∿ | Introduction

SIMON EMMERSON AND LEIGH LANDY

Additional online resources for this book can be found at: www.cambridge
.org/9781107118324.

This book is the result of an Arts and Humanities Research Council
funded project *New Multimedia Tools for Electroacoustic Music Analysis*
(2010–13), designed to address a range of genres, drawing together existing
methods, engaging the latest interactive and hypermedia tools, and apply-
ing them to compare their strengths and weaknesses. This contribution
aims to introduce the reader to the background ideas which have, we trust,
guided and given direction to this initiative. 'Analysis' means many things
and these will depend on mutually interactive questions such as which
tools/approaches, for which works/genres, for which users, with what
intentions. It would be impossible for a single volume to cover all the
possible options and combinations. We have tried to open the field out
from a limited core set of genres and approaches (which have tended to
dominate the literature in the last 20 years or so) to embrace an eclectic
group of practices and to encourage a *range* of different points of view.

The project included the development of two new – and very different –
applications. First, a multimedia software package, EAnalysis (Pierre Couprie),
which takes visualisation of sound into new areas, allowing advanced
annotation of its characteristics, not only for analysis but also for a wide range
of uses; second a website, OREMA (Online Repository for Electroacoustic
Music Analysis) (Michael Gatt), possibly the first forum for sharing and
discussing analyses. The website was intended to develop a new model for
analytical methods through sharing and interactive discussion and to open out
the discussion from the narrow confines of academic journals and conferences.

We initially divided the corpus of electroacoustic music into genres (e.g.
acousmatic, electronica, glitch, soundscape), but these have hybridised con-
tinuously – an *installation* may include *algorithmic* generation, be *interactive*
and use *soundscape* and *acousmatic* materials. We clearly need a range of tools
for analysis, as well as a range of approaches to their application.

Thus Part I of the book contains a single chapter by the editors intended
to address 'the differing needs of the genres and categories' of

3

electroacoustic music when it comes to analysis. We experienced a difficult balancing act between the desire for an eclectic breadth and the need to contain the field in a manner that the reader could make sense of. Defining clearly the questions that analysis asks is common to all types of music, but electroacoustic music has some very special approaches to its soundworld and practice that are clearly very different from longer established 'note-based' methods. We hope that the outcome as seen in the remainder of the book goes some way along this sometimes tricky high wire.

Part II of the book addresses new ideas for *thinking about what is going on* and how this affects the *tools we need*. These contributions look at 'high-level' issues or aim to challenge existing approaches to analysis. In his chapter 'Listening and meaning: how a model of mental layers informs electroacoustic music analysis', Gary Kendall challenges static representations of music structure, moving away from ideas of 'sound object' to 'sound as event'. He adapts a layered model of mental processing to music and grasps the difficult but essential notion of the 'emergence of meaning' from the listening experience. John Young tackles an area underrepresented in work to date, namely form (and structure), in his chapter 'Forming Form'. He re-examines different views of forming musical experience over time. Comparing 'moment form' and Wishart's 'morphic form', the sculptural and the rhetorical, and their relationship to narrative, he gives a special place to what electroacoustic music adds to this experience. Michael Young challenges traditional views on analysis of a fixed 'work' – in this case one that might be generated anew at each performance. In his chapter 'Interactive and generative music: a quagmire for the musical analyst', he suggests that machine participation in composition and performance changes the nature of the questions we ask about the music. It may not be possible simply to 'listen to the result' as if the way we got there did not matter. Finally in this part, Raúl Minsburg addresses some high-level issues in his contribution 'Some ideas concerning the relationship between form and texture'. He argues that, historically, texture has been too little discussed, that is, how we perceive *layers* of music and their contribution to changing *complexity*, and that this is a key element for the building of formal structures. Using examples of work from South America he suggests a strong relationship of *textural modulation* to form.

Part III looks more specifically at the practical development of new tools. While the tenor of much of this book is strongly listener focused, Tae Hong Park argues the case for machine application, describing his ideas in 'Exploiting computational paradigms for electroacoustic music analysis'. His ongoing work on Systematic and Quantitative Electro-Acoustic Music

Analysis (SQEMA) is applied to a group of contrasting pieces, showing
how new multimedia analytical applications can reveal important features
of the music. There follow two contributions from the project team
members introduced at the opening. In 'OREMA: an analytical commu-
nity', Michael Gatt examines the origins and rationale behind the OREMA
(Online Repository for Electroacoustic Music Analysis) website and its
aims to add a 'wisdom of the crowd' dimension to the toolbox. Pierre
Couprie's 'EAnalysis: developing a sound-based music analytical tool'
examines the aims and objectives behind this new software and how the
challenges of new media may be harnessed to give us better ways to
represent the music.

Then in Part IV the authors present analytical examples illustrating a
wide variety of genres and approaches – each has unique demands on the
analytical method.[1] As an example of how analytical work can address
different audiences, Leigh Landy develops the theme in discussing 'Trevor
Wishart's *Children's Stories II* from *Encounters in the Republic of Heaven*:
an analysis for children of a sample-based composition' using a language
designed to communicate with school-aged people and their teachers. In a
chapter which aims to come to terms with 'new wave' developments in
materials, instruments and performance that came about in the 1990s
derived from more mainstream popular practice, Ben Ramsay looks at an
example of 'IDM/electronica' in 'Analysis of *Foil* by Autechre (from *Amber*
(1994))', showing how sound identities and relationships are established in
this genre. Acousmatic music has many streams and traditions. Ambrose
Seddon focuses on how recurrence may be related to timbral evolution and
real-world references in his chapter 'Temporal recurrence in Andrew
Lewis's *Penmon Point*'. John Ferguson's contribution ('Michel Waisvisz:
No Backup/Hyper Instruments') discusses how to come to grips with new
invented electroacoustic instruments designed primarily for improvisation,
where analysis demands the inclusion of the performative. There follows a
chapter on another genre to demand greater account of context. In
'Analysing Sound Art: Douglas Henderson's *Fadensonnen* (2009)',
Kersten Glandien examines a work of sound sculpture which challenges
established norms of analysis – the work weaves together experience of
both the physical and sonic spaces it defines.

Two succeeding chapters look at genres which 'sample' sound and
actively use our recognition of sources in their discourse. Manuella

---

[1] Not all feel the need for an EAnalysis or Acousmographe representation.

Blackburn's 'Analysing the identifiable: cultural borrowing in Diana Salazar's *La voz del fuelle*' focuses on 'cultural borrowing' – the use of recordings of tango, what that might indicate and how this influences the way we follow the work. Sophy Smith has pioneered analysis of turntable music. Here she explores in detail a team turntable routine by Kireek ('*Kireek* 2011 Championship routine analysis'). She has developed a notation for this virtuoso gestural world and shows how the routine is performatively structured. Simon Emmerson looks at an example of more recent developments in the notated instrumental Western tradition in his contribution 'The analysis of live and interactive electroacoustic music: Hans Tutschku – *Zellen-Linien* (2007)'. Starting from the listening experience alone, he works back only later to the composer's notes and eventually the score.

Analysis of two very contrasting genres of soundscape conclude the book. Andrew Hugill and Panos Amelides examine 'Audio-only computer games: *Papa Sangre*' – arguing for their inclusion as sound art, with strong environmental, narrative and affective dimensions, enhanced by the acousmatic nature of the experience. They suggest that 'play' can become performance. Finally Katharine Norman returns to the world around us and how we listen to it with her chapter 'Some questions around listening: *Vancouver Soundscape Revisited* by Claude Schryer'. She weaves together recognition, memory (individual and collective), space and time all as components of a listener's imaginary soundwalk.

(No) Conclusion

All parts of this book offer both general and genre-specific examples of the state of developments today and will hopefully provide an incentive to expand the horizon of electroacoustic music analysis further in the years to come.

It aims to open doors to new futures and we have seen – and will continue to see – considerable further development of software since the conclusion of the original project (September 2013). The world of electroacoustic music is broad and, compared with many other forms of music, still quite young. Integration with analytical tools used for different purposes in note-based music deserves further attention and tools for analysis going across the new media arts are expected to develop apace.

There may be no Schenker equivalent in electroacoustic music analysis as each genre has such different approaches to substance, process, form and performance. What we have tried to do is to assemble a toolkit by

example. While such a collection is necessarily incomplete, we aim to introduce this wide range of new options, crucially shared under a single cover such that you, the reader, may make choices – and perhaps develop and share additional tools for future work.

The website to accompany this book, which will be launched at publication, will contain colour images (of figures printed in black and white in this volume) as well as sound examples.

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 construc-
tion of a work, as opposed to being related to its reception? Why have so
few tools and methods been proposed for electroacoustic music analysis[2]
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, *Understand-
ing 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 (music-ologists, 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 qualities[4] 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 Acousmographe 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 aesthesic 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.

As suggested earlier, an analysis may include investigations of more than one aspect. One might consider analyses involving *three intentions for one piece*. In this example, one might conceive of someone investigating the relationship between order/disorder and narrative discourse in a specific work or the relationship between layering and simultaneities or the relationship between source identification and structure in the same work. It is equally conceivable that one apply *a single tool across three dissimilar genres*. One might consider investigating sound recurrence and variation through sound spotting in an acousmatic, a lower case or a Sound Art work. It would be easy to conceive of hundreds of such examples. These examples show the breadth and flexibility of the four-part question.

The four-part question and its associated template allow us to look at electroacoustic analysis holistically. It is clearly true that the four-part question could be used for any type of music. It has been proposed here to help people identify exactly what they might seek from an analysis of an electroacoustic work or genre. These two together have made it possible for us try to delineate an area of electroacoustic music analysis. They formed an important part of the project's foundation and that of the current book, and offer a point of departure for those interested in undertaking analytical studies.

Genres and categories: differing demands

Now we have attempted to delimit the field in the questions and template discussed above, let us turn to the varying needs of the genres and categories themselves. Genre and category (as we have defined them) may be seen as essentially social constructs, in some ways comparable to subcultures which are based on shared practice. As has been much discussed by ethnomusicologists over the years, this can create problems of 'insider/outsider' decoding – members of a given social group may articulate the important features of their culture in very different ways to an outsider. These have been termed 'etic' and 'emic' differences. Etic refers to a *measurable* difference, emic to a *significant* difference. Thus the idea of emic is based on salient features as defined by the community of practice. But this raises some interesting issues – is it not possible for a community to work in a particular way *unaware* (or at least not consciously aware) of some features of their work which seem obvious (salient) to outsiders? In the tradition we know as 'acousmatic', practitioners claim to judge

combinations of sounds on the 'ear', that is, 'what sounds right'. They rarely say much more on what that sounding right actually entails. It may thus have to be much more an outsider's view as to how we answer that question.

What kinds of things do we want to examine? What are the salient aspects and how do we describe them? Our research has thrown up some unexpected applications of words and meanings. One theme that has emerged is the steady migration of a language derived from one genre (or category) applied to another – this may lead to some confusion which may need to be tested to see what might be valuable. The following terms are all found in the literature to mean roughly the same thing – *parameters*, *variables*, *qualities*, *attributes*, *properties*, *features*. We must remember, however, that these have been largely developed with respect to analysis of the sound signal or its transcribed (visualised) substitutes. Applied more broadly to interpretation and more subjective listening traits, the meanings shift. Thus the salient features of a genre need to encapsulate not only the soundworld, but also the world of interpretation and sites of reception.

Hence each genre or category is 'generated' by its salient features.[7] These features work effectively like tags which configure into 'clouds' for a given genre practice. These demand languages of description – that is, vocabularies – which in turn help define suitable tools for analysis. The following list reduces the large range of analytical issues described above in the 'template' to four key areas – material, construction, interpretation, site and place. These interact continuously but help define the vocabularies we have seen emerging in the last 50 years for the definition of genre. None can strictly be separated – a genre may privilege one or another but all will play a part to some degree.

Material and its organisation

There is an assumption in this undertaking that we are dealing (with some small exceptions) with what Landy has described as 'sound-based musics' – that is, those where pitches (or 'notes') play a secondary role (if any) to sound qualities. Also we confine ourselves to musics where technology plays an important mediating role. Thus sounds are our subject – and such genres will need an agreed representation and description.

---

[7] Not the other way round.

That said, we note that some of the contributors to the analytical part of this volume resisted 'outside time' representations of their chosen music when discussing the organisation of the sounding flow.

There was a range of reasons – mostly that 'fixing' time in this way gave a false sense of music as 'architecture'. By appearing to fix structure and form in this way, the time dimension is frozen in space and (it is argued) its perceptual essence lost. The alternative view prefers to describe music rather as a living organism having 'growth' and 'behaviour', and the listener as part of a process emerging from the accumulation of experience over time. The 'sound object' gives way to the 'sound event'.

The advent of analysis tools that include full playback facilities has made a substantial difference in this respect. Programs such as Sonic Visualiser, Acousmographe and this project's EAnalysis return the time domain (listening) to near the forefront of use features. In forthcoming versions of books such as this read on portable devices, all musical figures will have the capacity to play back their materials.[8] Taken to an extreme, we might not need to discuss music *with words* at all – leaving its experience unsullied by mere verbal or graphic interpretation. But words are a form of representation (however limited) which can guide us over time through an enhanced experience.

Interpretation

Ecologically informed thinking ensures we do not erroneously separate interpretation from perception itself in some arbitrary manner. It is intimately bound in with how we discuss materials and organisation. Most clearly this is true on those many earlier discussions that deal with surmising sources and causes in acousmatic music. We are at the same time describing a sound quality and its behaviour, but with respect to some imagined object and agency, 'out there'. We play games with the real, the imaginary and the imaginative. Denis Smalley has suggested (1996) that we need reference to what he calls the real world's 'indicative fields' to make sense of the acousmatic musical flow. Then a further sense of interpretation was introduced by Luke Windsor (after Gibson) (2000), who introduced *affordance* to the musical vocabulary. This may be interpreted

---

[8] Of course, this is possible today and effective in e-journals – but copyright issues still inhibit widespread adoption.

both literally (the music affords us listening) and imaginatively (the music may 'tell stories' and afford us empathic responses).

The domain of the more personal response – of narrative, meaning, affect and feeling – has been difficult to grasp and largely ignored until recently in analytical discussion of contemporary music in general and electroacoustic music in particular. In commissioning the analyses contained in this volume, we encouraged all the authors to address this area. Not surprisingly, those who wished to forefront symbolic and extra-musical reference found this to be no problem but we sense a continuing need to develop (over a longer timescale than we have available) a community discussion on what many of these musical genres convey or mean.[9]

Site and place

What is the music *in this place* communicating to us as individuals and as a community and how best do we communicate that amongst ourselves? All music is interpreted and presented some*time* and some*where* and this will always affect what takes place. But this trivialises the degree to which site and place can be fully *part* of the musicking. Where I am and who I am with when I listen to music (or participate in its making) effects salient features and qualities of the result. While clearly true of site-specific installations – where the materials and their organisation are determined largely by the site itself – it is equally true for freer forms of live music making such as improvisation.[10] Here there may be a strong sense of theatre and dramaturgy, an essential empathy between audience and the performers which may be hard to capture and account for.

However, there remains a legacy of 'absolute music' which persists in some genres – those that claim a 'high art' heritage usually. In this view, the music exists outside of its performance time and place – a Platonic ideal to be aimed for in performance, though rarely achieved. In the fixed media acousmatic genre, this is sometimes equated with a 'neutral/perfect' studio listening experience such as the composer might have had, though others see the performance as 'completing' the composition and thus demanding that the performance space be taken into account (Harrison 1998).

We thus have a reciprocal and dynamic relationship: the genre as practice is defined by salient features and an appropriate vocabulary through

---

[9] In Chapter 2 of this volume Gary Kendall makes a further step along this long road.
[10] As Sophy Smith (Chapter 15) and John Ferguson (Chapter 12) discuss in this volume.

dynamic and evolving configurations of material, construction, interpret-
ation, site and place.

'Poietic leakage'

While the orientation of this project is clearly to focus on the listener's
experience and how the music may be analysed from this perspective, it is
of course impossible completely to *exclude* the composer's intentions on
the one hand and the poietic aspects of social context on the other. Both of
these contribute to the construction of the music in some way, and the
knowledge the listener has of these will influence the resulting experience.
For example, this is clearly true when socially sited aspects of practice
become dominant – it may be that a very real social critique is embedded
in the performance. Take *hardware hacking* – here the primary purpose
often lies in social activity, the practice *resists* acousmatic aestheticisation
of the sound alone and usually demands a visual dimension (perhaps
projection) and some knowledge of the real objects and social circum-
stances of the performance. An examination of music as social practice
clearly demands more than simply recorded sound. We may also listen
differently if we know (or are told) that a work is generated from a
particular (say a *swarm*) algorithm. This knowledge might be a helpful
part of the learning cycle – if several swarm pieces share characteristics, we
may in time learn to recognise these characteristics without prompting.
There are many more such examples of *poietic leakage* being vital to the
listening experience.

Some examples

We cannot here illustrate every genre and its needs – many are covered in
the discussions of Part IV. Here we aim simply to show how a range of
genres generate different visualisations and hence demand different
approaches to discussion. Each EAnalysis page shows contrasting examples
of salient features addressing material, construction, interpretation with
reference also to issues of site and place – in each genre similar features
may be present but with (very) different emphasis. Types of relevant
language and 'holes' in the descriptive vocabularies will be highlighted
and filled as the research progresses. We have in general suggested that
many 'taboo' issues of representation and description be abandoned as a
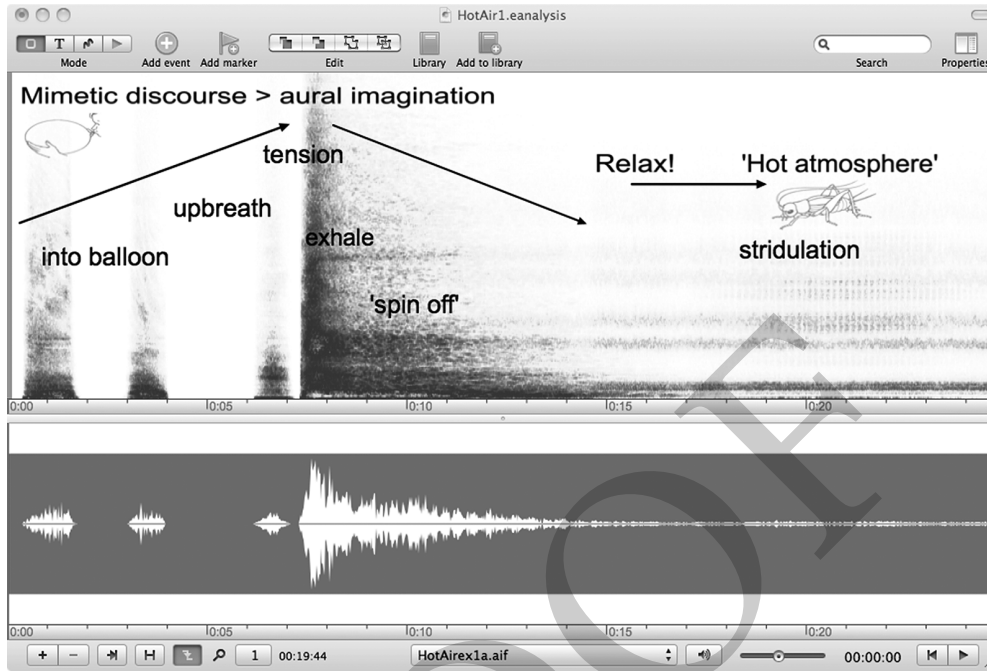
Figure 1.1 Jonty Harrison – *Hot Air* (opening)

way of 'freeing up' the discussion. Thus if we believe we hear a cicada sound, then perhaps a pictogram of a cicada will illustrate that this is indeed a real-world referent for the listener (Figure 1.1).[11] However, there is no (equivalent) pictogram for mains hum[12] – so one could instead use the written phrase (Figure 1.2).

Thus an example from a fixed media acousmatic tradition – *Hot Air* by Jonty Harrison – is rich with real-world references 'feeding back' into the more musically abstract discourse.[13] Its salient features and hence vocabularies of description reflect this wide range.

The glitch work *Cyclo (C2)* by Ryoji Ikeda and Carsten Nicolai is centred on technological artefact. The hum, spark sounds and glitches have extraordinarily characteristic spectra quite unlike the natural environmental sounds of the Harrison. We can also easily extract the rhythmic articulation and the 'call and response' patterns within the motifs. Sounds originally

---

[11] Colour versions of the figures in this chapter may be found on the website accompanying this book.

[12] Of course, other electrical symbols might be useable.

[13] This would be described as a 'balance of aural and mimetic discourse' in Emmerson (1986) and as 'expanded listening' in Harrison (1996).

Figure 1.2 Ryoji Ikeda and Carsten Nicolai – *Cyclo (C2)* (opening)

associated with 'breakdown' or 'failure' are now commonplace and have migrated to other genres and sites of practice.

Our third example is the classic soundscape composition *Kits Beach Soundwalk* by Hildegard Westerkamp (Figure 1.3). Here we see how the piece is structured sonically – and how this follows the composer's 'voice-over' narrative. What is emphasised by the display is the frequency-dependent 'sculpting' of the sound – with the delicate environmental sounds 'floating' above the city – which has been surgically removed (filtered out) to allow the small sounds greater voice. The two dream sequences are clearly differentiated, the second incorporating quotations from Xenakis's *Concret PH* (unaltered) followed by Mozart's Clarinet Concerto (hi-pass filtered to match the surrounding frequencies). This all confirms our ear's suggestion of a kind of 'niche theory' (Krause 1987) in which the voices of nature speak more clearly through unmasked frequency bands. The pertinent feature here is the relationship of frequency band to perceived environmental cause.[14]

---

[14] This is expressly referred to in the voiceover – which 'demonstrates' the exaggeration and then filtering out of the city ('the monster').
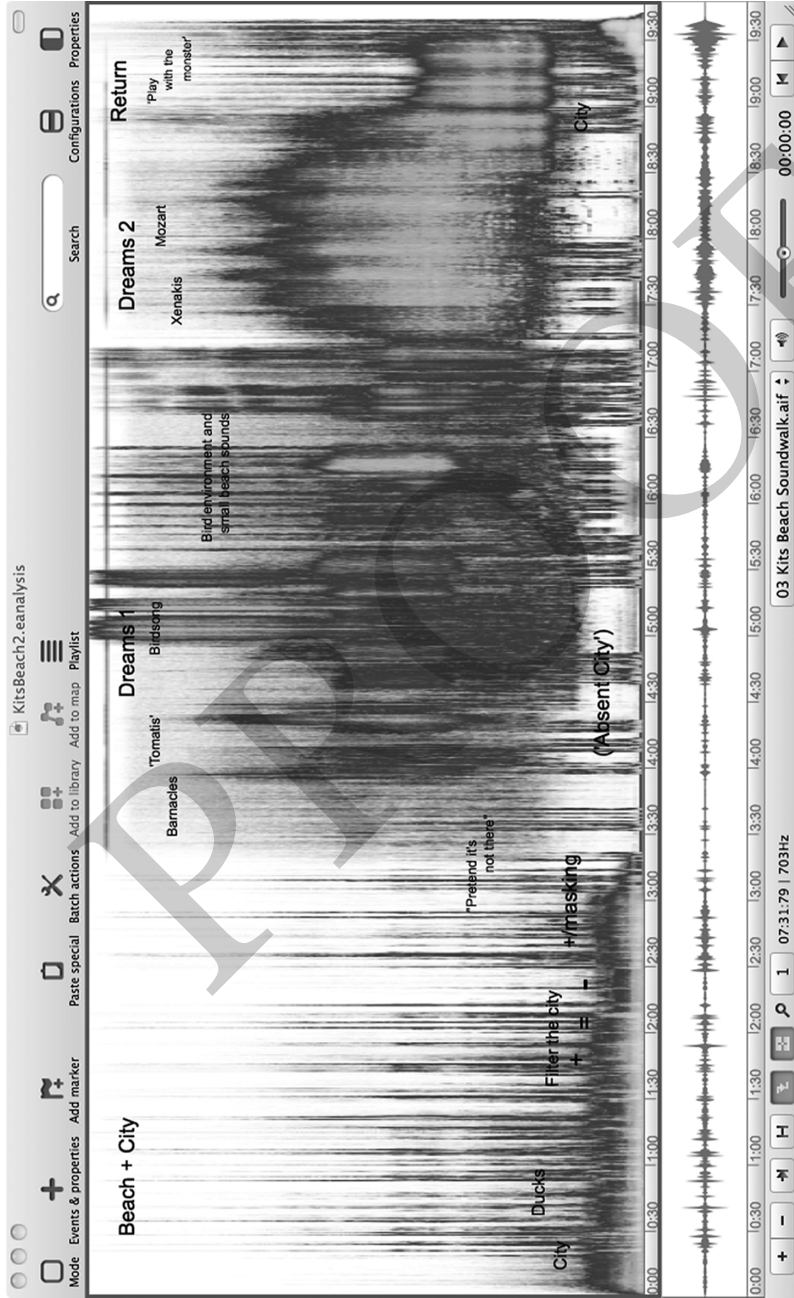
Figure 1.3 Hildegard Westerkamp – *Kits Beach Soundwalk* (overview)

Conclusion

We have developed a symbiotic model of genre and analysis with electro-acoustic music which is dynamic. Over time, genres of music change and hybridise. The genre as practice defines to a large part its salient features not all of which we will immediately grasp. Analysis seeks to uncover, explain and integrate our experience of the music (or sound art) and how it 'works'. This is a potentially vast task where there is no definitive analysis; we have thus attempted to bring a degree of order to this field by articulating a four-part question and a template. These we put to the authors of the contributions in Part IV who analyse examples from a range of genres. While they have each applied the ideas in a different way – some in common across a range of genres, others more specific to the artwork they have chosen – there is a core coherence which we believe unites their purpose.

References

Bregman, A. S. 1994. *Auditory Scene Analysis: The Perceptual Organization of Sound*. Cambridge, MA: MIT Press.

Casey, M. 2009. Soundspotting: A new kind of process? In R. T. Dean (ed.) *The Oxford Handbook of Computer Music*. Oxford University Press.

Clarke, M. 2006. Jonathan Harvey's *Mortuos Plango, Vivos Voco*. In M. Simoni (ed.) *Analytical Methods of Electroacoustic Music*. London: Routledge, 111–43.

  2010. Wind chimes: An interactive aural analysis. In É. Gayou (ed.) *Denis Smalley: Polychrome Portraits*. Paris: INA/GRM, 35–57.

Couprie, P. 2012. EAnalysis: A new electroacoustic music analysis piece of software, in *Proceedings of the Electroacoustic Music Studies Network Conference, Stockholm 2012* (www.ems-network.org/spip.php?rubrique48).

Emmerson, S. 1986. The relation of language to materials. In S. Emmerson (ed.) *The Language of Electroacoustic Music*. Basingstoke: Macmillan, 17–39.

  2007. *Living Electronic Music*. Aldershot: Ashgate.

Handel, S. 1989. *Listening: An Introduction to the Perception of Auditory Events*. Cambridge, MA: MIT Press.

Harrison, J. 1996. Liner notes, *Articles indéfinis* (CD), Empreintes Digitales: IMED 9627.

  1998. Sound, space, sculpture: Some thoughts on the 'what', 'how' and 'why' of sound diffusion. *Organised Sound* 3(02), 117–27.

Krause, B. 1987. The niche hypothesis: How animals taught us to dance and sing. *Whole Earth Review* 57.