks of philosophers such as Brian Massumi and psychologists such as Teresa Brennan. This focuses on non-linguistic, pre-social, cognitive responses, or the 'autonomous reaction of an observer's body when confronted with a particular perception' (Meelberg 2009: 324). An affective analysis of electroacoustic music really needs to be multidisciplinary, drawing on several methodologies.

On the whole, such phenomenological approaches have taken us even further away from notions of style. This is partly for methodological reasons, since the approximation of any generally agreed stylistic characteristics would presumably require a deductive approach involving unfeasibly large sample sizes and agreement on what constitutes 'style' in the first place. This is not the kind of thing that responds well to inductive methods, which move from specific observations to broader generalisations, being more in the tradition of the 'historical method' of humanities research. Literary scholarship has addressed this problem by adopting a genetic research method that 'focuses on the compositional process and requires access to all the materials that were used in the creation of a work' (Hugill 2012: 236).[9] Such a 'digital humanities' approach is theoretically available to music analysis too, but so far there has been little enthusiasm for it amongst the scholarly community, although

[7]The italics are those of Nattiez.

[8]It should be noted that notation-based music analysis has followed a similar path, albeit with somewhat different underlying concepts (Monelle 1992).

[9]See, for example, the work of the Centre for Manuscript Genetics at the University of Utrecht and in particular its work on Samuel Beckett (Van Hulle 2015).

https://doi.org/10.1017/S1355771815000333 Published online by Cambridge University Press

there have been some attempts (Lorrain 1980; Zattra 2003). In the case of electroacoustic music, destructive editing techniques tend to make it difficult to obtain sketches or preliminary versions of a work, which may explain the relative lack of interest.

8. STYLE AND ELECTROACOUSTIC MUSIC

'Style', as traditionally understood, relates to the more recognisable features of a musical surface that are encoded within the technical practice. Thus we may speak of 'Palestrina's style' as distinct from 'Victoria's style', which enables us to identify from listening to the music alone the distinctive fingerprints of the individual composer while at the same knowing that deeper analysis would bring about an understanding of the processes by which this more superficial character had been achieved. The uncovering of style may be said to have been one of the primary aims of music analysis up until the twentieth century.

The authorial figure of the composer, who is so central to the question of style, is generally even more present in electroacoustic music than in instrumental music, because the degree of control exerted over the musical content of an electroacoustic piece ensures that the composer's 'fingerprints' are fixed in every part of the surface and the substructure. It makes no difference if the composer is a computer, or a collective: this still remains true. Nor are the neutralising strategies of John Cage and his followers an escape. The choice to use chance is a choice, the choice not to decide about chance is a choice, and the desire for aesthetic indifference is just as stylistically charged as its opposite. Marcel Duchamp's readymades are a relative failure in their own terms: objects whose lack of aesthetic qualities makes them the aestheticised objects of desire of the museum culture that their 'creator' supposedly opposed, a phenomenon he acknowledged by reproducing 'Fountain' so many times towards the end of his life. We may indeed speak of 'Duchamp's style' in the readymades. Style is an inevitable property of artistic creation. The only way to avoid it is to do nothing (and even nothingness may have a certain style).

Style refers to the *way* in which things are done. It is a matter of understanding technique: how sonic materials are handled, in a work or a group of works. We may, for example, compare many instances of the sound of water in electroacoustic composition. Since this is one of the most commonly used sounds, we may be assured that the stylistic insights gained will have a high level of importance and a wide degree of relevance. However, it is not the sounds of water *in themselves* that constitute the stylistic component, but rather the way they are treated. How are they extended or shortened? How are they diffused? What processes are applied to them?

We could compare, for example, time domain manipulations such as fades, loops, delays and time-stretching, or frequency domain processes such as EQ, filtering and pitch-shifting. Even a relatively straightforward analysis of cut-and-paste, or brassage, techniques, will reveal much about the style of a particular passage or work. This kind of analysis would seek for the compositional fingerprints of the composer, at all levels of the piece. So, by comparing the extension of water sounds by time-stretching in the works of three composers working in different centres at a certain time, we would get a cross-sectional snapshot of their style. More longitudinal studies might examine the way a particular technique changes over time, within the work of a single composer or, once again, between different artists or groups, cultures or locations.

We may also analyse sound treatments as signs. So, for example, we might observe that the treatments of bird sounds in Trevor Wishart's *Red Bird* (1973–77) differ from those in Francis Dhomont's *Forêt profonde* (1996). In Wishart's case, their use was prompted by the real fear he experienced when walking through a wood at night, startling birds into flight. This became auditorily coupled in his mind with the rustling of the pages of books (Wishart 2000). For Dhomont, the forest is that of fairy-tales, evoked by a reading of the essay by Bruno Bettelheim *Psychanalyse des contes de fées* (*The Uses of Enchantment*) on which the composition is based. Both composers are driven by a strong narrative urge and a sense of theatre, but in Wishart's case it is a rhetorical drama, punctuated by stuttering sounds such as gunshots, whereas Dhomont's more fluid tapestry includes piano, spoken voice, and electronic evocations of birdsong. Wishart's is more abrasively structured, with the transformations between sounds delivered as clearly as possible. Here there is mainly foreground, whereas in Dhomont the evocation of the forest necessitates a sense of endless depths and consequently a receding background. We may conclude, perhaps, that a distinctly Anglo-Saxon pragmatism (Wishart) contrasts with a more French inclination for the oneiric (Dhomont). Both composers have a strongly theatrical approach to the transformation of the sounds, and there is a clear narrative drive, but Wishart's surrealism is focused on the transformation of reality whereas Dhomont's world is already imaginary.

9. ELEMENTS OF STYLE IN ELECTROACOUSTIC MUSIC

Such brief examples do not of course substitute for a thorough stylistic analysis. Rather, they merely indicate a direction of travel, which could lead to a more rigorous understanding of style in electroacoustic music. Its elements are not so very different to those in

https://doi.org/10.1017/S1355771815000333 Published online by Cambridge University Press

notated music, despite the use of sounds as opposed to notes. Traditional conceptions of style typically identify: the style of a historical period; the style of a nation or region; the style of a particular composition; the style of a musical medium; and the style of an individual composer. These styles are often understood in terms of extra-musical influences, such as social, national, religious and so on. Some of these need some refinement in a more contemporary, globalised context. For example: 'twenty-first century style' is probably too diffuse to be susceptible of a single definition; the emphasis on national style needs to take account of changes in international culture; the notion of an 'individual composer' is increasingly challenged by advances in both artificial intelligence and collaborative composition; the 'musical medium' has acquired a new significance, as discussed above. Nevertheless, this basic framework still enables the discussion of musical style in an electroacoustic context and even, perhaps surprisingly, acquires reinforcement through its very connection with tradition. Despite the progressive agenda of electroacoustic music, it seems tied to a desire to be seen as having an equal importance to instrumental music in general and classical instrumental music in particular.

The challenge facing critics of electroacoustic style is to understand the stylistic function of the elements of electroacoustic music. There has already been some progress in this respect. Spectromorphological theory has provided a reasonably comprehensive taxonomy of sound types, with some principles of cause and effect. Young, for example, identifies the following:

> *Causative*, expressed via
>
> - continuity (implication of a continuous flow of energy, for example from attack to resonance)
> - interactions (where sound events prompt each other)
>
> *Transformative*, expressed via
>
> - mutation (leading to changes in morphological design)
> - variation (where a generative link is perceived between two or more sounds).
>
> (Young 2005)

The stylistic implications of such principles, however, are rarely discussed. François Delalande argues that the reason for this is the absence of reductive standardisation enabled by the musical score:

> Caractériser un style de façon explicite et rigoureuse n'est déjà pas simple dans le cas général, mais s'agissant d'une musique sans partition, on devine que l'entreprise va devenir franchement périlleuse […] Notons d'abord que la musique électroacoustique est un exemple prototypique de musique donnée sous forme d'objet sonore: les remarques que nous avons proposées s'appliqueraient sans doute en partie, à quelques aménagements près, aux musiques de tradition orale, aux variétés ou à l'analyse de l'interprétation. Mais la partition simplifie le problème puisqu'elle est une réduction à des valeurs discrétisées, abstraites; elle est déjà une modélisation du sonore.
>
> To characterise style in a way that is explicit and rigorous is already not at all straightforward in general, but when we try to do it for a music without score, one can see that that the enterprise becomes frankly perilous […] Let us note first of all that electroacoustic music is a prototypical example of music given in the form of a sonic object: what we have proposed would also apply somewhat similarly to music from an oral tradition, to the variety show, or to the analysis of interpretation. But the score simplifies the problem since it is a reduction to discrete, abstract, values: it is already a model of the sound.
>
> (Delalande 1993: 28, 33)[10]

Delalande proposes both a poietic and an aesthesic approach, but essentially abandons the enterprise as too problematic. However, he does underline the importance of *comparative* analysis as the main methodology. Given the contemporary availability of big data processing and effective analytical tools such as Pierre Couprie's *EAnalysis* (Couprie 2014), it may be argued that the time is ripe for re-engagement with this problem. The absence of a score need no longer represent such an obstacle, since computers are now capable of detecting and modelling precisely those common factors and regularities that Delalande identified as essential.

10. STYLISTIC ANALYSIS OF ELECTROACOUSTIC MUSIC

It is important that comparative analysis itself goes further than merely observing similarities and differences between collections of sonic objects and their treatments. It must be capable of understanding *why* such similarities and differences exist, and of examining them under a common semantic framework. Musicology has tended to fashion its own framework in the past, one which self-defines as appropriate to notated artefacts. This clearly is inadequate to the task of electroacoustic music analysis, so consideration of a more widely applicable framework is a necessary first step. Charles Tilly identified four types of comparative analysis in the social sciences, which could be usefully applied in the study of electroacoustic music:

1. The *individualising* comparison contrasts 'a small number of cases in order to grasp the peculiarities of each case' (Tilly 1984: 82).
2. The *universalising* comparison 'aims to establish that every instance of a phenomenon follows essentially the same rule' (ibid.: 82).
3. The *variation-finding* comparison seeks to 'establish a principle of variation in the character or intensity

[10]Andrew Hugill's translation.

https://doi.org/10.1017/S1355771815000333 Published online by Cambridge University Press

of a phenomenon by examining systematic differences between instances' (ibid.: 82).

4. The *encompassing* comparison 'places different instances at various locations within the same system, on the way to explaining their characteristics as a function of their varying relationships to the system as a whole' (ibid.: 83).

A systematic use of these methods would be able to lead to a new stylistic understanding that would consolidate rather than overturn the foundational aspirations of electroacoustic music theory. This would require the computational analysis of large numbers of electroacoustic works, looking for commonalities, regularities, patterns and features of all kinds, which could locate the music not just within a purely musicological framework, but also within its wider societal and functional context.

So, for example, one could take a given sound and compare its treatment in a small number of compositions to grasp the peculiarities of each individual instance. Given the sonic characteristics of the sound, it would also be a relatively straightforward matter to make a universalising comparison. It is the variation-finding comparison that would provide the gateway to a stylistic analysis, operating at both the affective and the effective levels and considering matters of context and extra-musical influence as well as detailed technical analysis. A taxonomy of sound types and their treatments could provide sufficiently large datasets for such an analysis. The outcome would not merely be a quantitative analysis, but also a qualitative analysis that is entirely readable in terms of musical style.

The most immediately obvious way to achieve all this would be to deploy Music Information Retrieval (MIR) techniques. These offer several methods that are clearly useful, such as 'psychoacoustically grounded causal listening', 'time-lag embedded feature representation', and 'perceptual similarity clustering' (Jehan 2005). Genre and style recognition is a standard task in MIR (Collins 2010: 251). Audio analysis is capable of detecting spectral similarities and recognising structural divisions, thanks either to feature vectors built up from 'low-level feature data to higher-level information' (ibid.: 252) in a 'bag of frames' model which disrupts the original order of the events, or by 'shingling' which preserves the original order (Casey et al. 2008). The annual Music Information Retrieval Evaluation eXchange (MIREX) conference includes a competitive community-evaluated submission process that shows the evolution of these techniques (Downie et al. 2010).

Given the existence of such a flourishing set of techniques, and given that electroacoustic music offers an object for analysis that is likely to have a set of 'fingerprints' at every level of the composition, why does MIR mostly focus on areas other than electroacoustic music? Park et al. suggest reasons:

> One of the reasons for the scarcity in MIR-based research for electroacoustic music may perhaps be attributed to the need for MIR researchers to be interested and actively be involved in composing or be deeply engaged in electroacoustic music on a musical level. Another reason for this somewhat imbalance may be that the community seems to prioritize resources to the more standard musical repertoire that the general public accesses. (Park et al. 2009: 693)

'The more standard musical repertoire' is perhaps a polite way of saying that MIR research is largely driven by commercial interests that focus mainly on popular tunes.[11] There have been some musicological applications of MIR, but they tend to concern 'dots' music and especially the analysis of tonal music. One reason may be that sometimes there is a greater degree of complexity in the way in which electroacoustic music handles sonic materials, but this is by no means always the case. The bigger problem emanates from the music itself and its maker community, which tends to resist the notion of 'style'. There may be an anti-commercial agenda at work here (although it is hard to find clear evidence of that) but more likely it is to do with the attitudes to style described above.

11. CONCLUSION

Analysis of style in electroacoustic music is really a transdisciplinary problem. Computational techniques such as MIR are by no means the only way to approach the challenge. Human perception and human experience are also a key component. Understanding style may be framed as a classification problem, which would be susceptible to an array of psychological testing methods, from affective and emotional responses to memory studies and 'similarity studies', in which participants are asked to pair similar sound segments leading to inferences that may be made, statistically or otherwise, from the results (Whitman and Smaragdis 2002; Wiggins 2007). But there also needs to be contributions from historical musicology, media theory, sociology, cultural history, ethnography and ethnomusicology, philosophy, even mathematics. Furthermore, an essential prerequisite to the habilitation of 'style' in electroacoustic music is the willing engagement of the community of electroacoustic musicians themselves. As Park et al. rightly observe, these people often do not sit within the disciplinary groupings outlined above. To avoid becoming incidental, or mere objects of study, they need to be persuaded of the importance of the question of style. One aim of this article is to help towards that act of persuasion. Since wider access to this music is

[11] Collins gives a list of MIR systems that are all, to a greater or lesser extent, commercially driven (Collins 2010: 258).

https://doi.org/10.1017/S1355771815000333 Published online by Cambridge University Press

one of the most frequently and hotly discussed aspects of the electroacoustic 'scene', the prospect of increased public appreciation may be decisive in this respect.

REFERENCES

Bregman, A. S. 1999. *Auditory Scene Analysis: The Perceptual Organization of Sound*. Cambridge, MA: MIT Press.

Camilleri, L. 1993. Electroacoustic Music: Analysis and Listening Processes. *Sonus Contemporary Music Materials* **1**: 1–13.

Casey, M., Veltkamp, R., Goto, M., Leman, M., Rhodes, C. and Slaney, M. 2008. Content-based Music Information Retrieval: Current Directions and Future Challenges. *Proceedings of the IEEE* **96**(4): 668–96.

The Chemical Brothers 1999. *Surrender*. Virgin Records XDUSTCD4.

Chion, M. 1994. *Audio-vision*. Trans. Claudia Gorbman. New York: Columbia University Press.

Collins, N. 2010. *Introduction to Computer Music*. Chichester: John Wiley.

Couprie, P. 2014. *EAnalysis*. http://logiciels.pierrecouprie.fr/?page_id=402 (accessed 19 October 2015).

Cusick, S. G. 1997. Response to Round Table 3. In D. Greer (ed.) *Musicology and Sister Discplines: Past, Present, Future*. Oxford: Oxford University Press.

Delalande, F. 1993. Analyser le style en musique électro-acoustique; Approximation et pluralité en analyse comparative. *Analyse musicale* **32**: 28–33.

Delalande, F. 1998. Music Analysis and Reception Behaviours: *Sommeil* by Pierre Henry. *Journal of New Music Research* **27**(1–2): 13–66.

Downie, J. S., Ehmann, A. F., Bay, M. and Cameron Jones, M. 2010. The Music Information Retrieval Evaluation eXchange: Some Observations and Insights. *Advances in Music Information Retrieval* **274**: 93–115 http://bit.ly/KpM5u5 (accessed 19 October 2015).

Emmerson, S. 1982. Analysis and the Composition of Electro-Acoustic Music. PhD thesis. City University, London.

Emmerson, S. (ed.) 1986. *The Language of Electroacoustic Music*. Basingstoke: Macmillan.

Hugill, A. 2012. *The Digital Musician*, 2nd edn. New York: Routledge.

Jehan, T. 2005. Creating Music by Listening. PhD thesis. MIT. http://web.media.mit.edu/~tristan/phd/dissertation/index.html (accessed 16 October 2015).

Kendall, G. 2014. The Feeling Blend: Feeling and Emotion in Electroacoustic Art. *Organised Sound* **19**(2): 192–202.

Kendall, G. 2006. Juxtaposition and Non-Motion: Varèse Bridges Modernism and Electroacoustic Music. *Organised Sound* **11**(2): 159–71.

Landy, L. 1999. Reviewing the Musicology of Electroacoustic Music: A Plea for Greater Triangulation. *Organised Sound* **4**(1): 61–70.

Landy, L. 2007. *Understanding the Art of Sound Organization*. Cambridge, MA: MIT Press.

Le Corbusier. 1954. *The Modulor*. Trans P. de Francia and A. Bostock. Cambridge, MA: Harvard University Press.

Le Corbusier. 1956. *Preface to Paul Damaz, Art in European Architecture: Synthèse des Arts*. New York: Rheingold, viii–ix.

Le Corbusier. 1958. *Modulor 2*. Trans. P. de Francia and A. Bostock. Cambridge, MA: MIT Press.

Le Corbusier and Ozenfant, A. 2000. Purism. Trans. R. L. Herbert. In R. L. Herbert (ed.) *Modern Artists on Art*. Mineola, NY: Dover Books.

Lorrain, D. 1980. Analyse de la bande magnetique de l'œuvre de Jean-Claude Risset *Inharmonique*. *Rapports IRCAM* 26/80.

Manning, P. 2013. *Electronic and Computer Music*. Oxford: Oxford University Press.

Mattis, O. 2006. From Bebop to Poo-wip: Jazz Influences in Varèse's *Poème électronique*. In F. Meyer and H. Zimmerman (ed.) *Edgard Varèse: Composer, Sound Sculptor, Visionary*. Woodbridge: Boydell Press.

McAdams, S. 1996. Audition: Cognitive Psychology of Music. In R. Llinas and P. Churchland (eds.) *The Mind-Brain Continuum*. Cambridge, MA: MIT Press.

McAdams, S. 2015. *Perception et cognition de la musique: Les conférences Alphonse Dupront*. Paris: Vrin.

McClary, S. 1994. Constructions of Subjectivity in Schubert's Music. In Brett, P., Wood, E. and Thomas, G. C. (eds.) *Queering the Pitch: The New Gay and Lesbian Musicology*. New York: Routledge.

Meelberg, V. 2009. Sonic Strokes and Musical Gestures: The Difference between Musical Affect and Musical Emotion. In J. Louhivuori, T. Eerola, S. Saarikallio, T. Himberg and P.-S. Eerola (eds.) *Proceedings of the 7th Triennial Conference of European Society for the Cognitive Sciences of Music (ESCOM 2009)*. Jyväskylä: University of Jyväskylä.

Monelle, R. 1992. *Linguistics and Semiotics in Music*. New York: Routledge.

Nattiez, J.-J. 1990. *Music and Discourse: Toward a Semiology of Music*. Princeton: Princeton University Press.

Osmond-Smith, D. 1989. Between Music and Language: A View from the Bridge. *Contemporary Music Review* **4**: 89–95.

Park, T. H., Li, Z. and Wu, W. 2009. EASY DOES IT: The **E**lectro-**A**coustic Mu**s**ic Anal**y**sis Toolbox. *10th International Society for Music Information Retrieval Conference* (ISMIR). Kobe, Japan, 26–30 October.

Radford, L. 2014. I am Sitting on a Fence. *eContact!* 15:4. http://econtact.ca/15_4/radford_soundimage.html (accessed 18 November 2015).

Ramsay, B. 2012. Analysis of 'Internal Clock' by Monolake. http://researchspace.bathspa.ac.uk/6651/ (accessed 15 December 2015).

Ratcliffe, R. 2013. Analytical Précis of Chime by Orbital: Towards an Analysis of Electronic Dance Music. www.robertratcliffe.com/writing (accessed 15 Decembert 2015).

Reed, T. 2008. Planes of Discourse in Fixed Media Electro-acoustic Music: A Comparative Study and Application of Analytical Approaches. PhD thesis. University of Florida.

Roy, S. 1998. Functional and Implicative Analysis of *Ombres Blanches*. *Journal of New Music Research* **27**: 166–92.

Schaeffer, P. 1966. *Traité des objets musicaux*. Paris: Éditions du Seuil.

Schaeffer, P. 2004. Acousmatics. In C. Cox and D. Warner (eds.) *Audio Culture: Readings in Modern Music*. New York: Continuum.

Schuller, G. 1965. Conversations with Varèse. *Perspectives of New Music* **3**(2): 32–7.

https://doi.org/10.1017/S1355771815000333 Published online by Cambridge University Press

Smalley, D. 1997. Spectromorphology: Explaining Sound-shapes. *Organised Sound* **2**(2): 107–26.

Snarkmarket 2007. *Musical Genre Name Generator*. http://snarkmarket.com/blog/snarkives/music/musical_genre_name_generator (accessed 10 June 2015).

Thistlethwaite, N. and Vebber, G. 1998. *The Cambridge Companion to the Organ*. Cambridge: Cambridge University Press.

Tilly, C. 1984. *Big Structures, Large Processes, Huge Comparisons*. New York: Russell Sage Foundation.

Truax, B. 2008. Soundscape Composition as Global Music: Electroacoustic Music as Soundscape. *Organised Sound* **13**(2): 103–9.

Van Hulle, D. 2015. *The New Cambridge Companion to Samuel Beckett*. Cambridge: Cambridge University Press.

Varèse, L. 1972. *Varèse: A Looking-Glass Diary*. New York: W. W. Norton.

Whitman, B. and Smaragdis, P. 2002. Combining Musical and Cultural Features for Intelligent Style Detection. *Proceedings of the International Conference on Music Information Retrieval*. Paris, France, 13–17 October.

Wiggins, G. A. 2007. Models of Musical Similarity. *Musicae Scientiae*. Discussion Forum 4A: 315–38.

Wishart, T. 2000. Computer Sound Transformation: A Personal Perspective from the UK. www.trevorwishart.co.uk/transformation.html (accessed 10 June 2015).

Wishart, T. 2008. Globally Speaking. *Organised Sound* **13**(2): 137–40.

Young, J. 2005. Sound in Structure: Applying Spectro-morphological Concepts. *Electroacoustic Music Studies Network Conference*. McGill University, Montreal.

Zattra, L. 2003. *Science et technologie comme sources d'inspiration au CSC de Padoue et à l'IRCAM de Paris*. PhD thesis. Paris IV-Sorbonne–Trento University.

https://doi.org/10.1017/S1355771815000333 Published online by Cambridge University Press