

1 | The analysis of electroacoustic music:
 the differing needs of its genres and categories

SIMON EMMERSON AND LEIGH LANDY

Introduction: genres and categories

The ElectroAcoustic Resource Site (EARS) (www.ears.dmu.ac.uk) lists 81 genres and categories of electroacoustic music – these are effectively naming conventions, clustering into two categorisations which are in no way exclusive: a *genre* is a musical or artistic grouping (e.g. *soundscape* or *acousmatic*), whereas a *category* is grouped around a *performance situation*, an *aspect of technology* or an *approach* (e.g. *installation*, *microsound*, *algorithmic*). But sometimes the distinction of genres and categories cannot easily be maintained. A word used to describe a category may migrate in meaning to describe a genre – some might argue this is true of ‘acousmatic’!

While we have positioned the approach of our Arts and Humanities Research Council project (and this book) firmly from the listener’s perspective, there can be no *tabula rasa* – we all have memories, knowledge and feelings to bring to the listening encounter. So, for example, does knowledge of a *generative* algorithm influence perception and hence analysis? Analysis may furthermore include *socially situated* characteristics of production, perception and consumption. *Glitch* and *hacking* works analysed from their sound alone would surely lose a substantial part of their meaning. How do we capture these additional dimensions, including emotional response? What other traces should run in parallel to transcription of the sound? Any analytical procedure must balance the gravitational pull of genre or category with a networked, relativistic world of characteristics which reconfigure depending on initial questions (which we shall discuss below).

We therefore have a dilemma – there is no single way forward for analysis in this field and the plethora of possibilities threatens to drown the listener and reader. We thus had to establish limits and boundaries, but in such a way, we hope, that the reader can create his/her own pathway – perhaps from a hybrid of approaches – through this rich landscape. Our first limit is that the approach to analysis is (as already stated) primarily listener focused – the composer’s intentions, methods and approaches may influence but not define the experience of the music. We aim to make analysis an *active support* for listening and composition. Hence this book is intended for

wide use within composition, teaching, analysis and musicology at all levels, including non-specialist users. Our project has brought together existing research, attempting to assess its range and efficacy. From this we have tried to identify needs and to ‘fill gaps’ in the assembled toolkit.

Research methods

The first stage of any such project involves the assembly and comparative evaluation of existing analytical tools. After assembly of the toolbox, we will be in a better position to see if there are gaps – that is, topics, genres, materials which are not fully addressed or do not have relevant tools available. We must then address how best we *represent* the data needed for analysis for each genre or category and how this limits the analytical questions. The tools and the questions are thus strongly interactive. This all informed the project’s software development and innovation (EAnalysis), and hence the content of this book.

But this book has a further function beyond simply being the outcome of this research project. The analytical discussions are not intended to be dry and unapplied, but immediately to encourage more engagement and understanding of the music *through listening*. All music examples are publicly available on CD or reliable download.¹ Thus the completion of the research ‘method’ lies with the reader-listener. The analyses focus on aspects of the work *that can be heard* – not those that can *only* be detected by machines.

Some important points of departure: the four-part question and a template for analytical discussion

The question that we posed when applying for funding for this project was: What do we want from analysis of electroacoustic music and how might we get it? This raises a number of questions. In fact, we could simply go back to the heart of the matter and ask: What is music analysis? *The New Grove Dictionary* includes the following definition: ‘[A]nalysis may be said to include the interpretation of structures in music together with their resolution into relatively simpler constituent elements and the investigation of the relevant functions of these elements’ (*New Grove* 2001). This, in itself, does cover a large part of the territory that we wanted to investigate.

¹ In addition, several contributors have prepared (with permission) sound and video examples to be found on the website accompanying this book.

Interesting here is the central focus on structure, perhaps the weakest point in terms of methods and tools used in electroacoustic analysis thus far. Moving from structure to detail makes sense in a great deal of music, but there are two issues that might be raised in order to suggest that this definition might not be ideal for our purposes. First, part of the reason why structure (and form) has proven so problematic in much electroacoustic music analysis has to do with the fact that a fair share of this music is what might be called ‘bottom-up composition’. With this approach the building blocks are the small-scale sound materials, often painstakingly assembled without a pre-formed structure common to many forms of traditional music. Therefore, many structures are unique and difficult to identify convincingly. There is another issue, too. As will be discussed shortly regarding our so-called ‘four-part question’, an analysis need not focus on the entirety of a work, but instead on one or more aspects of the composition. Structure may not be amongst these unless it is of influence to the understanding of the analytical goals or intentions.

Closer to home, it was Emmerson who helped launch (at least in English) the discussion regarding ‘the language of electroacoustic music’ in 1986. Do we know much more about this subject over a quarter of a century later? The questions that led us to embark on this project included: Why have there been so few analyses made of electroacoustic music? Why are many of these based on the poiesis, that is, the construction of a work, as opposed to being related to its reception? Why have so few tools and methods been proposed for electroacoustic music analysis² and, with this in mind, is it right that so many analyses rely heavily, on the one hand, on Schaeffer’s and Smalley’s contributions (e.g. Schaeffer 1977; Smalley 1997, 2007) or, on the other hand, on sonograms and other graphic forms of representation (Licata 2002 and Simoni 2006, amongst others)? To what extent are approaches used in note-based music analysis relevant to this project?

Part of the problem, as summarised in Landy’s 2007 book, *Understanding the Art of Sound Organization*, is that a great deal of high-level research has been done in the field of electroacoustic music studies, but there has been too little foundational work presented. We do not possess a large choice of tools for this type of analysis. Perhaps poietic analysis is more straightforward – we have so much more information from the composers themselves, as well as descriptions of technical means. Schaeffer’s and

² Michael Gatt’s OREMA and Pierre Couprie’s EAnalysis (Couprie 2012) have assembled most of these – some are discussed below.

Smalley's work is based on morphological categorisation and evolution, that is, a bottom-up approach which rarely looks at mid- and large-scale structural entities. Their application to the listening experience seems to be easily made, and it is quite likely that it is for this reason that their approaches have been called upon fairly regularly.

Falling back on note-based tools can be dangerous. Is the sound event, however defined, the same as the musical note? Clearly not; more likely a cluster or accumulation of notes would be more appropriate. Much note-based analysis is based upon expectancy or grammatical issues. Expectancy in electroacoustic music is a growing area of analytical concern, but has hardly been developed. This is perhaps ironic, as the notion of the 'electroacoustic cliché' has existed for quite some time. To our knowledge, this has not been formally studied thus far. In any event, discussions between analysts of traditional music and of electroacoustic music are long overdue. Fortunately, new types of analytical approaches are being developed, such as Michael Clarke's interactive analysis (see, e.g., Clarke 2006, 2010) where the analyst creates a simulation of how a composer created some of their materials and the user can relive the experience as well as try alternatives using the same technique. Again this is very much based on bottom-up building principles.

In attempting to define analysis for the many genres and categories examined in this book, we took an empirical view. As suggested above, one does not normally analyse a piece of music from every conceivable angle; the analyst has specific intentions. An analysis is based on the sum of those intentions. To create a working empirical model, a *four-part question* has been formulated that is offered as a basis to determine what one might seek when investigating electroacoustic works from the listener's point of view. (It is indeed true that this question can be applied to other types of music, but it is crucially needed in a world which has little history and few developed tools.) There is no particular order of importance:

- For which users?
- For which works/genres?
- With what intentions?
- With which tools and approaches?

Let us discuss these now one by one. As far as *for which users* is concerned, one might think of describing potential users based on specialists (musicologists, musicians, educators) or non-specialists (e.g. school children). Another way of looking at this would be to support understanding related

to: research, composition/practice and teaching. Let's tease this out briefly. *Research* needs the least amount of elaboration as most analysis has been undertaken with this specific goal in mind. Thus the goal is the greater understanding of certain aspects of a given work, not necessarily with any particular application envisioned. *Composition/practice* is an area that has not yet been considered by many involved with analysis in this field. One can analyse a work before the act of composition to understand aspects of one's own or another person's work that might influence the piece in question. One can also analyse a work after it has been completed to identify characteristics that were not consciously part of the compositional process. Finally, and this is perhaps the most radical of the three approaches mentioned here, one can analyse what is taking place in a work during performance. For example, a laptop ensemble's members may be able to track what they are playing and, on the fly, select materials used and either return to them or modify them during performance. As far as this book is concerned, this falls under the category 'future plans', as it is not in our current remit. *Teaching* refers to both specialists (e.g. at higher education level) and non-specialists in schools. Analysis can be used in teaching not only to support the general understanding of a work, but also to exemplify new general ideas and concepts.³

The question *for which works/genres* will be treated at some length in the following section. The list of *tools and approaches* is quite finite currently. We have already cited Schaeffer's 'typomorphologie' and Smalley's 'spectromorphology' and 'spatiomorphology'. Then there are Roy's and Thoresen's additions related to these (Roy 2003; Thoresen 2007). Furthermore there is UST ('unités sémiotiques temporelles', MIM 1996) on offer, not to mention Emmerson's 'language grid' (Emmerson 1986) and Landy's 'something to hold on to factor' (Landy 1994). Other tools have been created for timbral contemporary music including instrumental note-based works. A list of these can be found on the OREMA site that will be introduced in detail in Chapter 7 (www.orema.dmu.ac.uk/?q=analytical_toolbox). None of these has been widely applied in electroacoustic music analysis. Beyond this, there are new computational ones being developed; ones to do with structure beyond the level of gesture; ones to do with live performance, installations or audio-visual works. As these are developed,

³ For example, in the EARS 2 Pedagogical project (Landy *et al.* 2013; ears2.dmu.ac.uk), brief analyses are presented to young learners (for example 11–14 years old) to introduce them to particular concepts and to aid their appreciation of this type of music. An example of how this might be done is presented in the Wishart analysis in Chapter 9 of this book.

they should be tested to investigate where they optimally apply. Our goal is to offer as many of these as we can on EAnalysis (the program developed as part of this project and introduced by Pierre Couprie in Chapter 8) and add newly developed ones that can also be implemented in the future. However, these tools and approaches do not exist in isolation and should always be related to an analytical intention.

Analysis can have one goal or many interconnected ones. The question *with what intentions* is our means of articulating these goals. Intentions might include aspects such as to reveal structuring, layering, narrative discourse, sound qualities⁴ and their evolution in time, and gestures at the local level. We might aim to examine movement from one type of listening to another (e.g. between contextual and musical), drawing in social, emotional or meaning elements, and any of these in combination with other performance-related and sonic aspects. Furthermore, a composer's dramaturgic intention and/or compositional aspects may need to be triangulated as part of an analysis.

The following list of 'headers' has been put together to form a proposed template for analysis. This template has been proposed in order to offer people a potential model for the consistent presentation of analyses based on defined intentions yet flexible when specific concerns are of importance. All authors presenting analyses in Part IV received it and used it as a benchmark appropriately to their genre.

- Representation
- Materials
- Listening behaviour
- Behaviour of materials
- Ordering
- Space
- Performative elements
- Intention/reception, social, emotional and meaning-related aspects
- Elements specific to a given genre or piece.

Representation. Many analysing electroacoustic music like to include or even to be led by some form of visual representation. Examples vary from handmade diffusion scores subsequently used for analysis and sonograms

⁴ 'This is used as an umbrella term [...] referring to a single or composite sound's aural characteristics. Instead of discussing source and cause, in this case one describes the sound's colour or timbre, aspects related to its texture and any other description related to its sonic as opposed to contextual value' (Landy 2012: 195–6).

(or similar) including specially prepared output files from such as the GRM's Acousmographie to the much more complex visualisations possible with EAnalysis transcription and annotation. The question of importance here is: What are the most effective form(s) of representation? The answer is largely dependent on what has been proposed based on the four-part question. EAnalysis continues to be developed so that it will be seen to be highly flexible to optimise its usefulness. Although it is by no means solely a representation tool, it offers a wide variety of types of representation to aid an analyst's work.

Materials. What types of sounds have been used and what sound morphologies are present? In aesthetic and, to an extent, poietic analysis, this can be a non-trivial request. We have very few systems for categorising sound materials. Some sound descriptions are based on surmised source and cause, while others are not, relying solely on spectral and other acoustic data; yet others are more metaphoric of the visual and emotion domains. Presenting materials on a simple list may be a useful first step, but this needs to become a well-organised taxonomy which can be combined with other items of the template, such as sound behaviours, ordering and the like.

Listening behaviour. The way the listener interprets sound material, its behaviour and function within sound structures is the subject of modes of listening, whether Schaeffer's 'quatre écoutes' or any other alternative that has been presented by numerous authors (e.g. Truax 1984; Norman 1996). Listening strategies are rarely identical amongst listeners to music or even from one aural experience of a work to another. Some shifts of material within pieces do indeed trigger an altered means of listening. Real-world musical material may call for heightened or contextual listening whilst more abstract material may invite reduced or musical listening. In other words, the recognisability of sounds may affect the listening experience. Finding relationships between listening behaviour and the musical language involved can be a very gratifying aspect of electroacoustic music analysis.

Behaviour of materials. This item picks up on the morphology aspect raised under materials (above). As in any kind of music, once material has been introduced, it tends to reappear under several guises. Therefore, behaviour has to do with the development of sound qualities. It also has to do with the combination of materials; for example, sometimes, when two material types are presented concurrently, they blend to create a single sound quality. In other situations, this may not be the case and they take on an individual role in the collection of sounds present. For example,

when using contextual elements where source identification is suggested, what is the relationship between foreground and these more contextual sounds? Behaviour of materials is a focus in a great number of analyses, as it should be; it is often combined with discussions under the next heading (they form an interacting pair) – ordering.

Ordering. This item focuses on the order of sound events and their organisation. It can be investigated in terms of both horizontal and vertical components. Furthermore, it involves audible salient characteristics related to sonic and structural behaviour as well as discourse. Once patterns are discovered, their evolution in terms of ordering can be investigated. Patterns may be discovered at many levels within the work. Ordering investigates small- to full-scale means of structuring.⁵

It is perhaps in this item, more than others, that relationships with note-based music can be discovered. For example, much analysis of twentieth-century European art music, like the compositions themselves, focuses on the isolation of musical parameters. Perhaps the best known are analyses of 12-tone (or pitch-set) works in which primarily pitch is taken into account. However, pitch is not the only isolable parameter relevant to instrumental or electroacoustic music. Duration (of events, gestures, sequences, other structural entities) forms its complement. Other parameters of relevance include dynamics, density, order/disorder, simultaneities (analogous with traditional harmony), horizontal relationships such as layering (analogous with traditional counterpoint) and space (see below).

Large-scale structure identification along with narrative and discourse elements of a work are underdeveloped aspects of electroacoustic music analysis. This is possibly due to the fact that many works constructed bottom-up are difficult to analyse at this level. Textural compositions, focused on layering, deserve another approach to structure than that applied in most note-based music analysis. Many (by no means all) works based on a priori structuring rules fall under the heading of formalised composition. The interesting challenge here is that the majority of formalised electroacoustic works are based on algorithmic methods that are not readily deciphered aurally. This is another reason why structural analysis is in need of development in this field.⁶

⁵ One aspect of this, which is an aim of ongoing research, is the development of computational sound/sonic behaviour spotting (Casey 2009).

⁶ Ironically, this raises the question of how easy works without identifiable structures are for listeners, but that is a subject for another book.

Space. Discussion of spatialisation has been a recent development in electroacoustic music analysis, yet it is one of the most audible and interesting aspects of the art form. The treatment of space and spatial movement is an integral part of electroacoustic composition and should be reflected in analysis. Terminology has evolved related to spatialisation, not least Smalley's vocabulary related to spatiomorphology (1997, 2007), which can be put to good use when applying this template. Some works from the psychoacoustic literature (Handel 1989; Bregman 1994) will also allow us to explain the relationship of the musical materials to perceptions of space, structure and 'scene'. In mixed and live electronic works, there are social spaces around the performers and audience, the venue and environment (Emmerson 2007). Even in fixed works which are actively diffused, recordings have been made and compared of a single composition diffused differently to identify different interpretation strategies.

Performative elements. Aspects of electroacoustic music, related to musicians making live, in particular improvised, performance, may need special attention. There may be no score or fixed media. Issues of performance, or 'liveness', cannot be separated from the sounding result of, for example, a live electronics performance. Where improvisation is involved, it is certainly useful to investigate more than one performance (whether of a given piece or a specific ensemble) when it comes to analysis. The language of performance, the level of on-the-spot decisions and their musical coherence, may form part of the many aspects related to performance that belong to this template. Using video recordings of performances is useful when considering performative elements (and was an early inclusion in the development of EAnalysis).

Intention/reception, social, emotional and meaning-related aspects. Amongst the things we may hold on to when listening, and which contribute to analysis, are extra-musical aspects, such as dramaturgic intentions. The intention/reception loop is a means of gauging successful musical communication whenever a musician is willing to share intention information. There are many levels of such potential communication: dramaturgic, emotional and meaning-related aspects are perhaps the most important. These are often best analysed by working with groups of listeners of the same or of differing backgrounds to learn to what extent the reception of works offers coherent response data.

Another aspect of a good deal of electroacoustic music relates to the social circumstances of performance. Not all electroacoustic music genres

are intended for traditional concert presentation. Some types may be presented in clubs, galleries and the like, for example, sound installations, some of which may be site-specific. Social settings inform the musical experience either through the community sharing the musical values of a genre or for other reasons. These need to be integrated into electroacoustic analytical studies.

Elements specific to a given genre or piece. Although this template attempts to cover as much common ground as possible, there is in general no isomorphic relationship between intentions, tools and genres. There are genres, even specific pieces, that pose particular questions that are not of universal relevance, such as audio-visual coordination in installations and visual music or specific questions related to interactivity, such as comprehensibility to the audience or the participant.

Therefore, there are certain intentions that are more relevant to some genres than to others. Let us look at *sampling culture* to exemplify this. *Which tools and approaches* are of particular importance to this body of music? In some cases these take on a specific importance, even though they might be of relevance to other genres, while in other cases, they are of particular relevance only to the genre, itself.

- Which (types of) sources?
- How are they treated? (E.g. with respect, ironically.)
- Are they used legally? (If not, was this deliberate?)
- Have they been modified? If so, to what extent are they still recognisable?
- What role do they play in the work/performance?
- How have they been integrated into the composition/performance?

In particular the second and third questions above are specific to sample-based music. The others are more generic but take on a special function in many such works. A list related to any other electroacoustic genre or category would look quite dissimilar to this one. These questions are all discussed in the analysis of Trevor Wishart's sample-based composition in Chapter 9 of this book.

This template has been proposed as a starting point for investigations and subsequent presentations of analyses of electroacoustic works. It has also been conceived to offer some consistency in terms of the presentation of electroacoustic analyses regardless of the answer to the four-part question. It is not complete, nor is it intended to remain in its current form. It will evolve as new genre hybrids on the one hand and technological tools on the other are developed.