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A Sonic Arts Approach to Sound Design Practice

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Abstract

This *practice-as-research* study documents the development of a sonic arts approach to film sound design. An interdisciplinary conceptual framework that combines selected theories of electroacoustic music and apposite perspectives from film soundtrack studies informs the approach. Over the course of the research, a broadening practical knowledge of theoretical applications influenced the development of the sound design approach and its conceptual framework.

The term 'sonic arts' characterises the compositional tenets of the sound design approach, which takes the form of an *inter-modal* strategy based on the interdependence of two compositional modes. The *intersonic* compositional mode corresponds to sound-object design and to the forming of meaningful structural relationships between soundtrack elements. The *audiovisual* compositional mode corresponds to forming meaningful relationships between soundtrack elements and film images. The overall approach also reflects Walter Murch's concept of sound design as a multifaceted practice endeavour, which includes taking creative responsibility for the soundtrack in post-production (Murch 1995).

The presentation of research in this thesis comprises two distinct parts. The first part outlines the sonic arts approach, defines the theoretical basis of its conceptual framework, and identifies potential practice applications. The second part presents three case studies of sound design practice for independent film projects. The case studies document applications of the conceptual framework and critically reflect on acquired practical knowledge of the sonic arts approach.

The study concludes that the electroacoustic music theories of *spectromorphology* and *indicative fields* (Smalley 1986; 1992; 1997) have useful applications in sound design practice as a perception-based system of analysis. The research also illustrates that *sonic landscape* theory (Wishart 1986; 1996) constitutes a creatively enabling conceptual framework for sound design when it is applied to the inter-modal compositional strategy.

Contents

Chapter 1

Introduction

Within the area of film soundtrack studies there are indications of increased emphasis on interdisciplinary research.[1] This has highlighted the potential for analytical studies of film sound to develop deeper levels of critical engagement with the practice perspectives of soundtrack creators (Sergi 2004). It is further suggested that soundtrack studies can evolve its interdisciplinary focus by opening a research dialogue with intersecting domains of sound practice (Grajeda & Beck 2008).

In this regard, the emerging field of sound design practice-research can contribute to interdisciplinary soundtrack studies by developing its links with the sonic arts. Electroacoustic music is one sonic arts domain with the potential to theoretically enrich sound design practice-research. On closer examination, there is logic to pursuing such a research direction, as the origins of sound design and electroacoustic music share a connection to the innovations of 1950s electronic music. This common ancestry implies the possibility for a synthesis of ideas to establish a research exchange between the two areas that converges on compositional approaches to the soundtrack of audiovisual media. The timing for such an endeavour may now be appropriate, as within electroacoustic music there are signs of its traditional insularity being challenged by calls for a development of its relationship with the visual arts (Emmerson 1999; Waters 2000; Landy 2007).

[1]For example, Altman (2007) emphasises the need for soundtrack studies to develop a more interdisciplinary outlook.

1.1 Background to the Study

This thesis constitutes a pilot study in the field of interdisciplinary sound design practice-research. The purpose of the study is to research a holistic compositional approach to film soundtrack creation and develop applications for it in practice. The 'sonic arts' form of the approach reflects its basis in an interdisciplinary conceptual framework that integrates theories of electroacoustic music and informing perspectives from film soundtrack studies. Overall, this study aims to contribute knowledge and research that is cogent to scholars in the areas of soundtrack studies and electroacoustic music, while retaining an applied relevance for sound designers and other sonic arts practitioners.

Implicit to this study is a learning cycle, whereby the practitioner-researcher accumulates experience of applying an experimental approach and conceptual framework. This constitutes acquired practical knowledge, which has the potential to modify theoretical interpretations and refine subsequent practice applications (Sternberg & Horvath 1999). Through practice case studies, this research engages in generating and documenting practical knowledge. Consequently, the assimilation of practical knowledge is a key aspect in the development of the interdisciplinary conceptual framework and the sonic arts approach to sound design.

The subsequent sections develop the argument for pursuing a sonic arts direction in sound design practice-research. This commences with an overview of the development of sound design in film industry practice, and is followed by a discussion of the interdisciplinary focus of soundtrack studies.

1.1.1 A Synopsis of Film Sound Design Practice

In the film and television industries, the practice of sound design is primarily associated with sound effects creation (Sider 2003). Working in Hollywood, there is also a minority group of highly respected sound designers who on occasion assume extended creative responsibilities for the soundtrack (Beck 2008).

The term 'sound design' was first coined by Walter Murch to denote the spatial mixing practices for surround sound that evolved during the post-production of *Apocalypse Now* (1979) (Murch 1996; Lastra 2008). Murch's approach to sound design engendered a multifaceted role, one that incorporated sound effects creation, re-recording, mixing, and overall responsibility for the soundtrack (Murch 1995; 1996). Reflecting this approach, Murch also advocated the sound designer as the soundtrack's 'creative director' (Ibid.). This aspect of sound design implies a mandate for developing the 'artistic vision' and 'sonic character' of the soundtrack (Sonnenschein 2001; Sider 2003; Zettl 2005), a role concept that has also invoked hierarchical analogies with cinematography and production design (LoBrutto 1994; Beck 2008).

In the 1970s Murch was a key figure in the *American New Wave*, a filmmaking movement that challenged the systemic constraints on film production imposed by Hollywood studios and trade unions. One aspect of the movement's departure from industry conventions involved a revaluing of the soundtrack and its associated practices. Also during this period, technological developments including the emergence of Dolby standards awakened the film industry to the creative possibilities of the soundtrack (Sergi 2004). This combination of technical facilitation and creative agency steered the subsequent evolution of soundtrack practices towards the era of sound design. In this context, Walter Murch and Ben Burtt became significant industry players in a practice-led initiative to "[...] shift the focus from sound people as 'technicians' to sound people as 'creative' figures [...]" (Ibid., p.182). Moreover, this creative agency was deeply embedded in the American New Wave's auteur principles and artistic sensibilities towards developing the narrative significance of film sounds (Flueckiger 2009).

Murch's influential role in the 1970's evolution of soundtrack practices is defined by his creative empowerment to explore the representational possibilities of film sounds. His subsequent development of soundtrack aesthetics and narrative applications focuses on a series of collaborations with the American New Wave directors Francis Ford Coppola and George Lucas. Prior to *Apocalypse Now*, Murch received the film

credit 'sound montage', which he acknowledges was a strategy to offset union sensitivity towards his practice of integrating conventionally separated post-production roles (LoBrutto 1994). Films such as *THX 1138* (1971) and *American Graffiti* (1973) demonstrate the sonic artistry of Murch's approach to sound montage (Whittington 2007), as well as the innovative re-recording and mixing techniques that were intrinsic to its development (Murch 1995).

In interviews Murch has remarked that his approach to sound montage was inspired by a desire to apply *musique concrète*[2] to film soundtracks (LoBrutto 1994; Costantini 2010). This compositional approach is evident in *THX 1138*, and indeed Whittington (2007, p.57) describes the soundtrack as a "[...] symphony of musique concrète". Murch continued to refine sound montage and extend its aesthetic palette on other American New Wave films, including *American Graffiti* (1973), *The Conversation* (1974), and *The Godfather: Part II* (1974).

Analysis of these soundtracks reveals the signature qualities of Murch's approach to sound montage. This includes realistic spatial and electro-acoustic renderings, finely orchestrated arrangements of sound effects, as well as symbolic uses of sound in metaphorical relationships with the image (Murch 1996; Whittington 2007). These aspects of sound montage extended the narrative significance of film sounds beyond those functions that merely support the image. Moreover, in films such as *THX 1138* and *The Conversation*, the soundtrack often challenges the storytelling hegemony of the image, to the extent that the ear perceptually 'leads' the eye.

As with later sound design, the practice innovations of sound montage were creatively enabled by developments in sound recording and studio production technologies (Sider 2003; Sergi 2004). For example, on *THX 1138* and *American Graffiti*, Murch made extensive use of the Nagra recorder to capture the natural reverberation of sound effects diffused into various acoustic environments (LoBrutto 1994). Murch subsequently termed this re-recording technique 'worldizing' (Murch 2003).

[2]A compositional form of experimental electronic music that developed in the 1950's. See section 2.1.

Sound montage is regarded as the practice precursor and technical foundation of Murch's approach to sound design (Whittington 2007; Beck 2008), which amounted to a "[...] strategy to modernize the soundtrack, integrating sound more fully and effectively into the production process" (Sider 2003, p.5). Following the inauguration of sound design with *Apocalypse Now*, Murch received critical acclaim for the film's sound mix.[3] Despite this, sound design's industry debut opened up a "[...] major fissure in the rigid hierarchy of film sound" (Beck 2008, p.73). This resulted in Murch's concept of the sound designer role being met with objections from unions and industry protectionists intent on preserving soundtrack post-production conventions and divisions of labour (Ibid., p.74).

The industry marginalisation of associations between sound design and soundtrack creative directorship, or integrated post-production roles, is contrasted by its popular acceptance as a sound effects creation practice (Ibid.). This association was forged in the 1980s through the notable work of sound designers like Ben Burtt and Frank Serafine on science fiction and action-adventure epics (Mancini 1985; LoBrutto 1994). In general, this circumscribed definition of sound design practice has remained predominant throughout Hollywood's post-Dolby era (Beck 2008).

Sider (2003) laments the failure of Murch's concept to become standard practice, tying it to the persistence of industry attitudes which leave the soundtrack "[...] mired in its traditional use as an add-on or embellishment for the picture" (p.6). Industry practitioners generally concur with this view, highlighting sound design's unfulfilled storytelling potentials (Ibid.; Thom 2003) and less-than-optimal integration with production cycles (LoBrutto 1994; Pasquariello 1997). This suggests that fixed industry associations with sound effects creation are effectively stalling the practice development of sound design, particularly in ways that could reinvigorate the Murchian approach. This curtailment of sound design's reformation in film and television is contrasted by its practice diversification across the creative industries to encompass computer gaming and online multimedia. Possibly as a reflection of this trend, sound design is now emerging as an area for postgraduate study. Furthermore,

[3] Murch received an Oscar for his sound mix for *Apocalypse Now* in 1979.

through the launch of specialist soundtrack studies journals[4], film sound design is increasingly becoming the subject and source of academic research.

1.1.2 Film Sound Studies and Sound Design Practice-Research

Belton (1985, p.64) argues that because film sound is largely appreciated in terms of its relationship to the image, it is adjudged to have a subordinate status as a representation. This appears to underpin an 'image bias' within film studies that demeans the analytical significance of the soundtrack. Altman (1992, pp. 37–38) frames this bias as an 'ontological fallacy', a denial of the perceptual impact that sound has on the structure of film experiences and narrative interpretation.[5] More recently, Sergi (2004, p.4) has also stressed that film studies must confront this bias towards 'visual literacy' within its own discourse.

Beck (2008, p.73) identifies a tacit form of image bias in Chion's controversial claim that "there is no soundtrack" (see Chion 1999; 2009).[6] He regards Chion's position as indicative of how film studies can be misled into devaluing the soundtrack because the film industry itself reinforces the image's dominance over sound (Beck 2008, p.73). Sergi (2004, p.58) also argues that a pervasive image bias in traditional film studies has marginalised the soundtrack within its discourse, or otherwise given it a diminished status. However, he suggests that the recent growth of practice-focused 'novel' discourses on film sound has offered something of a counterbalancing perspective (Ibid., pp. 57–58).[7] Similarly, Hanson (2007) heralds the positive impact of texts that compile interviews with leading practitioners, on determining the scope of soundtrack studies.[8] One may also highlight the significance of scholarly contributions made by prominent sound designers[9], which counteract the entrenched

[4]For example, *The Soundtrack* and *Music, Sound and the Moving Image.*
[5]See also Altman (1985, pp. 51–52).
[6]The most recent version of Chion's argument is outlined in Chion (2009, pp. 226–230).
[7]This includes online resources (e.g. http://www.filmsound.org) and published interviews with film sound practitioners. Sergi also points to the rise of DVD commentaries and extra features on sound.
[8]For example, LoBrutto (1994), Pasquariello (1997) and Kenny (2000).
[9]In reference to Murch (1995; 1996) and Thom (1999).

image bias in film studies discourse by foregrounding, the creative rationales and agency associated with soundtrack post-production.[10]

Altman (2007, p.7) views the integration of practice rationales towards audiovisual relationships as being essential to the future interdisciplinary direction of soundtrack studies.[11] Grajeda and Beck (2008) further claim that the interdisciplinary focus requires "[...] a discursive, transmedial method of analysis, where the pedagogic tools of one field of knowledge are whetted and sharpened by those of another" (p.110). This signals the need for greater contributions from sound design practitioner-researchers that transcend the contextual divide between the film industry and academia (Sergi 2004).

It would be lamentable if the interdisciplinary advancement of film sound studies were to be hindered by a lingering epistemological schism between two established modes of discourse on the soundtrack. These modes correspond to authorial perspectives that are essentially 'etic-analytical' or 'emic-practice' in their focus.[12] For example, Chion's soundtrack analysis has remained consistently impervious to practitioner insights across a series of texts.[13] Conversely, the soundtrack production rationales advanced in practice-orientated discourses are seldom framed by film studies concepts.[14] Of course, it must be acknowledged that both modes of discourse reflect the epistemological preferences of readerships primarily affiliated to either the film industry or academic institutional context (Sergi 2004). However, on further consideration, soundtrack studies is increasingly confronting issues such as image bias and the 'discourse divide' via a third interdisciplinary modality of writing. For example, Sergi (2004) and Whittington (2007) demonstrate this interdisciplinary principle by integrating perspectives on sound design practice[15], whereas

[10]See also Sergi (2004).
[11]See also Altman (1992).
[12]See Sergi (2004, pp. 56–57) who makes a parallel distinction between film studies' academic (traditional) literature on the soundtrack, and those industry-focused (novel) accounts that include articles/texts authored by practitioners.
[13]See Chion (1994), Chion (1999), and Chion (2009a).
[14]In reference to LoBrutto (1994), Pasquariello (1997), and Kenny (2000).
[15]See also Sider *et al.* (2003) and Grajeda and Beck (2008).

Sonnenschein (2001) illustrates how an instructional guide can be inclusive of soundtrack studies concepts.[16]

1.1.3 A 'Sonic Arts' Direction for Sound Design Practice-Research

Sound design practice-research is embryonic at present, but the future value of its knowledge contributions is dependent on a trajectory that must intersect the film industry and academia. In order to contribute meaningfully to soundtrack studies, sound design practice-research could adopt its interdisciplinary conceptual frameworks and extend them. For the industry, sound design practice-research might demonstrate the relevancy of its applications and stimulate new approaches to soundtrack creation. The form of these knowledge contributions raises the issue of how sound design practice-research should be pursued. Grajeda and Beck (2008) propose a plausible course, noting that soundtrack studies' interdisciplinary outlook may benefit from engaging dialectically with other sound production domains, taking an approach that "[...] circulates between the imperatives of medium specificity and the cultural ubiquity of sound practices" (p.110).

This suggests that sound design practice-research could thrive by opening an interdisciplinary research dialogue with other sonic arts domains. While Licht (2007) argues that sound design is not a meta-genre of sonic art, Landy (2007, p.11) is more pragmatic in recognising the ambiguity of the identifiers 'sonic artist' and 'sound designer', as well as their similar practices. Moreover, Landy's broad definition of sonic art as "[...] a subset of works of organised sound" (Ibid., p.15) may be extended to include the sound designs of film soundtracks.[17] However, Gibbs (2007, p.36) makes a distinction, noting how sonic art pursues artistic ideas 'for their own sake', whereas sound design applies its artistic ideas to a production.

In principle, the uncertain status of sound design as a sonic arts practice should not hinder the progress of interdisciplinary research that interfaces with areas like

[16]Sonnenschein makes particular reference to Chion's ideas on 'listening modes' (see Chion 1994).
[17]While Landy's definition is not medium specific so as to exclude the soundtracks of audiovisual media, it is not inclusive either, as no reference to film sound is implied.

electroacoustic music. Moreover, it not necessary to argue the case for sound design's inclusion in the pantheon of 'pure' sonic arts, by resolving dogmatic issues stemming from its 'applied practice' status across various contexts of audiovisual media production. Such a debate may be simply transcended by acknowledging that sound design practice may adopt the form(s) of a sonic arts approach. Furthermore, this initiative does not necessarily devalue the artistic currency of sonic arts principles when they are applied to the creative contexts of sound design (see Licht 2007, Gibbs 2007). These points acknowledge a tendency for the creative agency of sound design to be overlooked or misunderstood as a sonic arts practice; a view which stems partly from the pervasiveness of image bias, coupled with the notion that apart from film music, soundtrack elements have no meaningful integrity when separated from the structure of audiovisual media (Murch 1995, Sergi 2004, Chion 2009a).

On further consideration, these issues do not detract from the validity of this study's proposal to explore a direction within sound design practice-research that focuses on the application of sonic arts principles to soundtrack creation. Within this research paradigm, one possible course is the investigation and development of new sound design strategies based on applications of compositional concepts and forms adapted from electroacoustic music. This research could be built on the foundation of an influential relationship that already exists between sound design and the sonic arts (Gibbs 2007). Murch's application of musique concrète to sound design's practice precursor, sound montage, reveals the origins of this relationship (LoBrutto 1994, Costantini 2010). Sonnenschein (2001, p.58) also advocates musique concrète as a compositional approach for expanding sound design creativity. More recently, Kulezic-Wilson (2008) has referred to soundtrack applications of musique concrète in the films of Gus Van Sant and Darren Aronofsky. Overall, this suggests that musique concrète continues to exert an active influence on approaches to soundtrack creation, and this constitutes a sign that practice-research should investigate further sound design applications of electroacoustic music forms.

Outside of practice, Michel Chion's work on soundtrack analysis (Chion 1994; 1999; 2009a) demonstrates selective applications of sonic arts concepts originally developed

by musique concrète's founder, Pierre Schaeffer (Schaeffer 1966).[18] Chion has also published his own guide to Schaeffer's work (Chion 1983)[19] and remains active in electroacoustic music research. This interdisciplinary stance, combined with the ongoing significance of Schaefferian concepts within the field of electroacoustic music (Wishart 1996; Landy 2007), identifies Chion as an important theoretical conduit between the sonic arts and soundtrack studies. Consequently, Chion's application of Schaefferian ideas to soundtrack analysis conceptually resonates with the application of electroacoustic music theories to sound design in the present study. Chion's soundtrack concepts are therefore of critical importance to the development of the interdisciplinary framework, and are discussed throughout this thesis in reference to the author's sonic arts approach.

In summary, sound design practice-research may contribute to soundtrack studies by developing new interdisciplinary links with electroacoustic music. This endeavour represents an opportunity to open new lines of research enquiry that build on the foundations of a sonic arts influence on sound design and soundtrack analysis. Concordantly, the research agenda should initially seek to assess the potential for selected electroacoustic music concepts to enrich sound design practice and inform soundtrack studies.

1.2 Overview of the Study

The author (practitioner-researcher) is an early-career sound designer with an artistic interest in developing an approach to soundtrack creation that draws on his knowledge of electroacoustic music composition (see Boland 2002). Prior to this study, the author acquired practical knowledge in applying electroacoustic music concepts to sound

[18]Chion (1994; 1999; 2009a) includes applications of Schaeffer's theories of listening modes and acousmatic sound to soundtrack analysis. These ideas were originally presented in Schaeffer's seminal text on experimental electronic music, *Traité des Objets Musicaux* (Schaeffer 1966).
[19]This work is entitled *Guides des Objets Sonores*. In 2009, John Dack and Christine North produced an authorised English translation, *Guide to Sound Objects*.

design for audiovisual media.[20] These experiences advanced a set of professional development goals that later inspired this study and its practice-research objectives.

This study presents practice-research that documents the development of the author's sonic arts approach to film sound design. This approach may be further defined as an *inter-modal* compositional strategy for sound design, as it is based on the interdependency of two compositional modes. These modes correspond to the sound design of *intersonic relationships* between soundtrack elements, and the sound design of *audiovisual relationships* between soundtrack elements and film images, respectively.

The notion that the creative process of sound design may be conceived as composition has resonance among industry practitioners (LoBrutto 1994; Sonnenschein 2001; Sergi 2004). Murch considers the soundtrack to be a form of musique concrète for the moving image (Costantini 2010, p.34), and also relates the structural arrangement of film sounds to the art of orchestration (Paine 1985; LoBrutto 1994; Murch 2003). This concept of the soundtrack as an orchestrated arrangement is further substantiated if one applies the expanded definitions of composition associated with electroacoustic music (Wishart 1994; 1996).

In this study, the inter-modal compositional strategy for sound design is supported by an interdisciplinary conceptual framework that integrates knowledge from two main areas: electroacoustic music and soundtrack studies. The framework is founded on audiovisual adaptations of Trevor Wishart's compositional theory of *sonic landscape* (Wishart 1986; 1996) and Denis Smalley's theories of *spectromorphology* and *indicative fields* (Smalley 1986; 1992; 1997). Each of these theories is recognised for its significant contribution to the development of post-Schaefferian electroacoustic music (Emmerson 1999; Landy 2007; Demers 2010). In practice, the application of electroacoustic music theory to sound design's inter-modal compositional strategy is informed by salient perspectives from within soundtrack studies.[21]

[20]From 2004–2005, the author was the coordinator for the Medialogy undergraduate program at the University of Aalborg-Esbjerg (AUE). The taught curriculum involved the application of experimental sonic arts to the sound design of interactive multimedia systems for installation and performance.
[21]Both the etic-analytical and emic-practice perspectives are represented in the interdisciplinary conceptual framework.

The sonic arts approach, its inter-modal compositional strategy, and supporting conceptual framework, are primarily developed for those project contexts where the sound designer assumes a multifaceted responsibility for the soundtrack. In essence, this is a fully integrated approach to soundtrack creation, one that reflects the defining concepts of sound design advanced by Walter Murch (Murch 1995), and advocated by Sonnenschein (2001). Consequently, the study aims to showcase the full approach, but practice-based evidence confirms that its compositional strategies are also applicable to sound design contexts that are focused purely on sound effects creation.

1.2.1 Research Aims

This study integrates two research aims that constitute the development of a sonic arts approach to sound design. The first aim concerns the definition of an interdisciplinary conceptual framework and its sound design applications. The second aim focuses on acquiring practical knowledge of conceptual framework applications in practice. Over the course of the study, the integration of the two research aims enables practical knowledge to both extend and modify the conceptual framework, and consequently refine its practice applications.

The study attempts to make a focused knowledge contribution to sound design practice-research and to the interdisciplinary field of soundtrack studies. The author intends to accomplish this by critically reflecting on acquired practical knowledge of spectromorphology, indicative fields and sonic landscape, as applied theoretical constructs within an inter-modal compositional strategy for sound design.

1.2.2 Research Design and Scope

This study employs *case-study research* operating within a *practice-as-research* (PAR) methodological paradigm. The thesis presents three practice case studies, each of which documents the process of sound design on an independent film project, and critically reflects on applications of the conceptual framework. The included DVD

video presents the three films as the material products of the case studies. The soundtracks of these films constitute the tangible evidence of sound design practice-research.

Reflecting the research objectives, priority was placed on seeking film project opportunities that offered the author a multifaceted sound design role with creative responsibility for the soundtrack. Previous project experience led to a determination that low-budget independent film productions constituted an accessible and feasible context for extended sound design practice. This reasoning suggests that at smaller economies of scale, independent films are more likely to foster project conditions that facilitate multi-tasking in soundtrack post-production, for example, a sound design role that combines sound effects creation and soundtrack mixing.

In total, the practice phase encompassed seven film projects, the majority of which were fully independent and non-commercial. Only three of these projects enabled extended sound design practice, and consequently, these projects were selected to formulate as case studies. Coincidentally, each of the three projects was connected to the academic-institutional context and involved collaboration with a single filmmaker.

The selection of case studies delimits the contextual scope of the research. On the surface, this would appear to detract from the relevance of the study to commercial production contexts in which the sound designer is a part of a multi-disciplinary team working on the soundtrack, usually in the capacity of a sound effects creator. On the contrary, the inter-modal compositional strategy encapsulates sound effects creation, and may therefore be applied on projects where sound design is restricted to that role. This assertion was confirmed by practical knowledge acquired on those projects where the author worked primarily on sound effects creation.[22]

The similarities in the three projects' post-production contexts together with the adoption of a common practice approach to sound design confers on the study the

[22]This included two short films: *Owl Creek Bridge* (2007) and *The Bone Orchard* (2007), both of which are co-produced by It's My Shout and ITV Wales, in partnership with the Skillset Screen Academy. In these projects, the author was initially offered an extended sound design role, which was later restricted to sound effects creation. Section 10.2 discusses the practice implications of this outcome.

robustness of *multiple case-study* research (Yin 2003). This adherence to methodological criteria aligns with the objectives of sound design practice-research to maximise the evidentiary content of the case studies. Specifically, each case study presents a complete demonstration of the sonic arts approach as a fully integrated practice covering all aspects of soundtrack creation. Moreover, in the three case-study projects, sound design assumed responsibility to develop representational themes and narrative contributions associated with the soundtrack—conditions that creatively enabled practice-research by supporting more extensive experimental applications of the interdisciplinary conceptual framework.

1.3 Structure of the Thesis

Chapters Two to Five collectively address a theoretical aim to develop an interdisciplinary conceptual framework that informs the sonic arts approach to sound design. The extensive literature review and supporting arguments progressively assemble a cohesive body of theoretical knowledge with applications to the inter-modal compositional strategy. Chapter Two first establishes the foundations of the sonic arts approach by selectively examining the influential legacy of 1950s electronic music on soundtrack creation. The discussion then describes the film industry development of sound design as a precursor to defining the key functions and responsibilities associated with current practice. Following this, the discussion reframes sound design as a compositional practice and defines its inter-modal strategy. The chapter closes with a survey of developments in post-Schaefferian electroacoustic music, which draws out selected concepts for application to the sonic arts approach.

Chapter Three establishes the interdisciplinary links of the conceptual framework with soundtrack studies. The intention is to selectively draw out film sound concepts from 'emic-practice' and 'etic-analytical' discourses within soundtrack studies that can meaningfully inform sound design practice. Three salient aspects are examined, including the symbolic-metaphorical potentials of film sounds, the structural functions of silence, and contrapuntal relationships between sounds and images.

Chapter Four integrates Denis Smalley's theories of spectromorphology and indicative fields within the conceptual framework. The discussion first examines the relative values of Schaefferian listening modes for soundtrack analysis and sound design practice. Based on this, spectromorphology and indicative fields are proposed as theories that can equip sound design and film studies with a language for describing sound perceptions. This is followed by a review of the theories in selective detail. The remainder of the chapter is dedicated to examining how spectromorphological and indicative fields concepts can be applied to the inter-modal compositional strategy.

Chapter Five introduces Trevor Wishart's sonic landscape theory as a component of the conceptual framework. Beginning with a critical examination of soundtrack structural concepts as represented by Chion's 'tripartite' model (Chion 1994; 2009a), the chapter then reprises the topic of listening, which is discussed in relation to the imaginative evocation of 'sound-images'. Following this, the discussion proposes Wishart's sonic landscape theory as an alternative structural concept for the soundtrack, one that may be meaningfully applied to the inter-modal compositional strategy.

Chapters Six to Nine collectively address the study's applied research aims to acquire practical knowledge of sonic arts approach and the interdisciplinary conceptual framework. Over the course of the practice phase of research, this knowledge was progressively assimilated into the conceptual framework, thereby refining and extending its potential applications. Chapter Six describes the methodology, and begins with a synopsis of practical knowledge research before defining the sound design 'practical knowledge categories' used in the analysis of case-study evidence. The chapter also describes the research design, establishing a definition of practice-as-research (PAR) and its principal operational criteria. The remainder of the chapter explains the case-study research methods employed, the approach to evidentiary analysis, and the report format.

Chapter Seven presents the case-study report for *Song of the Falklands* (2008), a nonfiction film that examines collective consciousness and its relationship to nationhood in a remote colonial enclave (Myer 2009). Chapter Eight reports on the

case-study for *The Immortal* (2007), a mixed-media film based on a dramatic adaptation of Jorge Luis Borges's short story (Borges 1949). Chapter Nine presents the case-study report for *The Lock* (2007). This experimental short film was produced for an interactive video installation project that explored the theme of social memory. The three case study films are presented on the accompanying DVD.

Chapter Ten presents conclusions on the study's practice-research. The discussion critically reflects on the case studies, acquired practical knowledge of the inter-modal compositional strategy, as well as sound design applications of spectromorphology, indicative fields, and sonic landscape. The author also draws on practical knowledge to reflect generally on the nature of creative collaborations with filmmakers. The chapter concludes with an appraisal of the study's interdisciplinary knowledge contribution to soundtrack studies, before finally considering the future prospects for sound design practice-research.

The thesis also contains an appendix for the *Song of the Falklands* case study. This presents supplementary project-planning information, and also includes the technical details of a production process designed to render 'radio' sonic landscapes.

Chapter 2

A Sonic Arts Approach to Sound Design

This chapter establishes the theoretical foundations of the sonic arts approach to sound design, and defines its compositional strategy. Subsequent chapters will build the interdisciplinary conceptual framework on this foundation. The first half of the chapter is partly historiographical, and begins with a synopsis of experimental electronic music. This is followed by a selective review of how compositional practices associated with 1950s electronic music subsequently influenced soundtrack creation and opened up new representational possibilities for electronic sounds in film. This leads into a discussion of Murch's application of musique concrète to sound design's practice precursor, sound montage. Having established an influential link between the sonic arts and soundtrack creation, the discussion moves on to examine the industry course of sound design practice post-*Apocalypse Now*.

The second half of the chapter incorporates an overview of the sound design role and an analysis of its storytelling functions in film. Following this, the sonic arts approach to sound design is defined as a compositional practice with an inter-modal strategy. Furthermore, the sonic arts approach is shaped by a review of the key compositional concepts in post-Schaefferian electroacoustic music, and an assessment of the potential for applications in sound design.

2.1 Sonic Arts Influence on Soundtrack Creation

This section presents a selective historiographical review of sonic arts influence on soundtrack creation. The review remarks on the introduction of electronic sounds to the soundtrack, and highlights the significance of developments in compositional practices and representational themes associated with 1950s experimental electronic music. The intention of the review is to widen the contextual frame of reference for Murch's application of musique concrète to sound montage. Concordantly, the review establishes a conceptual foundation and rationale for the application of post-Schaefferian compositional theories of electroacoustic music to sound design.

The review focuses on the soundtrack production contexts of mainstream film and television. This reasoning acknowledges that a long-standing relationship exists between experimental electronic music and the avant-garde (Gibbs 2007, Licht 2007). This is evidenced by John Cage's involvement in multimedia performance works of the 1960s (Goldberg 2001), as well as the 'fluxus' art movement's application of his influential ideas on musical indeterminism and performance improvisation (Rush 1999). The work of other experimental electronic music composers also influenced the soundtracks of post-fluxus structuralist film (Ragona 2008).[23]

Undoubtedly, there is rich history of interconnections between experimental forms of music and film, one that takes in the early twentieth century art movements of Futurism, Dadaism, and Surrealism, as well as fluxus films and later video installation art (Rush 1999; Paul 2003). However, this study will not further examine this particular history, as there is no direct evidence to suggest that the avant-garde 'arts' context had a bearing on Murch's application of musique concrète to the soundtracks of American New Wave films.

[23]Specifically, Ragona (2008) observes that the serialist principles of experimental electronic music composed by Karl-Heinz Stockhausen, Iannis Xennakis, and Pierre Boulez exerted an influence on the soundtrack approaches of the filmmakers Peter Kubelka, Stan Brakhage, and Paul Sharits.

2.1.1 The Development of Electronic Music

Sonic art is generically defined as a work of organised sound (Wishart 1996; Landy 2007). This idea is expressed in the futurist manifesto *The Art of Noises* (Russolo 1913), which proposed an expanded definition of music that embraced the concrete sonic textures of everyday life (Gibbs 2007, p.22-23). This modernist vision of music was further shaped by the development of electronic musical instruments, including the Theremin in 1920 and the Ondes Martenot in 1928. Edgard Varèse, an early advocator of electronic music, pioneered the integration of these instruments within orchestral ensemble works during the 1930s.[24] However, it was only after the Second World War that developments in sound recording and production technologies gained a sufficient momentum so as to facilitate the full realisation of electronic music as a distinct genre and compositional practice.

In the late 1940s and early 1950s, a pioneering community of European 'radiophonic' studios established two distinct compositional approaches to electronic music: *musique concrète* and *elecktronische musik.*[25] These 'compositional schools' were similarly engaged in new music research, but their respective investigations into the creative affordances of different sound technologies reflected contrasting ideologies towards the source of sounds (Glandien 2000; Manning 2003). According to Emmerson (2000, p.198), musique concrète's abstract bricolage of acousmatised 'concrete' sounds transformed both the act and artifice of recording into a creative means of production. In contrast, elecktronische musik applied the compositional principles of serialism and celebrated the purity of electronic sounds generated by synthesis techniques (Ibid.).

The compositional insularity of musique concrète and elecktronische musik was eventually transcended by more progressive works of fusion, such as Karl-Heinz Stockhausen's *Gesang der Jünglinge* (1956). In its combination of concrete and

[24]Varèse revised his piece *Amériques* in 1928 to include parts for the Ondes Martenot. His work *Equatorial* (1931-1932) features parts for two Theremins.
[25]The development of musique concrète centred on the work of Pierre Schaeffer and the *Group de Recherché de Musique Concrète* based at RTF in Paris (Radiodiffusion-Télévision Française). Elecktronische Musik was developed by Werner Meyer-Eppler, Robert Bayer, and Herbert Eimert at NWDR in Cologne (Nordwestdeutscher Rundfunk) (Licata 2002).

synthetic sounds, this work demonstrated a cross-pollination of compositional approaches (Decroupet & Ungeheur 2002). This overcoming of differences between the aesthetic principles of musique concrète and those of elecktronische musik was reflected across a worldwide network of electronic music studios established in the 1950s and 1960s (Manning 2003). In the post-modern era, this movement reached the zenith of its expansion in academic and institutional broadcast contexts, but it consistently maintained its research momentum as the genre *electroacoustic music* (Landy 2007).

2.1.2 Acousmatic Sound: Soundtrack Applications of Musique Concrète

One aspect of sonic arts influence on soundtrack creation stems from a connection between radiophonic drama and musique concrète. Landy (1994) notes that Schaeffer's development of musique concrète was inspired by French radiophonic drama, and became "[...] the first real-life programme music ... in which any sound can be used" (p.55). This connection is captured by Schaeffer's concept of *acousmatic sound*, which refers to sound that one hears without seeing or apprehending its source (Schaeffer 1966; Wishart 1996).

Acousmatic sound is described in Schaeffer's seminal text *Traité des Objets Musicaux* (Schaeffer 1966), which was influenced theoretically by European phenomenology and semiotics. This is evident in his assertion that the acousmatic situation of radio listening can liberate sounds from their worldly associations, permitting alternative meanings to be signified when they are reused in new compositional works (Dack 1994, p.7). Acousmatic sound has remained an influential if somewhat divisive theme in the post-Schaefferian theoretical development of electroacoustic music (Windsor 1995; 2000; Landy 2007). Chion (1994; 2009a) has also applied the acousmatic concept to soundtrack analysis as an overarching category for offscreen-diegetic and nondiegetic sounds.

Schaeffer's predilection with musique concrète was to transform concrete sounds to the degree that the original source identity was entirely disassociated or ambiguously perceived. In contrast, an 'anecdotal' form of musique concrète preserved sound's

real-world associations and source identities to create mimetic works that were imaginatively evocative of naturalistic landscapes (Emmerson 1986). A notable example of this style is Luc Ferrari's *Presque rien No.1 (1970)*.[26]

The connection between radiophonic drama and musique concrète has significance for the development of film soundtracks. For instance, Murch comments that the soundtrack for *Citizen Kane* (1941) reflects Orson Welles's earlier work in radiophonic drama, which bears technical and aesthetic comparisons with musique concrète (Jarrett 2000). On analysis, the experimental radiophonic qualities of Welles's film soundtracks include exaggerations of spatial realism, and perceptual disorientations achieved by (acousmatic) sound-source disassociations (Mintz 1985; Camper 1985).[27] Murch (2003) further notes that Welles achieved realistic spatial effects (i.e. reverberation, echo) in *Touch of Evil* (1958) through re-recording techniques that were similar to his own 'worldizing' approach. This suggests that Welles's pioneering use of radiophonic techniques in film were a source of inspiration to Murch in the development of worldizing (LoBrutto 1994; Jarrett 2000; Murch 2003; Costantini 2010).

It is clear that Welles's work establishes a stylistic link between the soundtracks of radiophonic drama and film. Welles and Murch are also linked by virtue of their similar approaches to achieving spatial effects, and in a more general sense through their respective applications of sound re-recording techniques and representational aesthetics that have associations with musique concrète. In section 2.1.5, the influence of musique concrète on Murch's approach to sound montage is examined more closely.

In general terms, both the 'abstract' and 'anecdotal' forms of musique concrète appear to have unique compositional applications to film soundtracks. Underwood (2008, p.201) elucidates on the sound design applications of 'abstract' musique concrète. He notes how the transformation of concrete sounds results in the deconstruction of their 'real-world' source associations. The resultant source ambiguity allows those sounds

[26]Full title: *Presque rien No. 1: Le Lever du jour au bord de la mer.* In this piece, Ferrari compresses a day's recording of a beach environment into a montage of twenty-one minutes.
[27]See also Altman (1994).

to acquire a different meaning when they reused in a new storytelling context (Dack 1994). A similar representational logic applies to the use of synthetic electronic sounds in film, which carry no intrinsic (concrete) source associations or meanings (Windsor 2000). In contrast, the 'anecdotal' form of musique concrète may be applied in film sound design to create mimetic 'sonic landscapes', which evoke realistic impressions of places or environments within a story world (Wishart 1996; Emmerson 1999).

Underwood (2008) highlights the representational possibilities for sound design that arise from the compositional application of musique concrète and experimental electronic music to film soundtracks. He suggests that sound design can utilise these approaches to create sound effect montages that carry a symbolic discourse, while conveying the emotional qualities of a musical underscore (Ibid.).[28] Over the course of this thesis these themes are fully explored, as they are significant aspects of the sonic arts approach to sound design.[29]

2.1.3 Early Applications of Electronic Sound in Film.

In the 1950s, popular science fiction films such as *The Day the Earth Stood Still* (1951) and *The War of the Worlds* (1953), introduced cinema audiences to electronic sounds (Whittington 2007). It has also been argued that the advent of musique concrète and elecktronische musik was a catalyst for the wider application of electronic sound to the soundtrack (Ibid.; Laudadio 2007; Underwood 2008). In this regard, Louis and Bebe Barrons' credited production of 'electronic tonalities' for *Forbidden Planet* (1956) represents a high artistic watermark (Deutsch 2003). Released in the same year as Stockhausen's influential *Gesang der Jünglinge*, the experimental sonic artistry of *Forbidden Planet* can be viewed as a consequence of the Barrons' development of electronic music research in America (Manning 2003; Laudadio 2007; Underwood 2008)

[28]In film, the term 'underscore' refers to nondiegetic music with dramatic functions that supports the drama (Handzo 1985, p.408). Chion (1994) refers to the underscore as 'pit music', which is usually composed to evoke an "empathetic effect" that reflects the emotional qualities of a scene (Chion 2009a, p.477).

[29]In later chapters, see sections 3.1, 5.3, and 5.5.

Forbidden Planet is a landmark film for electronic sound because it is used extensively to evoke impressions of futuristic technologies and ethereal alien landscapes (Laudadio 2007, p.335). Moreover, the abstract atmospheric quality of the soundtrack emerges from the source ambiguity of acousmatic electronic sounds. This effectively blurs the functions of electronic sounds as diegetic sound effects and nondiegetic music (Windsor 2000). In these respects, *Forbidden Planet*'s pioneering application of sonic arts principles to the soundtrack anticipates the sound designs of later science fiction films such as *Alien* (1979) and *Blade Runner* (1982).

In the 1950s the science fiction genre seized on the aesthetic affordances of electronic sounds, with 'B-movie' culture establishing its own palette of clichés. In other genres, however, electronic sound was used more subtly, leading to a number of sophisticated applications. For instance, in *The Birds* (1963), real (concrete) bird sounds are often replaced or supplemented with electronic sounds that function as a mimetic referent to the savagery of avian behaviour (Weis 1985). Underwood (2008, pp. 203–204) also observes that the film bears the hallmarks of later sound design by substituting a musical underscore for atmospheric 'electronic silences' and orchestrated 'connotative' electronic sounds. Weis (1985, pp. 305–306) similarly notes the absence of an underscore allows acousmatic electronic bird sounds to evoke abstract atmospheric effects throughout the film.

2.1.4 The BBC Radiophonic Workshop

Musique concrète and elecktronische musik had their origins in the radio studios of national broadcasters. The early history of the BBC's Radiophonic Workshop illustrates how such institutions provided a context that enabled the application of experimental electronic music to radiophonic drama and television soundtracks.

According to Niebur (2010), the unit was founded in 1958 with a mandate to pursue the innovations of musique concrète and to provide 'special sound' for an eclectic range of programming. *Quatermass and the Pit* (1958), represents an early foray by the workshop in applying musique concrète tape techniques to television soundtracks (Ibid.). Stylistically, this work and the greater proportion of workshop sound for

science fiction drama bears comparison with *Forbidden Planet.* This relates particularly to the use of abstract acousmatic electronic sounds to evoke rich impressions of alien worlds and phenomena. Moreover, the source ambiguity of electronic sounds often allows workshop soundscapes to function as an atmospheric underscore. During its 'golden age'[30] the workshop's reputation for producing innovative electronic sound was forged in association with popular science fiction dramas like *Dr. Who* (Ibid.).

Throughout the unit's history, compositional practices and aesthetics evolved in step with studio technologies. By the 1970s, synthesizers had all but displaced the time-consuming tape processes of musique concrète (Ibid.). This contributed to significant changes in personnel, which tempered the unit's experimental music ethos.[31] In the 1980s, fiscal insecurity and a steady decline in commissions signalled the beginning of the end for the Radiophonic Workshop, and it was finally closed in 1998 (Ibid.).

Gibbs (2007, p.26) associates the Radiophonic Workshop with sound design because its output was applied to radio and television soundtracks. Of perhaps greater significance is the fact that its compositional practices and style were firmly rooted in the traditions of experimental electronic music. This has been underlined by a resurgence of interest in the unit's work and a critical acknowledgement of its contributions to UK electroacoustic music (Ibid.).[32]

[30]This lasted through the 1960s until around 1974 (Niebur 2010).
[31]This included the departures of Delia Derbyshire in 1973 and Jon Baker in 1974. Both composers were firm advocates of musique concrète and had been at the forefront of experimental electronic music produced by unit in the 1960s. Neither composer made a successful adjustment to working with synthesizers, such as the EMS VCS3 and the Delaware (Niebur 2010).
[32]In October 2003 the BBC 4 documentary *The Alchemists of Sound* reviewed the history and achievements of the unit. In April 2009 there was a live concert performance of Radiophonic Workshop music that involved several former composers. The BBC also continues to maintain an archive of their work, and a number of CD's have been released.
(http://en.wikipedia.org/wiki/BBC_Radiophonic_Workshop) [Accessed: 12 September 2011].

2.1.5 Sound Montage

Walter Murch recalls that his first tape-splicing and re-recording experiments were inspired by musique concrète (Costantini 2010, p.34).[33] Murch states that when he subsequently embarked on a filmmaking career,

> [...] one of the main influences on me was the desire to somehow bring together film and musique concrète—the fun of assembling all these real sounds in an unusual context and yet having a visual reason for doing so. (LoBrutto 1994, p.84)

This quote highlights that musique concrète's approach to deconstructing and meaningfully re-contextualising sound source associations (Schaeffer 1996; Dack 1994), permeated Murch's compositional strategies for sound montage and its practice descendent, sound design (Underwood 2008, pp. 205–206). Murch also clearly views the application of sonic arts philosophy and musique concrète to audiovisual relationships as a way to appreciate how the soundtrack can transcend its traditionally supportive functions in film.

> [W]hat is the soundtrack of film but musique concrète that has some kind of relationship, a dynamic relationship, not always subservient to the image? (Costantini 2010, p.34)

Murch's assertion also underpins his narrative rationale for sound design, specifically in relation to the symbolic use of sounds in metaphorical relationships with the image (Murch 1995; 1996). This approach has its origins in Murch's work on sound montage, which defined his innovative application of musique concrète to the soundtracks of American New Wave films in the 1970s (Ibid.; Whittington 2007). Influenced by the unconventional soundtracks of the French Nouvelle Vague, many American New Wave soundtracks similarly challenged the dominance of the image through an extension of the narrative functions of sound effects (Flueckiger 2009,

[33]Specifically, Murch refers to a childhood radio listening of the *First Panorama of Musique Concrète* (1948), which included works by Pierre Schaeffer and Pierre Henry.

p.156). This view is upheld by Whittington (2007, p.61), who observes a comparable use of symbolic sounds in Jean-Luc Godard's *Alphaville* (1965) and *THX 1138*.

Whittington also states that the aesthetics of sound montage can be traced to the soundtracks of films such as *Psycho* (1960) and *2001: A Space Odyssey* (1968), which show an emerging tendency towards subverting representational realism (Ibid. p.57). Furthermore, the musique concrète inspired orchestration of sound effects to atmospherically replace a musical 'underscore', signifies a stylistic link between sound montage and films such as *The Birds* (Underwood 2008, p.205) and *Forbidden Planet*. Both representational themes are evident in Murch's first application of sound montage to the soundtrack of *THX 1138,* which Whittington (2007, p.57) notes "[...] recast the traditional instruments of the orchestra with organic instruments and organized sounds into a symphony of musique concrète". The film's soundtrack features a minimal use of underscore,[34] and this enables Murch to combine the abstract and mimetic discourses of musique concrète to evoke complex atmospheric impressions. In many sequences, these aspects of the sound montage are key to the representation of a strange anti-realism associated with a futuristic dystopia.

Whittington identifies the stylistic traits of sound montages in *THX 1138*, which includes contrapuntal audiovisual relationships, sound metaphors and spatial effects (Ibid. p.20). Murch achieves a rich 'spatial colouration' of sound effects in *THX 1138,* using a technique he invented and later termed 'worldizing' (Murch 2003). Inspired by musique concrète,[35] worldizing involved re-recording the reverberation of sound effects electroacoustically diffused into different acoustic spaces (Ibid.). In the studio, a mix of dry and worldized tracks could be adjusted to alter the perceived 'acoustic depth of field' (Costantini 2010, p.37).[36] Worldizing is used extensively in *American Graffiti* by Murch to create an impressionistic soundscape of popular music emanating from car radios (Jarrett 2000). The worldizing technique also highlights the

[34]Composed by Lalo Schifrin.
[35]Murch establishes this connection between musique concrète and worldizing in his commentary for the 2004 DVD re-release of *THX 1138*.
[36]A significant soundtrack innovation that preceded the advent of studio reverb units, worldizing represents a mechanical-analog approach to naturalistic convolution reverberation effects. Worldizing can also be seen as a development of the radiophonic approaches to sound effect re-recording previously used by Orson Welles in *Touch of Evil* (Mintz 1985; Camper 1985; Murch 2003).

significance that Murch places on representing the relationship of sounds to a surrounding space (LoBrutto 1994, p.88).

The worldizing principles of sound montage also extend another form of sound-source relationships, which focus on the realistic representation of sounds mediated by audio technologies. In *THX 1138,* Murch re-recorded dialogue to represent the various sound qualities of PA and radio intercom systems. Radio sound treatments are also prevalent throughout *American Graffiti* and are combined with spatial effects. In *The Conversation*, Murch's representation of audio surveillance is central to a narrative that raises the question of whether electronically mediated sound can be trusted (Lastra 2008, p.123).[37]

Murch was not alone in pushing the boundaries of soundtrack aesthetics throughout the 1970s. Sound montage techniques and metaphorical audiovisual relationships came increasingly into the fore in the science fiction and horror genres (Whittington 2007, p.133).[38] This decade also brought developments in the sonic representation of outer and inner landscapes (Ibid., p.137), a mixing of objective and subjective realities that characterises the soundtracks of films such as *Alien* (1979) and *Apocalypse Now* (1979).

2.1.6 Summary: Sonic Arts Influence on the Soundtrack

The acousmatic concept of musique concrète looks at recorded sounds as a raw sonic material for compositional transformation. For radiophonic drama and film soundtracks this engenders representational possibilities to disassociate concrete sounds from their sources and meaningfully re-contextualise intrinsic significations in new works. In contrast, the synthetic tonalities of elecktronische musik carry no

[37]In *The Conversation,* the narrative turns dramatically on a subtle alteration of electroacoustically mediated sound quality. The film's central character Harry Caul (Gene Hackman) applies filters to a garbled surveillance recording. This changes the emphasis of the key phrase *"He'd kill us if he got the chance"* in a way that recasts the potential victims of an assassination as the perpetrators of one.
[38]Whittington cites *The Exorcist* (1973) as a notable example of sound montage techniques being applied to horror film. *The Legend of Hell House* (1973) also demonstrates soundtrack applications of musique concrète to the creation of an atmospheric electronic underscore. This was composed by Delia Derbyshire and Brian Hodgson independently of their work for the BBC Radiophonic Workshop. (http://en.wikipedia.org/wiki/The_Legend_of_Hell_House) [Accessed: 14 December 2011].

worldly source associations, but the diegesis of science fiction films established a context for pure electronic sounds to signify futuristic phenomena and alien environments.

The technical and aesthetic innovations of both compositional schools of 1950s electronic music had a significant influence on the soundtrack, as evidenced by *Forbidden Planet,* the soundscapes of the BBC Radiophonic Workshop, and Murch's sound montage. In each of these cases, a compositional approach to orchestrating sound effects extended the representational possibilities of the soundtrack. Murch's sound montage work encapsulates this sonic arts approach, through atmospheric arrangements of sound effects that carry the emotional resonances of an underscore, and through the symbolic use of sounds in metaphorical audiovisual relationships.

In summary, Murch's innovations with sound montage in combination with the accomplishments of his contemporaries have a three-fold significance for the subsequent evolution of film soundtracks. Firstly, sound montage, in similarity with those approaches pursued by the Radiophonic Workshop, elevated soundtrack creation practices beyond the status of technical craft by applying compositional strategies akin to musique concrète. Secondly, sound montage in particular demonstrated how the soundtrack could go beyond those functions that merely support the image, in order to make more profound narrative contributions to film. This storytelling aspect of sound montage challenged the narrative dominance of the film image, a development built on the stylistic legacies of the French Nouvelle Vague (Whittington, 2007, p.74) and the work of soundtrack pioneers like Orson Welles and Alfred Hitchcock. Finally, in technical and aesthetic terms, sound montage clearly represents the sonic arts foundation of Murch's later approach to sound design.

2.2 The Development of Hollywood Film Sound Design

Sound montage is regarded as the practice precursor to sound design (Whittington 2007; Beck 2008). Both practices were also creatively enabled by developments in audio technologies (Sider 2003).[39] In the 1970s, the technical realisation of Dolby standards and multi-channel diffusion helped raise film industry awareness towards new creative potentials for sound (Sergi 2004, p.11). One consequence of this was a shift towards cinematic experiences that emphasised sensory immersion and 'spectacle' (Lastra 2008, pp. 124–127). The technical evolution of the soundtrack reached a turning point with the release of *Apocalypse Now*, a landmark film that introduced Dolby stereo surround sound to movie audiences (Ibid).[40] In production terms, *Apocalypse Now*'s parallel realisation of sound design and stereo surround sound was also technically dependent on the studio synchronisation of automated mixing consoles and 24-track tape machines to the picture (Pasquariello 1997; Kenny 2000).

Murch's development of sound montage and practice transition to sound design was also facilitated by the open production culture established at American Zoetrope Pictures.[41] The company's location in San Francisco is significant, for it allowed greater freedom from the systemic constraints of Hollywood (Whittington 2007; Beck 2008). For instance, Murch was particularly aware of union sensitivity towards his bridging of sound effects creation, re-recording and soundtrack mixing roles (Murch 1995). Therefore, prior to *Apocalypse Now* he assumed the innocuous, all-encompassing production credit of 'sound montage' in an attempt to minimise the risk of union interference (Ibid.; Whittington 2007).

Murch considers his multifaceted approach to the soundtrack to be an extension of film school practices (LoBrutto 1994, Murch 1995, Sergi 2004). His integration of soundtrack roles subsequently came to define the 'Zoetrope approach' to sound

[39]An example of this is Murch's 'worldizing' technique, which relied on the practicalities of portable mixers and the Nagra recorder (LoBrutto 1994).
[40]The Dolby Stereo 70 mm six-track format used in *Apocalypse Now* subsequently became known as 'Dolby 5.1'.
[41]Founded in 1969 by George Lucas and Francis Ford Coppola.

montage and sound design (Murch 1995), which was also characterised by an overarching production responsibility concerned with "[...] auralizing the sound for the film and making definitive, creative decisions about it" (Kenny 2000, p.9). Murch describes this concentration of control as an attempt at Zoetrope to re-invent the 'director of sound' role that had disappeared during the 1930s (Murch 1996, p.151). However, this aspect of Murch's practice concept for sound design would subsequently meet with opposition from within Hollywood (Beck 2008).

2.2.1 Sound Design and *Apocalypse Now*

Apocalypse Now heralded the twin births of sound design and a sensorially immersive cinema (Lastra 2008). Murch's definition of sound design reflects an extension of sound montage practices to encompass stereo surround sound and the process of mapping out the spatial mixing of soundtrack elements (LoBrutto 1994, pp. 91–92). On *Apocalypse Now* Murch also assumed the diversity of post-production roles that are generally associated with film sound design (Murch 1996).[42] According to Murch, the 'sound designer' is,

> [...] someone who plans, creates the sound effects and mixes the final soundtrack, and thereby takes responsibility for the sound of a film the way a director of photography takes responsibility for the image.
> (Murch 1995, p.246)

With the sound design of *Apocalypse Now*, Murch took the technical innovations and aesthetics of sound montage to new expressive heights. In particular, Murch often establishes a 'metaphoric distance' between the soundtrack and images to facilitate the audiences' active engagement in interpreting narrative meanings (Murch 1995; 1996). This is evident in the way in which the opening sequence blurs diegetic representations of an objective reality with a subjective reality experienced by Captain Willard.[43] This sequence also encapsulates Lastra's remarks about the film's surround sound mix, which highlighted new creative possibilities for cinema, characterised by

[42]Murch also worked as a picture editor on *Apocalypse Now* (Murch 2001).
[43]Played by Martin Sheen.

the "[...] impulse towards prosthetic sensory experience ... to create a substitute compensatory world [...]" (Lastra 2008, p.136). Lastra further argues that sound design's representational departure from the simulation of 'authentic' aural realism subsequently shaped its aesthetics as an art of mimesis and illusion (Ibid., p.133).

2.2.2 Sound Design in the Post-Dolby Era

Throughout the 1980s Richard Beggs maintained the continuity of the Zoetrope approach to sound design on films such as *The Cotton Club* (1984) and *Tucker: The Man and His Dream* (1988) (Pasquariello 1997). Elsewhere in Hollywood the reputation of sound design appears to have suffered somewhat from a degree of practice inconsistency and ambiguity (Yewdall 2007). This view accords with Beck's reference to an "[...] ongoing semantic problem with the term sound designer" (Beck 2008, p.74) that led some within the industry to emphasise a niche practice association with sound effects creation.[44] It is also probable that this was facilitated by industry opposition towards Murch's notion of the sound designer as the soundtrack's 'creative director' (Ibid.). Throughout the 1980s, this niche association was reinforced in relation to science fiction and action-adventure film epics, with Ben Burtt's critically acclaimed sound effects for the *Star Wars* saga being seen as significant turning point in the 're-branding' of sound design (Whittington 2007, p.25).

Beck (2008) determines that current approaches to sound design first began to emerge in the early 1990s. In reference to *The Silence of the Lambs* (1991), he concludes that the surmounting of early technical constraints in relation to surround sound, coupled with a relaxation of trade union politics, allowed a new breed of practitioners to "[...] construct their own sense of interactive sound design" (Ibid., p.76). This generally concurs with discourses on Hollywood sound design practice from the same period.[45] These consist of practitioner interviews that draw out individual expressions of practical knowledge characterised by different artistic values, conceptual influences and creative relationships with studio technologies.

[44]Beck (2008) refers to the example Mancini (1985), who places emphasis on sound design as a sound effects creation practice.
[45]In reference to interviews with sound design practitioners discussing their work on 1990s films, found in LoBrutto (1994), Pasquariello (1997), and Kenny (2000).

Sonnenschein (2001), similarly, highlights the value of developing an individuated approach to sound design. Furthermore, Sonnenchein's practice definition invokes Murchian ideals and promotes an artistic mandate that employs "[...] all the tools of music, psychology, acoustics and drama [...]" to enrich cinematic storytelling (Ibid., p.xiv). In contrast to the technical discourses that dominate many instructional texts, Sonnenschein places an emphasis on sound design conceptual strategies and exercises for acquiring practical knowledge.[46] He also presents a broad interdisciplinary conceptual framework designed to support and inspire the stylistic development of practitioners.

Several aspects of Sonnenschein's approach are reflected in this study's interdisciplinary conceptual framework. For instance, Sonnenschein stresses the need for practitioners to posses a comprehensive knowledge of auditory perception[47], an idea pursued by this study in relation to applications of spectromorphology and indicative fields. Furthermore, he similarly advocates compositional approaches to sound design that creatively apply experimental music techniques, including musique concrète (Ibid.). Also in coherence with this study, Sonnenschein highlights the informative value of soundtrack studies concepts for practitioners, with the significant inclusion of Chion's (1994) listening modes.

2.2.3 Summary: The Development of Hollywood Film Sound Design

Sound design has endured mixed fortunes in the Hollywood film industry during its brief history. In this context, sound design has prospered as a niche practice associated with sound effects creation, whereas Murch's ideals of creative responsibility for the soundtrack are only seldom put into practice by an elite group of practitioners (Sider 2003; Beck 2008). This suggests that a contextual caveat should ideally accompany those definitions of sound design practice that invoke hierarchical analogies with cinematography and production design (e.g. Zettl 2005). Such definitions may

[46]Holman (2002) and Wyatt and Aymes (2005) are generally representative of instructional texts that focus predominantly on post-production informatics.
[47]This is addressed by sections on Gestalt psychology and psychoacoustics in Sonnenschein (2001).

inadvertently promote a mythologised view of sound design practice by appearing to normalise an association with soundtrack creative responsibilities.

What is apparent is that sound design practice has retained the scope to cultivate a diversity of approaches individuated by practical knowledge and style. This is affirmed by Sonnenschein's broad strategies for sound design (Sonnenschein 2001). Moreover, his 'methodology' encapsulates the essence of Murch's approach to sound montage and sound design, as well as the sonic arts values they reflect. Hidden in this is a vindication of this study's aims to explore compositional applications of electroacoustic music in a sonic arts approach to sound design that emulates Murch's defining practice concept. The approach also draws inspiration from Sonnenschein by seeking to acquire practical knowledge of an interdisciplinary conceptual framework derived to supportively inform sound design practice.

2.3 The Practice of Sound Design

When sound design entails a strategic responsibility for "[...] creating the overall sonic character of a production" (Zettl 2005, p.328), collaboration with the director should focus on gaining a shared understanding of artistic intentions (Pasquariello 1997, pp. 130–131). Depending on the context, the scope of sound design responsibilities and the extent of collaborative involvement appear to be partly dependent on the industry status of the practitioner (Sergi 2004, p.118). However, industry luminaries like Randy Thom argue that the consultative functions of sound design are generally under used, particularly in the earlier stages of production (Thom 2003). Gary Rydstrom regards this as a missed opportunity in the development of the soundtrack:

> There would be a great benefit to having the sound designer involved as early in the process as possible. You can start to see how it's all going to work together at the earliest possible moment. (LoBrutto 1994, p.245)

In Hollywood at least, this suggests that sound design lacks the opportunity to realise its full practice potential and narrative contributions to film. This view is echoed by

Sider (2003, p.12), who further reasons that creative collaborations between directors and sound designers should ideally cultivate organic processes of 'trial and error'. In this regard, he commends David Lynch's 'action and reaction' approach to soundtrack development (Ibid.; Lynch 2003). According to Lynch, his various 'reactions' to the effects of different sound and image combinations (a set of creative 'actions'), are key to the formulation of his own soundtrack ideas (Kenny 2000, p.129). This iterative (action-reaction) approach to soundtrack creation is highly collaborative, and Lynch often contributes his own music and sounds to the process (Ibid.).

Unfortunately, Lynch's appreciation of sound (Lynch 2003) is not generally reflected across the film industry or in filmmaking education. In both contexts an image bias appears to permeate attitudes that regard soundtrack practices as a "[...] technical part of filmmaking, creativity being located elsewhere in the filmmaking process" (Sergi 2004, p.143). This would seem to account for why sound design is often under appreciated or misunderstood by filmmakers (Sonnenschein 2001, p.16).

In summary, sound design is still a pioneering practice in film, one seeking to expand its creative influence and correct misconceptions that soundtrack post-production is primarily a technical craft. This cause can be furthered if more filmmakers empower sound designers to demonstrate the full potential of the practice as an applied form of sonic art. Currently, the mainstream evolution of industry practice appears to be held back by attitudes that do not acknowledge the value of the sound designer's creative decisions about the soundtrack, which "[...] are commingled [*sic.*] with considerations of storytelling, genre, aesthetic impact and personal sensibilities" (Whittington 2007, p.4).

If sound design can successfully challenge these attitudes at all levels of the industry, then practitioners may be given a 'storytelling mandate' on a more regular basis. This in turn could begin to break down the dominance of practice associations with sound effect creation that have stalled sound design's industry progress. In parallel, sound design practice can attempt to advance its own cause by reinvigorating applications of the 'Zoetrope approach' at the grassroots level of the film industry (e.g., low-budget independent film).

2.3.1 The Storytelling Functions of Sound Design

The previous section highlights that filmmaking attitudes towards the soundtrack have a role in determining the functions of sound design, and whether the practitioner will be empowered with a storytelling mandate. What remains clear is that in conducive creative environments, sound design can make strong narrative contributions to film.

In an extended role, the sound designer articulates control over the soundtrack's structural arrangement of dialogue, sound effects, and music (Pasquariello 1997, pp. 119–120). These soundtrack elements fall into two broad categories: *Diegetic* sounds have perceived sources located 'inside' the depicted story world, whereas *nondiegetic* sounds have perceived sources located 'outside' the story space (Bordwell & Thompson 1985, pp. 191–192).

In film, diegetic sound effects that are concomitant with the image are integral to sustaining an illusion of story-world 'realism' for the audience. Whittington (2007, p.194) observes that realism is the dominant representational ideology in filmmaking and demonstrates a preference for treating audiences as 'passive receptors' of cinematic meaning.[48] Arguably, this ideology has extended to the production of 'hyper-realistic' soundtracks for certain genres, a recent stylistic trait in sound design that may sometimes be at odds with the storytelling principles of using 'suggestive' sounds in preference to realistic sounds (Thom 2009, p.20).

According to Murch (1995), the use of sounds to over-determine a 'see it-hear it' realism in film is to be avoided. While sound design will always be concerned with crafting an aural illusion of story world realism, Murch warns that 'exposition' encourages passive reception, whereas suggestion is more effective at engaging the audience's imagination (Murch 2001, p.15). Murch's philosophy for facilitating imaginative engagement is to use sounds that are metaphorically distant from the image, which he contends, stimulates the audience to discern a narrative meaning (Murch 1995, p.248). Zaza (1985) and Sonnenschein (2001) similarly observe that sound design can enrich film narrative by employing sound metaphors, a strategy that

[48] See also Doane (1985).

may be extended by the application of other 'poetic modes' to audiovisual relationships, including simile, hyperbole, allegory, and paradox amongst others.[49]

Coulter (2010) offers an overarching perspective that accounts for the mechanism by which audiovisual poetics establish film meaning. According to Coulter, *concomitant* audiovisual relationships form a meaningful residue from the integration of two heterogeneous schemas (meanings) carried separately by images and sounds. In contrast, *isomorphic* audiovisual relationships create a single schema based on the union of sounds and images (Ibid., pp. 27–28). A different insight into the nature of audiovisual relationships is provided by Chion's concept of *added value,* which he defines as the "[...] expressive and informative value with which sound enriches a given image so as to create the definitive impression" (Chion 1994, p.5). Chion (2009a, p.468) further points out that added value is bestowed on images by virtue of *audio-visiogenic effects,* which arise from the perception of meaningful image-sound associations carrying some combination of "[...] sensory, informational, semantic, narrative, structural, or expressive value [...]" (Ibid., p.466).

In summary, sound design has a responsibility to articulate the added values of film sounds by crafting different forms of concomitant and isomorphic audiovisual relationships. One clear function of sound in audiovisual relationships is to sustain an illusion of diegetic realism. However, sound design also has a storytelling role, which seeks to stimulate the audiences' imagination and engage it in an active process of interpreting meanings that are suggested or poetically signified by sounds.

[49]See also section 3.2.1.

2.4 A 'Sonic Arts' Approach to Sound Design

In preceding sections, Murch's application of musique concrète to sound montage is viewed in the wider context of a sonic arts influence on soundtrack creation, one that is traceable to 1950s electronic music. From these origins, sound design's development in the Dolby era has been charted to determine the current nature of its practice and functions in film. In this final section, these lines of enquiry are unified by the author in the definition of his sonic arts approach to sound design.

2.4.1 Compositional Modes of Sound Design

Sergi (2004, pp. 145–147) observes that the concept of orchestration is appropriate for understanding the creative process that forms structural relationships between soundtrack elements. Among sound designers, approaches to soundtrack structure have also been expressed in compositional terms, with Sonnenschein (2001) noting "[...] the act of orchestration comes into play, selecting the right sound for the right moment." (p.xix). Murch also invokes orchestration analogies in relation to soundtrack mixing (Paine 1985; LoBrutto 1994), and states, "[...] I try to analyse the sound into instrumental groupings, then balance each one against the others hierarchically [...]" (Murch 2003, p.94).

According to Sergi (2004, p.84) film studies has neglected this 'creative agency' in soundtrack mixing and consequently its impact on structuring film meanings. This study addresses this issue directly, by using sound design practice-research to foreground the creative agency of an *inter-modal* compositional strategy for the soundtrack. Given that future music composition for film and interactive media is likely to increasingly overlap with the functions of sound design (Deutsch 2003, p.34), it makes sense for sound designers to investigate compositional approaches to the soundtrack.[50]

[50]During soundtrack post-production for *The Bone Orchard,* the contributions of the music composer overlapped in functional terms with the sound designs created by the author. See also section 10.2.

However, the conception of the soundtrack as a composed structure is somewhat problematical, because traditional musicology defends a delimited association between composition and contemporary music (Wishart 1996). A more expansive definition of composition is therefore required to account for the soundtrack's structural integration of dialogue, sound effects and music. Wishart (1994; 1996) advances such a definition in regard to electroacoustic music, stating that all sounds may be considered as sonic materials for composition, with meaningful structural relationships emerging from the composer's creative intentions towards those materials (Wishart 1994, p.1). This definition also reflects the Schaefferian principles of musique concrète.[51]

The author has applied this inclusive philosophy of sonic arts composition to the orchestration of soundtrack elements. The result is a compositional approach which reflects the idea that soundtrack elements simultaneously form two interdependent structural relationships in film, one taking an 'intersonic' form and the other an 'audiovisual' form. This can be reframed to define an inter-modal compositional strategy for film sound design that integrates intersonic and audiovisual structural relationships. In these terms, the *audiovisual compositional mode* concerns the structural design and arrangement of meaningful relationships between soundtrack elements and images. Concordantly, this compositional mode deploys isomorphic and concomitant audiovisual relationships that articulate film sound's added value (Chion 1994; Coulter 2010). Paired with this is the *intersonic compositional mode*, which concerns the structural design and arrangement of meaningful, balanced relationships between soundtrack elements.

In practice these compositional modes are interdependent, with intersonic relationships facilitating the saliency of audiovisual relationships. Specifically, the sound design of film sound-objects focuses on rendering perceived qualities that bestow added value onto the image. These sound-object qualities are simultaneously an aspect of audiovisual relationships and the totality of intersonic structural relationships that define the soundtrack arrangement. The structural importance of intersonic relationships for audiovisual perceptions in film is borne out by

[51] See also section 2.1.2.

psychoacoustic factors that determine the engineering of the soundtrack mix (Sonnenschein 2001; Holman 2002).

In film studies there is scant critical acknowledgement of the significance that intersonic relationships have on the rendering of meaningful audiovisual relationships. This is generally reflected in Chion's argument "*There is no soundtrack*",[52] which states:

> [...] the sounds of a film, taken separately from the image, do not form an internally coherent entity on equal footing with the image track. (Chion 1994, p.40)

While this may be the case, Chion's denial of the soundtrack promotes the notion that film sounds acquire meaning only by virtue of their added value in audiovisual relationships (Chion 1994; 2009). Inadvertently, Chion casts sound as the subservient partner to the image in processes of *audio-division* (Ibid.),[53] a bias that underpins his assertion that there is no meaningful integrity to intersonic relationships in film's *sound channel*, which he describes as,

> [...] a hodgepodge of different elements ... not chosen or composed in relation to each other (and why should they be?) but in relation to the picture editing and the diegesis [...]. (Chion 2009a, p.228)

Beck (2008) views Chion's arguments as being symptomatic of an industry bias that "[...] perpetuates the idea of the dominance of the image over sound in film" (p.73). Murch (1995) succinctly characterises this inequality between sounds and images in film:

[52]See also Chion (2009a, pp. 226–229).
[53]The process of audio-division in audiovisual relationships refers to how the image is divided by sounds (sounds reinforcing images) and also how sounds are divided by the image into onscreen and offscreen diegetic space (Chion 2009a, p.467). According to Chion this process is driven by the image. This concept does not acknowledge that intersonic relationships between soundtrack elements may have a structural bearing on the process of audio-division.

> Film sound is rarely appreciated for itself alone, but functions largely as an enhancement of the visual.... whatever virtues the sound brings to the film are largely perceived and appreciated by the audience in visual terms—the better the sound, the better the image. (Ibid., p.239)

Murch's suggestion that the perceived qualities of film sounds are not valued independently of the image appears to explain why the structural significance of intersonic relationships is largely overlooked by film studies. Similarly, Chion does not acknowledge the existence of added value in the composed structural integrity of intersonic relationships. This view is contrasted by the author's principle of inter-modality, which aligns with Noël Burch's 'organic' philosophy of soundtrack creation, an approach in which "[...] the forms of interaction between sound and image will be closely tied to other interactions between the three types of films sounds" (Burch 1985, p.203). Théberge (2008) likewise argues that film studies must meaningfully acknowledge "[...] the relationships that exist between the various elements of the soundtrack and not simply the relationships of sounds to images" (p.55).

In summary, it is legitimate to propose that perceived audiovisual relationships in film have a meaningful interdependency with soundtrack intersonic relationships. In turn, sound design may integrate this perspective through an inter-modal compositional strategy for the soundtrack. The form of such strategies can seek to build on the musique concrète foundations of Murch's sound montage by integrating other compositional approaches from the sonic arts (Underwood 2008), a notion that resonates with the recent interdisciplinary emphasis of soundtrack studies (Altman 2007; Grajeda & Beck 2008). This raises the question of which theoretical contributions from sonic arts domains like electroacoustic music could offer applied value for sound design's inter-modal compositional strategy.

2.4.2 Electroacoustic Music: Salient Perspectives for Sound Design

Emmerson (1999) states that electroacoustic music must seek to develop its long-neglected relationship with the visual arts, a perspective Landy (2007) more recently echoes. According to Waters (2000), the field is primed for practice extensions into new media contexts. While these signals are positive, electroacoustic music is a traditionally insular area (Ibid.). It is therefore probable that outside initiatives, including those of sound design practice-research, will take the lead in reforging relationships between electroacoustic music and the visual arts.

Post-Schaefferian electroacoustic music has largely abandoned its early formalist principles (Landy 2007, p.129). This is reflected in a preponderance of 'hybrid' works that compositionally combine synthetic and concrete sounds within a fusion of aural-abstract and mimetic 'musical' discourses (Emmerson 1986). Emmerson (2007) further observes that the course of post-Schaefferian electroacoustic music has been influenced by R. Murray Schafer's work on the 'soundscape' and acoustic ecology (Schafer 1977).[54] Consequently, compositional approaches have incorporated the soundscape principle of exploring the perception of sounds in space, as well as the evocation of aural landscape 'images' in the listener's imagination (Emmerson 1999, pp. 137–139). Furthermore, acoustic ecology has been central to the critique of Schaefferian 'reduced' listening and acousmatic sound in electroacoustic music research (Windsor 1995; 2000). Overall, this emerging compositional tendency towards soundscapes that establish the listener's relationship with the auditory environment, has enabled electroacoustic music to reconnect with the representation of real-world experiences (Field 2000; Landy 2007).

Trevor Wishart's *landscape* approach to sonic arts composition (Wishart 1986; 1996) is acknowledged as typifying the soundscape principles of post-Schaefferian electroacoustic music (Emmerson 1999; Landy 2007). Demers (2010) also cites Wishart's sonic landscape as embodying a greater compositional emphasis on

[54] In charting the development of post-Schaefferian electroacoustic music, Emmerson (2007, pp. 7–10) examines the interconnections between anecdotal forms of musique concrète, Schafer's soundscape acoustic ecology and Wishart's work on sonic landscape (Wishart 1986; 1996).

metaphorical discourse. Field (2000) claims that this combination of the soundscape and symbolism has led to works in which "[...] reality can be directly alluded to, represented or subverted by the composer" (p.37). This aptly describes Wishart's conceptual development of permutations in sonic landscape design, which vary in their perception along a continuum from the 'ecologically realistic' in nature, to the entirely 'imaginary' and unrealistic (Wishart 1986; 1996).

Denis Smalley's work on *spectromorphology* and *indicative fields* has also made a significant contribution to post-Schaefferian electroacoustic music (Smalley 1986; 1992; 1997). Landy (2007, p.97) states that the application of spectromorphology to the analysis of works that incorporate concrete and synthetic sounds is a positive developmental extension of Schaeffer's spectro-typographical categories (Schaeffer 1966; Chion 1983). Furthermore, Demers (2010, p.34) notes that, while spectromorphology primarily focuses on the perceptual analysis of sounds' intrinsic features, Smalley also promotes the composer's awareness of extrinsic features that point to meaningful relationships between sounds and the real world.

On analysis, these conceptual developments in post-Schaefferian electroacoustic music have feasible applications to sound design. In section 2.4.1, Wishart's inclusive perspective on sonic arts composition is applied to the definition of an inter-modal strategy for the soundtrack (Wishart 1994; 1996). This strategy could in turn adopt the soundscape principles encapsulated by Wishart's landscape approach and apply them to the structural arrangement of film sounds in diegetic and nondiegetic space. This approach also accords with the emphasis that Murch places on sound-space relationships in sound design (LoBrutto 1994). Furthermore, the sonic landscape approach to establishing a metaphorical-symbolic discourse (Wishart 1986; 1996) could be used to articulate sound design's poetic modes (Zaza 1985; Sonnenschein 2001), and a metaphoric distance in audiovisual relationships (Murch 1995).

Emmerson (1999) also argues that sonic landscape could represent a 'mature approach' to audiovisual relationships, one that acknowledges the power of sound to imaginatively evoke an image (Wishart 1996). This idea has clear relevance to the objectives of film sound design; particularly in the use of acousmatic (offscreen)

diegetic sounds to evoke 'sound-image' based impressions of unseen objects, phenomena and surrounding environments. Emmerson's notion is also coherent with Murch's thoughts on using sounds suggestively to imaginatively engage the film audience (Murch 1995).

As in electroacoustic music, the theories of spectromorphology and indicative fields could be used to support a sonic landscape approach to soundtrack composition. In this context, the perceptual basis of spectromorphological categories could assist in the sound design of film sound-objects and intersonic structural relationships, establishing a link between the intrinsic features of sounds and their extrinsic relationships to the diegetic story world.

2.5 Chapter Summary

It is clear that the technical and aesthetic innovations of 1950s experimental electronic music left an indelible imprint on the soundtrack. Musique concrète opened up new representational potentials for concrete sounds as a 'sonic material', which could be transformed and re-contextualised in the soundtrack to signify alternative meanings or form new diegetic associations. This compositional ethos was at the heart of Murch's approach to sound montage. On the other hand, pure electronic sounds possessed no intrinsic worldly associations, which in itself constituted a representational potential for such sounds to form associations in the diegetic contexts of science fiction film. Overall, both representational themes were significant for the development of the soundtrack and its storytelling contributions to film. Moreover, sound design's storytelling mandate encapsulates these representational applications for sounds, and consequently these ideas are at the core of the sonic arts approach.

In the 1970s, sound montage demonstrated these representational applications for sounds, thereby elevating the storytelling significance of the soundtrack in ways that actively engaged the audience in the discovery of narrative meaning. *Apocalypse Now* suggested that sound design might carry these representational aesthetics forward in the surround sound era. However, with the industry rejection of Murch's practice

concept, the sound montage ethos of sound design was overwhelmed in the 1980s by a practice fixation on sound effects creation and the cultivation of a sensorially immersive but somewhat 'passive' soundtrack experience.

Sound design has long since consolidated its industry status as a sound effects creation practice, but this restricted production involvement effectively curtails possibilities for a practical re-investiture of Murch's approach. This status quo, one still in favour of the image, prevents sound design from a full realisation of its storytelling potentials in film. Therefore, from a certain perspective, this study aims to reacquaint sound design practice with its sonic arts heritage and Murchian ideals. However, the reframing of sound design as an applied form of sonic art with an inter-modal compositional strategy is not a 'throwback' to sound montage. Instead, the study proposes a development of its principles, based on applications of compositional concepts associated with post-Schaefferian electroacoustic music.

It is also important to note that Murch's sonic artistry was facilitated by creative autonomy and the freedom to integrate the different aspects of soundtrack creation. Therefore, in order to emulate this approach, the study shifts the sound design context to independent film projects. In subsequent chapters, the interdisciplinary conceptual framework that supports this practice-research endeavour is further defined, prior to a series of project case studies that report on specific examples of its application.

Chapter 3

When the Ear leads the Eye

This chapter takes a broad look at soundtrack studies and identifies a number of contributions that sound makes to film storytelling and cinematic experience. The review is selective, and focuses on drawing out representational themes for the interdisciplinary conceptual framework that have particular significance for the sonic arts approach to sound design and the inter-modal compositional strategy.

3.1 Preamble

The notion that the ear may lead the eye in film viewing experiences is expressed by David Lynch: "Sound is 50 per cent of a film, at least. In some scenes it's almost 100 per cent" (Lynch 2003, p.52). However, an aural emphasis in a sequence does not undermine the mutual dependency of sounds and images in film (Crittenden 2008, p.88), but may instead reflect Calvacanti's assertion that "[...] the picture is the medium of statement, the sound is the medium of suggestion" (Calvacanti 1985, p.109). According to Doane (1985), sound can be a suggestive gateway to the subjective reality of film characters. This narrative application of sound to signify subjective realities is particularly evident in Lynch's films, most notably *Eraserhead* (1977) and *Dune* (1984).

The idea that sound unlocks representations of the subjective is reflected in Bresson's soundtrack philosophy: "The ear goes more toward the within, the eye toward the outer" (Weis & Belton 1985, p.149). This understanding is also implicit in Bresson's

assertion that sounds and images can contribute to storytelling in a non-duplicative way by engaging in a form of 'relay' (Ibid.). This raises the questions of how the soundtrack functions in this relay and what unique qualities sounds contribute to audiovisual representation.

Chion (1994, p.136) argues that most perceived qualities of diegesis are *transsensorial* in nature and are not exclusively revealed by either audition or vision. Bresson's relay rests on this transsensorial exchange, which partakes of the separate sensory advantages of the ear and the eye.[55] Subsequent sections will examine the unique qualities of sound in the audiovisual relay of transsensorial perception. This analytical knowledge has inherent applied value for sound design compositional strategies, as it offers an insight into the cognitive processes underlying the various storytelling functions of film sounds.

3.2 The Semiotic Potentials of Film Sounds

In *Traité Des Objets Musicaux*, Schaeffer describes the semiotic potentials of the sound-object as a *sign*, which connects with the two objective modes of listening in his *Quatre Écoutes*[56] (Schaeffer 1966; Chion 1983). Specifically, mode 1 listening (*Écouter*) involves a first-order signification in which the sound (the *signifier*) functions as an index to the cause and identity of the sounding source (the *signified*) (Barreiro 2010, p.36). Mode 4 listening (*Comprendre*) involves a second-order signification in which the indexed sound-object (first-order sign) functions as a signifier that conveys a signified meaning (Ibid.; Field 2000, p.41).[57] According to Chion (1983; 2009b), mode 4 listening and second-order significations direct the perceiver to apprehend a concept.[58]

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[55]This includes the superior sensitivity and acuity of auditory perception in relation to the temporal encoding of sensory impressions (see Matlin & Foley 1997). Chion (1994, pp. 12–13) notes that this allows film sounds to temporally animate film images.

[56]Four modes of listening.

[57]Schaeffer's application of semiotics retains the structural essence of the *sign* as referring to the relationship between the *signifier* and *signified*. A chain of ordered significations is created when a first-order sign becomes the signifier at a second order of signification. This 'sign as signifier' expresses a 'higher' meaning. The chain can be meaningfully extended by successive expressions of signs as signifiers at higher orders of signification (Barthes 1972).

[58]Reference from the unpublished English translation of Chion (1983) by John Dack, (Chion 2009b).

Chion later adapted Schaefferian listening modes to derive three modes applicable to filmmaking and soundtrack analysis, terming these the *causal*, *semantic* and *reduced* listening modes (Chion 1994).[59] Causal listening is concerned with first-order significations and a focus on apprehending the sources of sounds (Ibid, p.25).[60] Semantic listening purports to second-order significations that require listeners to 'decode' the meanings (concepts) carried by sounds in the form of spoken language or other audible codes (Chion 2009a, p.489).[61] Reduced listening is inherently non-semiotic and phenomenological in nature. It involves a sole focus on the perceived qualities of sounds in isolation from causal and semantic associations (Ibid, p.487).[62]

While semantic listening identifies the linguistic or symbolic codes that are central to film narrative, it is clear that the soundtrack's conveyance of meaning extends to higher-order significations. Sonnenschein (2001, p.78) addresses this by introducing a fourth *referential* listening mode to describe how sounds, as contextually embedded signs carrying socio-cultural or historical significance, evoke "emotional and dramatic meaning". Referential listening is therefore crucial to the sound designer's ability to develop the extra-narrative significance of film sounds through audiovisual poetic modes (Ibid.).[63]

[59]Chion's causal and semantic modes are direct adaptations of Schaeffer's mode 1 (*Écouter)* and mode 4 (*Comprendre*), respectively. The reduced listening mode (*Écouter Reduité*) is not one of Schaeffer's four primary modes, but is associated with mode 3 (*Entendre*) (Barreiro 2010), and involves the action implicit to mode 2 (*Ouïr*).
[60]Typically, a focus on 'recognition' and identifying the source of sounds.
[61]Chion refers to Morse code or other systems of coded communication that use sound.
[62]Section 4.1 presents an in-depth discussion of reduced listening and 'modal' listening in general.
[63]See also section 2.3.1 and section 4.1.1.

3.2.1 Film Sound as Metaphor

According to Sonnenschein (2001), narrative meaning is either consciously or unconsciously interpreted in film, with sounds expressing their 'poetic functions' in these states via "[...] a language of sound imagery [...]" (p.55). As previously noted, the modes of this audiovisual language are deemed to be analogous to literary devices (e.g., simile, metaphor, allegory, irony, and paradox) (Ibid.).[64]

Field (2000, p.48) states that a sonic simile "[...] gives a new meaning to an existing sound by juxtaposing it with new material". Hitchcock in several films deploys a simile motif formed by the substitution or merging of a mechanical scream (e.g., a whistle) with a human scream (Weis 1982; Sonnenschein 2001). Weis (1982) observes this juxtaposition of sounds with a perceived similarity functions over a sequence transition in *The 39 Steps* (1935), and is reused in *Sabotage* (1936) and *The Lady Vanishes* (1938). However, she suggests that Hitchcock's use of simile is not symbolic, but rather a "bravura effect" designed to disrupt the "[...] subdued classical style of the film" (Weis 1982, p.162).

In contrast, Murch (1995, p.249) refers to a symbolic deployment of simile in *The Godfather* (1972), where a metaphorical scream from an acousmatic source (a train) signifies Michael's[65] inner turmoil prior to committing his first murder. This exemplifies Murch's philosophy of creating a 'metaphoric tension' between sounds and images to "[...] provoke an image or a sensation that is not on the screen but is elicited from the mind of the audience" (Costantini 2010, p.36). Whittington (2007, p.68) claims that the emphasis on sonic metaphors in films such as *THX 1138* demonstrate a defiance of naturalistic codes in cinematic representation that was influenced by the French Nouvelle Vague.[66]

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[64]See section 2.3.1. Refer also to Sonnenschein (2001, p.55) for a full listing of poetic modes. Zaza (1985) presents a similar listing. While Sonnenschein does not state that he derives his list from Zaza, he includes a reference to Zaza (1991) in his bibliography (Zaza 1985, republished).

[65]Played by Al Pacino.

[66]Myer (2011) also observes that the representational style of Godard and the French Nouvelle Vague was in defiance of cinematic codes that strove for an illusion of naturalism, which equates to realism.

According to Murch, naturalism and over-determinations of sonic realism do not facilitate the audience's active imaginative engagement in narrative interpretation (Murch 1995; 2003). For this reason, he advocates using film sounds metaphorically. In terms of sound design, this may be achieved

> [...] by choosing carefully what to eliminate, and then adding sounds that at first hearing seem to be somewhat at odds with the accompanying image. (Murch 1995, p.247)

Murch regards the meaningful tension created by *metaphoric distance* between sounds and images as a narrative dynamic and expressive aspect of sound design compositional strategies (Ibid., pp. 247–248). He advances the following hypothesis about the cognitive process of 'closing' metaphorical distance to arrive at a meaning:

> [...] the human mind will look for deeper and deeper patterns, and it will continue to search ... if not at the geographical level, then at the natural level; if not at the natural level, then at the psychological level. (Murch 2003, p.100)

Murch also considers that the audience's active engagement in resolving narrative meanings is a rewarding aspect of their cinematic experience (Murch 1995). He further notes that the engineering of metaphoric distance may in rare instances manifest *conceptual resonance* between the sound and image:

> The sound makes us see the image differently, which in turn makes us see something else in the image, which makes us hear different things in the sound, and so on. (Ibid., p.250)

Murch refers to the opening sequence of *The Conversation* as a potential example of conceptual resonance at work (Ibid.). Initially, the metaphorical distance between the images of a couple conversing in a city park and the electronically mediated sound poses a narrative question (LoBrutto 1994; Katz 1997). The meaning is ultimately resolved through conceptual resonance and the realisation that a surveillance operation is taking place.

Sound-image metaphors are emblematic of Murch's approach to sound montage and sound design. In the opening sequence of *Apocalypse Now* he orchestrates the metaphorical transformation of a soundscape in its entirety, by progressively substituting the realistic sounds of Saigon with 'analogous' jungle sounds (Costantini 2010, pp. 42–43). According to Murch (1996), this sonic transformation signifies a transition from the objective reality of the hotel room to Willard's subjective experience of being trapped in a combat psyche. This metaphorical turn to the subjective also includes a notable example of simile, engineered by the synchronous superimposition of helicopter rotor sounds with images of a ceiling fan (Sonnenschein 2001).

Metaphoric distance engineers a comparable representation of subjective combat trauma in *The Cruel Sea* (1953). As the captain[67] inspects his new ship, the acousmatic sounds of drowning men issuing from a bridge communications pipe represent his memory of a previously depicted sinking. Metaphorically, these sounds signify his guilt and the lonely burdens of command.

3.2.2 Acousmêtres

Chion (1994) defines an *acousmêtre* as an unseen but apparently human source of sound with "[...] a wholly specific presence based on their characters' [sic] very absence from the core of the image." (p.129). Chion notes that acousmêtres posses a unique representational power in film by virtue of their ubiquity, panopticism, omniscience and omnipotence as characters (Chion 1999, p.24). This explains why the 'de-acousmatisation' of an acousmêtre, such as Dorothy pulling back the curtain in *The Wizard of Oz* (1939), is often a moment of climactic symbolism (Ibid., Sonnenschein 2001, p.153).

Whittington (2007, pp. 64–66) highlights the symbolic power of the acousmêtre as the artifice of totalitarian state control in a comparative analysis of *THX 1138* and

[67]Played by Jack Hawkins.

Godard's *Alphaville*. In both films, an acousmêtre takes the form of an artificial intelligence exercising mind control over a futuristic dystopian society.[68] As sources of propaganda, these acousmêtres signify the omnipresence of an Orwellian 'Big Brother' character. Also, in both films the reinstatement of individual free will is symbolised by destruction of the acousmêtre, an act of de-acousmatisation that reveals its identity as an *acousmachine* (Chion 1999, pp. 44–45).

Arguably the most dramatic transition from acousmêtre to acousmachine occurs in *2001: A Space Odyssey*. In this film the destructive disconnection of the malfunctioning AI, 'HAL', unfolds in parallel with the timbral decay of his 'human' voice to a crude synthetic tonality (Ibid. p.45). This sonic metaphor for HAL's lobotomy and death as a sentient consciousness evokes empathy for his paranoid homicidal behaviour as a humanised acousmêtre. This sequence, in similarity with the destruction of acousmachines in *Alphaville* and *THX 1138*, reflect a recurring theme in science fiction narrative that signifies the danger of AI anthropomorphism (Whittington 2007, p.67).

3.3 The Power of Silence

When cinematic experience is denied visual sensory impressions, sound—the medium of suggestion—may evoke a compensatory mental image. This is evident in *Throne of Blood* (1957), where the acousmatic details of the castle at night fill the imagination with an atmospheric 'sound-image' of the unseen. Similar effects are ubiquitous in the horror genre, most commonly when acousmatic sound-images are used to evoke the presence of an unseen agent of terror (Spadoni 2007).

In comparison with audition, vision is less capable of triggering imaginative synaesthesia (Blackmore 2003). Therefore, somewhat paradoxically, the response to film silence may not be an automatic perceptual focus on the image. Instead, the absence of sound may sharpen the attentional acuities of hearing, prompting the audience to listen more intently. What does seem clear is that film silence manifests

[68] In *Alphaville* the central computer is called 'Alpha 60', whereas in *THX 1138* the electronic deity is referred to as 'OMM'.

tension (Balaz 1985), a storytelling dynamic orchestrated by the relative phenomenological presence and absence of sounds, one which counterparts the contrast between visual movement and stillness (Crittenden 2008, p.88).

Chion (2009a) remarks that the Dolby era has facilitated a fine control over the dynamics of sound, facilitating listening experiences that focus the powers of silence:

> The overwhelming silence that digital sound makes possible [...] allows the film screening to deepen our attention, to deepen the emptiness between sentences and between words, to send each of us back closer than ever to the truth of our own silence and listening [...]. (Ibid., p.160)

The depth of attention and personal awareness that silence can stimulate is also paralleled by a sensitisation of auditory perception, an idea echoed in the following analogy:

> Every instance of silence is disarming since it seems to expose our faculty of hearing; it's as if a giant ear had turned towards us ready to pick up the tiniest sounds we make. (Ibid., p.148)

Silence therefore profoundly alters our conscious awareness with the consequence of stimulating the imagination to compensate us for what we are perceptually denied. In film, the imaginative rendering of sound may occur as a *palimpsest effect,* one driven by the expectation that an unheard sound is otherwise 'present' (Ibid., p.170). Silence can also have a metaphorical quality that creates an imaginative space for the audience, who "[...] crowd that silence with sounds and feelings of their own making [...]" (Murch 2003, p.100).

It would seem that film silence or near silence, stimulates two interconnected responses from the audience. One is a focused listening response, which in the right circumstances may facilitate reduced listening and selective attention on the perceived qualities of sounds that are present. The other response is imaginative engagement, whereby a silence may prompt the mental rendering of 'sound-images' and aural impressions.

3.3.1 Silence and the Subjective

Théberge (2008) notes that silences grant us access to the "metadiegetic" realm that represents the "[...] mental life of a film character" (p.57). This representational turn to the subjective is evident in a sequence from *Apocalypse Now* where Willard encounters a soldier nicknamed 'Roach'. Murch (2003) explains that the minimal sound design is intended to facilitate audience participation in "[...] the psychological state of the characters onscreen who are listening more intently to a precise point in space" (p.96).

The sequence is surrealistic, as visually an intense battle continues to rage while the soundtrack evokes the subjective experience of Roach as a kind of "human bat" (Kenny 2000, p.10) who has the ability to perceptually attenuate all sources of sound, except those made by his target (Murch 1996). In this sequence, Murch's sound design demonstrates how a near silence can be used to focus listening attention on specific sounds. Moreover, the soundtrack's metaphorical impact prompts us to question the nature of an 'objective' battle reality by opening a suggestive metadiegetic doorway to the subjective experience of a character.

3.3.2 Focused Perceptions of Sound

Cognitive Psychology describes selective attention towards innately interesting auditory stimuli as the 'Cocktail Party Effect' (Cherry 1953). Studies have also applied the metaphor of a 'variable spotlight' to describe selective visual attention (Posner, et al. 1980). Both these themes express the idea that with complex sensory impressions, selective attention brings the perceived details of a particular object into focus. The concept of selective attention may be applied to cinematic experience to account for how a near silence focuses auditory perception on the details of sound qualities, including what Chion (2009a) refers to as *materialising sound indices* (MSI's), "[...] the qualities of a sound that direct our attention to the physical nature of its source" (p.244).

The relationship between silence and focused auditory attention is controlled with poetic artistry by Robert Bresson in *A Man Escaped* (1956). In the film, near silence is used extensively to facilitate a heightened perceptual sensitivity towards the MSI's of sounds. Bresson accomplishes this focus on sound qualities by often presenting sounds in a serial manner (Belton 2008, pp. 31–33), which in turn facilitates the perception of Bresson's finely controlled variations in timbre and dynamics (Bordwell & Thompson 2009). This is most evident in the cell sequences, in which Fontaine[69] is acutely conscious of every sound he makes while fashioning the tools of his escape (Ibid., p.379). At these points, Bresson activates reduced listening to isolate the material qualities of sounds, drawing the audience into a state of focused perception that parallels the subjective experience of Fontaine.

Hanlon (1985, p.145) observes that the alternation of sound and silence in Bresson's films reflects the concept of the sound-image 'relay'. In the final escape sequence of *A Man Escaped*, Bresson demonstrates this relay by frequently allowing the sound to evoke impressions of events that compensate the audience's imagination in the absence of detailed visual renderings.[70] As the tense drama of the escape unfolds, the audiovisual relay and dynamic switch from sound to silence "[...] concentrates our attention on the characters' most minute reactions and gestures" (Bordwell & Thompson 2009, p.379).

In *Das Boot* (1981), instances of near silence also facilitate a representational turn to the subjective experience of characters and prompt us to participate in their focused perception of sound qualities. Bresson's relay is evident in the depth-charging sequences, and Gary Rydstrom describes how sounds and images respectively correspond to the offscreen and onscreen world (Sergi 2004, p.171). After each depth charge, the crew listen intently in near silence to the fully rendered acousmatic MSI's of the boat's hull under pressure, the incessant dripping of water and their own shallow breathing. This intense focus on the perceived qualities of sounds is violently interrupted by an explosive event that psychologically shatters engagement with their subjective experience. These sequences in *Das Boot* eloquently demonstrate Chion's

[69]Played by François Leterrier.
[70]For example, the audible murder of a prison guard is carried out in almost complete darkness.

notion that silence can be the *fundamental noise* from which all other sounds erupt (Chion 2009a, p.158).

3.3.3 A Conspicuous Absence of Sound

Théberge (2008, p.56) notes that a "relational silence", or contrast between the presence and absence of sounds, can meaningfully support film narratives. Moreover, the absence of sound may be conspicuous when there is a deviation from narrative expectancies. Consequently, the phenomenological non-presence of sound can constitute a sign and function as a dramatic vehicle that promotes tension. This effect is demonstrated in *The Birds* by a silent scream, an absence of sound in defiance of expectancy that deepens the horror of discovering a dead body (Weis 1982).

Chion (2009a, p.170) refers to another instance of sounds' conspicuous absence in *The Birds*, one that demonstrates the palimpsest effect. Chion observes that, as the birds assemble outside the school, there is the impression that the children's singing masks their sounds, even though no bird sounds are rendered in the soundtrack (Ibid.).[71] Throughout the film, unnatural bird silences and minimal, electronic, near silences, signify the malevolent threat of attack (Weis 1985; Underwood 2008). During the film's finale, Hitchcock dramatically exploits a dynamic contrast between silence and cacophony to frame a series of bird attacks on the house. In this sequence the presence of the birds is maintained by their acousmatic sound-images, and when their silence erupts "[i]t is as though the sound were attacking the image" (Chion 2009a, p.166). A threatening electronic silence is reinstated several times, most notably during the escape, when the survivors walk tentatively among the near-silent birds, conscious of every sound they make.

[71]Chion's example of the palimpsest effect appears suggests the power of natural listening expectancies to stimulate the imagination. Specifically, an expectancy that the birds arrival outside the school is not entirely silent drives the imaginative rendering of associated sounds as being 'present' although unheard due to their masking by the children's singing.

3.4 Audiovisual Counterpoint

Kershaw (1992) notes that in film a predominant audiovisual consonance can be strongly contrasted by 'dissonance', or an apparent contradiction between sounds and images. The storytelling applications and narrative effects of audiovisual contradiction vary, but nonetheless require the audience to actively engage in their interpretation. More often than not, 'dialectical' collisions between sounds and images are intended to signify a comprehensible meaning (Kracauer 1985). This idea is implicit to Murch's sound design concept of *metaphoric distance* in audiovisual relationships, which aims at engaging the audience's imagination in 'closing the distance' to arrive at a meaningful interpretation of the montage (Murch 1995).

In *THX 1138*, metaphoric distance varies dynamically, and its most extreme leads to the momentary formation of aural narratives that are meaningfully independent of the image (Whittington 2007, p.65). This could be termed 'audiovisual counterpoint', but Chion (2009a) argues that film studies' appropriation of this musical analogy to describe conflicts between sounds and images is misleading. Chion's objection is underlined by the derivation of alternative terms, including *anempathetic effect* to refer to uses of music and sound that express emotional indifference to events in diegesis (Ibid., p.467), and the term *audiovisual dissonance* to describe a more general "effect of diegetic contradiction [...]" (Ibid., p.475).

3.4.1 Soviet Montage Theory

Eisenstein (1949) insisted that film's true form is *montage*: a meaningful structure constructed out of a collision of elements that reflects art's social responsibility. Eisenstein summarises the philosophical mechanics of narrative meaning in film montage as follows:

> [T]o form equitable views by stirring up contradictions within the spectator's mind, and to forge accurate intellectual concepts from the dynamic clash of opposing passions. (Ibid., p.46)

Chion (1999, p.11) observes that Soviet montage theory rejected 'illustrative' soundtracks in order to promote the symbolic potentials of film sounds as independent signs and meaningful signifiers. This is reflected by Eisenstein's application of Marxist and Hegelian dialectics—whereby concepts or meanings are formed from the resolution (*synthesis*) of two ideas or elements in collision (*thesis-antithesis*)—to film form. Eisenstein defined several montage approaches to image editing based on dialectical principles (Eisenstein 1949). In the following manifesto extract, the concept of contrapuntal sound is incorporated within montage theory, thereby positing the signification of meaning through a dialectical collision of sounds and images:[72]

> [...] every ADHESION of sound to a visual montage piece increases its inertia as a montage piece, and increases the independence of its meaning.... ONLY A CONTRAPUNTAL USE of sound in relation to the visual montage piece will afford a new potentiality of montage development and perfection. (Emphasis preserved, Weis & Belton 1985, p.84)

In a separate manifesto on the principle of asynchronism, Pudovkin suggests that contrapuntal relationships may be constructed by aligning an image-led representation of objective-diegetic reality, with a sound-led representation of the subjective experience of characters:

> It is possible therefore for sound film to be made correspondent to the objective world and man's perception of it together. The image may retain the tempo of the world, whilst the sound strip follows the changing rhythm of the course of man's perceptions, or vice versa. (Ibid., pp. 87–88)

The principle of asynchronism is evident in the opening sequence of *Apocalypse Now*. In this sequence, sound represents the temporal course of Willard's subjective experience, which often contradicts the image and the objective-diegetic reality of the hotel room. In fact, the asynchronism is dynamic and complex in its narrative effect,

[72]Written by S.M. Eisenstein, V.I. Pudovkin, and G.V. Alexandrov.

as any linear sense of time is blurred by shifts between representations of Willard's perceptions of the hotel room (objective reality) and his imaginings (subjective reality).

In general, Chion (2009a, p.201) delivers a scathing criticism of Soviet montage theory and contrapuntal uses of sound. He argues that audiovisual dialectics often fail to realise their intended narrative significations (Ibid, p.203) and are overvalued within film studies because anempathetic sound is a 'conspicuous' effect (Ibid. p.209). Chion also contends that cinema has not developed audiovisual codes that allow acousmatic sounds to reliably signify the subjective experiences of characters (Ibid, p.202). On face value, Chion's scepticism towards audiovisual counterpoint is valid insofar that he highlights the clear potential for misinterpretation. However, Chion's absolutist position does not acknowledge that finely judged narrative deployments of audiovisual dialectics could yield coherent meanings. When this occurs, the narrative effects are often powerful, profound and imaginatively engaging.

For instance, a successful use of dialectical montage features in *Code Unknown: Incomplete Tales of Several Journeys* (2000). In one sequence, photographs of Parisians taken surreptitiously on the Metro by the photojournalist Georges are counterpointed by the sound of his voice reciting a confessional letter to his girlfriend Anne.[73] The aural narrative fixates on George's experiences of a war zone assignment and is seemingly unconnected to the imagery. However, when this sequence is framed by the film's overall narrative trajectory, the resolution of the audiovisual dialectic advances several interconnected significations.[74]

[73]Georges is played by Thierry Neuvic, and Anne by Juliette Binoche.
[74]One interpretation reinforces an emergent view of Georges as a self-obsessed character in possession of a secret fetish. The letter also emphasises his physical and psychological distance from the traumas affecting Anne. The montage also implies Anne's discovery of George's fetish and engenders a realisation that their relationship has no future. This is borne out by the film's conclusion which plays out Anne's decision to exclude Georges from her life.

3.4.2 External Logic

Audiovisual dialectics akin to montage are relatively rare in mainstream film. Stylistically more common are instances in which sound is used to momentarily 'fracture' the diegesis. Chion's concept of *external logic* describes this structural effect in a sequence, which "[...] foregrounds effects of discontinuity and rupture, as external interventions with respect to the represented content" (Chion 2009a, p.479). When external logic is intentionally applied to disrupt narrative flow or fracture an illusion of diegetic 'realism', the structure of audiovisual representation itself is revealed to the viewer (Myer 2009; 2011).

External logic is evident in the work of the French Nouvelle Vague director Jean-Luc Godard. Williams (1985, p.335) observes that Godard's anti-realist aesthetics often focus on sound, revealing a stylistic trait to over-articulate the volume of mechanical sound effects. Moreover, intrusively loud ambient sounds often obscure dialogue in Godard's films, and in general these effects appear to be ignored by his characters (Ibid, p.336). Bordwell and Thompson (2009) similarly note Godard's anti-realist break with the soundtrack conventions of classical European cinema in *Breathless* (1960), a film that frequently brings into question sound's supportive relationship to the image (Sheahan-Wells 2000, p.54).

Godard's *Breathless* includes numerous sequences of 'jump cuts' (Bordwell & Thompson 2009, p.432), a form of diegetic fracture caused by audiovisual discontinuity. Throughout the film, a variety of additional sound strategies achieve the same effect. These include dialogue being masked by loud mechanical noise (as in the airport sequence) and over-articulations of contrasts in the relative loudness of sound effects and music (Sheahan-Wells 2000).[75]

In the context of French cinema, the brash soundtrack of *Breathless* constitutes something of an antithetical statement to the sonic poetry of Bresson's audiovisual

[75]In one example, the sound of a gun fired from a car window by Michel (Jean-Paul Belmondo) is unrealistically loud. This contrasts to his murder of a policeman, which is unusually quiet relative to the raucous musical score that accompanies his escape.

'relay' in *A Man Escaped*. However, *Breathless* remains an influential sound film because its soundtrack attempted to "[...] create a fresh relationship with the image, one that can be both complementary and contradictory [...]" (Sheahan-Wells 2000, p.57).

3.5 'When the Ear leads the Eye': Conclusions

As one of the architects of the French Nouvelle Vague, Godard was regarded as a divisive 'l'enfant terrible' by his classicist contemporaries. Chion (2009a, p.209) pillories Godard's 'ostentatious' use of sound, and in film studies he continues to divide opinion. What is undeniable is that Godard and the French Nouvelle Vague were a source of influence for the American New Wave (Whittington 2007; Flueckiger 2009). The form of this influence stems, in part, from a metaphorical use of sound-driven external logic that liberated the soundtrack from its classically supportive (subordinate) role in film. This represented an important stylistic legacy for the American New Wave and Murch's sound montage, which elevated the narrative significance of the soundtrack via a greater emphasis on sound-image metaphors (Whittington 2007).

The soundtrack for *A Man Escaped* represents a different stylistic legacy for sound design. In this film, Bresson creates the imaginative space for acousmatic 'sound-images' to compensate the viewer's experience in the absence of visual details. Bresson also demonstrates how a near silence can attentively focus listening sensitivity on the perceived qualities of sounds. Examples from *A Man Escaped* and *Apocalypse Now* also reveal that silence is capable of drawing the audience into the subjective experience of characters. Moreover, Hitchcock's silent scream underlines that silence has a signifying power all of its own, one that may stem from a conspicuous absence of sound that conflicts with our listening expectancies.

For Chion, the effectiveness of montage dialectics and sound-driven external logic is a contentious issue, and betrays his preference for empathetic sound that adheres to the internal logic of a sequence (Chion 2009a, p.209). The author does not wholly

subscribe to Chion's position, as a use of sound that counterpoints the image can be meaningful when it is finely executed with a clear narrative intention. One context where the principles of montage dialectics and diegetic fracture may be meaningfully applied is to the structural discourse of nonfiction films that attempt to break with representational illusions of realism (Myer 2009; 2011).[76]

In summary, one must partly accept Chion's view by acknowledging that at the dialectical extremes of metaphoric distance between sounds and images, there is a greater risk that intended significations could be either missed or misinterpreted. What remains clear however is that symbolic uses of sound, silence and counterpoint are mechanisms by which the ear can lead the eye in film.

3.6 Chapter Summary

This chapter aimed to define salient themes in soundtrack studies that point to how sound contributes meaningfully to film storytelling and cinematic experience. The three themes examined: - *semiotics*, *silence* and *counterpoint*, reflect an emphasis on understanding the narrative significance of film sounds beyond 'image directed' modes of supportive reinforcement. Bresson succinctly encapsulates this notion of sound and image parity with his relay concept. Moreover, each of these themes highlight how the soundtrack can break the shackles of its enslavement to the image and make unique, powerful contributions to film narrative.

Knowledge of the three themes can have an applied potential in sound design by informing its compositional intentions and approaches towards storytelling. Consequently, the integration of this knowledge within the interdisciplinary conceptual framework reflects the idea that the storytelling intentions of sound design are interwoven with its compositional approach. Subsequent chapters on applications of spectromorphology, indicative fields and sonic landscape to the inter-modal compositional strategy will establish this connection to storytelling intentions.

[76]These representational themes are explored in chapter seven in relation to applications of montage dialectics and diegetic fracture in the sound design of the nonfiction film *Song of the Falklands*.

In practice, each of the three themes advanced concepts that became integrated aspects of the author's compositional approach to soundtrack narrative. The sound design case studies present the evidence of how these storytelling concepts were applied in practice. Collectively, they reveal continuity in the conceptual application of metaphoric distance and poetic modes to symbolic uses of sound. Also, narrative symbolism associated with the resolution of an audiovisual dialectic is a defining structural feature of *Song of the Falklands* (Chapter 7), a nonfiction film that applies the principles of intellectual montage.[77] Moreover, the film's anti-realist ethos also relied on sound design to structure instances of diegetic fracture.

Other conceptual applications of the three themes are unique to *The Immortal* (Chapter Eight), and *The Lock* (Chapter Nine); two films with narratives based on recollections that represent memories and imaginings. Consequently, in these cases the sound design was informed by ideas discussed in this chapter that relate to how the soundtrack functions in film representations of subjective experience. In the three films the use of silence is not immediately apparent, and differs somewhat from the examples discussed in section 3.3. However, relative silences are ubiquitous, and are meaningfully structured to engineer dynamic contrasts in the soundtrack. Silence is also used to foreground narrative significations carried by sound signifiers that are diegetically 'present' or conspicuously 'absent'.[78]

From the discussion thus far, one recurring theme has come to define the guiding philosophy of the sonic arts approach to sound design. It may be framed as a primary compositional objective, one that seeks to stimulate the imaginative engagement of the audience and facilitate their active participation in the discovery of narrative meaning. The ethos of this approach is encapsulated by Murch, who observes that sound design should endeavour to "[...] create a purposeful and fruitful tension between what is onscreen and what is kindled in the mind of the audience" (Murch 1995, p.247). In chapter five, this thematic objective of sound design is expressed through proposed applications of sonic landscape concepts and compositional approaches.

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[77]One of the five forms of montage that Eisenstein (1949) describes.

[78]For example, in *The Immortal* a near silence foregrounds the sound of a ticking watch that signifies the passage of time. Later in the film, silence frames the absence of this sound, which signifies that marking the passage of time is no longer of any consequence to the fate of the central character.

Chapter 4

Spectromorphology

Films such as *Das Boot* and *A Man Escaped* show how a judicious use of silence can facilitate attentive listening, and bring the phenomenal qualities of sounds to the foreground of soundtrack perceptions. Film sound design embodies a creative responsibility to articulate the multi-dimensional 'added-values' of the soundtrack to the image, but these values are dependent on the qualities and structure of sound perceptions. Consequently, a comprehensive knowledge of sound perception and psychoacoustics is a functional component of sound design conceptual frameworks (Sonnenschein 2001).

This chapter integrates knowledge of 'modal' listening and sound perception within the interdisciplinary conceptual framework, and describes its application to the inter-modal compositional strategy. Central to this is a proposed selective application of Denis Smalley's spectromorphology and indicative fields theories to sound design and soundtrack analysis (Smalley 1986; 1992; 1997). The theories may be applied in these contexts as an analytical tool and descriptive language of sound perceptions.

4.1 'Modal' Listening

Altman (1992, pp. 1–2) argues that 'text-centric' approaches to film studies fail to acknowledge the production and reception processes that frame cinema as an experienced event. Altman concludes that film studies requires a language that is capable of describing the "geometry of cinema events" (Ibid., p.3). This underpins his

general assessment of soundtrack analysis as being "[...] insensitive to sound's phenomenality" (Ibid., p.16). Altman attributes this to an over-reliance on musical vocabularies that are insufficient to describe the complex "material heterogeneity" of sound events (Ibid., p.15)[79]. Altman further asserts that this reflects a *reproductive fallacy* within soundtrack studies that promotes the misleading assumption that "[...] sound itself is restricted to those characteristics" (Ibid., p.40).[80]

The focus in soundtrack analysis on perceptual (phenomenal) qualities is elucidated by Chion (1994, p.29) in reference to Schaeffer's concept of *reduced listening* (Schaeffer 1966; Chion 1983). The specialized 'intentionality'[81] of reduced listening reflects Schaeffer's application of Husserl's phenomenological reduction (*epoché*) to 'bracket out' information that is external to the sound as an object of perception (Demers 2010, p.26).[82] In principle, reduced listening liberates the perceiver from a conscious consideration of the cause and meaning of sounds, in order for perception to focus on the intrinsic morphologies of sound qualities (Chion 1994; Landy 2007), or on what has been more succinctly described as the "spectromorphological characteristics" of sounds (Barreiro 2010, p.36).

Schaeffer (1966) defines reduced listening as a specialist listening mode, and acknowledges that to be practised, the natural predispositions of the listener to seek knowledge of the sound source must be overcome (Demers 2010, p.28). Schaeffer held that reduced listening could be facilitated by an acousmatic 'listening situation', one that "[...] draws our attention to sound traits normally hidden from us by the simultaneous sight of the causes" (Chion 1994, p.32). This assertion is somewhat divisive and has prompted the reverse view that acousmatic listening situations may intensify causal listening instead (Ibid.; Windsor 2000; Emmerson 2007). Other

[79]Sergi (2004, p.6) also identifies that film studies' use of musical vocabulary is inadequate to describe the inherent complexity of the soundtrack.
[80]Altman (1992) refers to the limitations of musical categories for describing unpitched and non-musical sounds effects in film. A discussion of soundtrack aesthetics by Bordwell and Thompson (1985) demonstrates the application of simple 'acoustic properties' (e.g., *loudness, pitch, timbre*) and musical concepts (e.g., *rhythm*). Zettl (2005) similarly restricts perceptual analysis of the soundtrack to musical categories.
[81]The term 'intentionality' is used here in the sense in which it is applied within phenomenology, meaning the 'consciousness of' or 'experience of' something. This is to be distinguished from the semantics of the word 'intention', which denotes a meaningful purpose in acting (Sokolowski 2000, p.8).
[82]See also Idhe (1976).

criticisms of reduced listening argue that a focus on perceived qualities does not necessarily imply that external associations are entirely bracketed out (Idhe 1976, Demers 2010), but may only reflect a suspension of interest in causality (Emmerson 2007).[83]

These arguments reflect the debate that has surrounded reduced listening in the post-Schaefferian era of electroacoustic music (Wishart 1996; Windsor 2000). Despite divided opinions, reduced listening has retained its specialist applications in the contexts of music composition and analysis (Smalley 1997; Demers 2010). Chion (1994) has also promoted the application of reduced listening to the soundtrack by film scholars and practitioners. This is underpinned by the following rationale:

> The emotional, physical, and aesthetic value of a sound is linked not only to the causal explanation we attribute to it but also to its own qualities of timbre and texture, to its own personal vibration. (Ibid., p.31)

Chion subsequently develops an argument that reduced listening can facilitate our understanding of how perceived sound qualities contribute to knowledge of the cause of sounds, particularly in the case of acousmatic film sounds (Ibid., pp. 31–32).[84] This reflects his general position that natural (passive) and specialist (active) listening attitudes in film perception are essentially inter-modal: "[T]hese three listening modes overlap and combine in the complex and varied context of the film soundtrack" (Ibid., p.33).[85] Smalley (1992) similarly comments on the inter-modal intentionalities of listening in reference to music perception and Schaeffer's *Quatre Écoutes*:[86]

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[83]Emmerson (2007) categorizes external associations as being either symbolic, cultural, or environmental. Demers (2010, pp. 32–33) references Idhe's phenomenology of sound (Idhe 1976) to argue against the bracketing of external associations of cause and meaning. Combining these perspectives implies that reduced listening brackets first-order significations (causal index), second-order significations (language/codes), and higher-order significations (socio-cultural signs) attributable to the sound-object. See also section 3.2

[84]Chion (2009a) highlights a closer relationship between causal and semantic listening. One may account for this by virtue of their semiotic connections—once a sound has been identified (first-order signification) via the action of causal listening, semantic listening is activated to decode the signified meaning (second-order signification). See also section 3.2.

[85]In reference to the *causal*, *reduced*, and *semantic* listening modes.

[86]Schaeffer (1966). See also section 3.2.

> One can imagine varieties of modal shading and shifts during the listening process.... Our music listening mixes all four modes, crossing between them in differing doses depending on our attention and focus, and on our competence and experience as listeners. (Ibid., p.517)

This statement implies that specialist listening requires a practised control over modal shifts and focus (Ibid.). While there is a logical consistency to Smalley's assertion, Windsor (2000) brings into question the epistemological need for modal listening concepts on the grounds that they appear to be incongruous with an 'ecological' view of auditory event perception:[87]

> The ecological perspective ... does not imply that sounds cannot be described as having 'qualities' ... or that they cannot be used as signs.... [I]t does imply, however, both that such mediated concepts are unnecessary for sounds to inform us about our environment and that the sources of sound may be harder to ignore than one might hope. (Ibid., p.16)

Windsor does not dismiss the concept of modal listening entirely, but his remarks echo the idea that studies of perception can be differentiated by the contexts they refer to (Maund 2003).[88] Therefore, theoretical perspectives on listening can be distinguished in terms of how they relate both to the context (natural vs. specialist) and to the attitude of the perceiving agent (passive vs. active).

Section 3.2 outlined the respective intentionalities and knowledge-seeking foci of Schaefferian listening modes and their soundtrack derivatives (Schaeffer 1966; Chion 1994). A further discussion of reduced listening has identified that its intentionality towards the perceived qualities of sounds has significance for the knowledge-seeking objectives of causal listening. This substantiates an inter-modal view of specialist listening that shifts between different intentionalities to reveal the qualities, causes and

[87]Windsor (2000) cites the 'ecological' view of visual perception developed by Gibson (1979).
[88]This quotation from Windsor (2000) is taken from an argument against the pervasiveness of Schaefferian ideals in acousmatic music. Windsor asserts that certain styles of acousmatic music do not automatically prompt a reduced listening focus on sound qualities. Instead, natural perceptual predispositions may increase the emphasis on causal listening and source identification.

meanings of perceived sounds. In turn, inter-modal listening has specialist applications that are unique to a context, including those particular to electroacoustic music (Landy 2007; Smalley 1997), and soundtrack analysis (Chion 1994). In sound design, Sonnenschein (2001) advocates applications of Chion's listening modes and his own concept of *referential listening,* but he does not elucidate on this aspect of practice.

It is also apparent that in the context of soundtrack analysis, reduced listening is not paired with a descriptive language of sound perceptions (Altman 1992). This issue is addressed in subsequent sections following a discussion of modal listening in the context of sound design practice.

4.1.1 Modal Listening and Sound Design

The application of inter-modal listening in sound design implies a degree of practised control over the intentionalities of auditory perception. Causal listening reflects our natural predispositions to identify the source of sounds, and is therefore likely to be the most dominant mode in soundtrack perception (Chion 1994, p.26). In sound design, this mode is active in the production of diegetic sounds that complement an image-led illusion of story world realism. Sound design is also concerned with narrative meaning, and in this respect the semantic and referential listening modes support its compositional strategies towards structuring chains of signification within the soundtrack.

A hypothetical view of modal listening in sound design practice, suggests a dynamic shift in attention and perceptual focus between the associated causes, meanings and phenomenal qualities of soundtrack elements. As an aspect of the inter-modal compositional strategy, the practice of inter-modal listening can be applied to direct the natural listening intentionalities of the audience, in an analogous way to cinematography's direction of visual perception. In the majority of practice scenarios, inter-modal listening is likely to manifest as a tacit form of practical knowledge, an acquired perceptual competency that continually adapts to the pursuit of creative goals within compositional strategies.

The following extract from an interview with Gary Rydstrom illustrates that modal listening is an intuitive practice skill for expert sound designers:

> The more you tune into the complexity of natural sound, the more you can try to emulate that in your work.... I'm listening to everything in my life around me. If it sounds great I record it. New and interesting sounds are not always in exotic locales. The ghost sounds I used in *Ghostbusters II* came from my rice steamer. You just tune in and separate what it is from how it sounds. (LoBrutto 1994, p.243)

"Tuning in" in order to separate the "what it is" from the "how it sounds" captures the practice of reduced listening. Rydstrom's listening approach also aligns with Schaefferian principals of musique concrète, whereby natural sounds are 'liberated' from their external significations to become a raw sonic material for composition (Schaeffer 1966; Wishart 1994). Rydstrom's comments therefore allude to the possibility that the outcomes of reduced listening can facilitate the sound designer's generative creativity with sonic materials.

Accepting in principle that reduced listening is a valuable practice skill in sound design, raises the question of whether complementary analytical tools are required to formally describe the perceived qualities of film sounds. In practice, sound designers are likely to have individuated approaches towards a language of sound perception. Sonnenschein (2001, p.65) formally identifies what he considers to be the "major perceived attributes" of film sounds, building on a familiar musical vocabulary to establish the categories of *pitch*, *rhythm*, *intensity*, and *timbre*. He also designates the categories of *shape*, *speed*, and *organization* to refer to perceptions of morphology and structure (Ibid., pp. 68–70).

Musical categories appear to be the foundation of a language of sound perception used in relation to the soundtrack. Altman's diminished view of this language for soundtrack analysis (Altman 1992) is echoed by Chion (1994), who similarly points to the inadequacies of musical categories "[...] to describe the sonic traits that are revealed when we practice reduced listening [...]" (p.31). In contrast, electroacoustic

music has transcended the limitations of musical categories to develop the comprehensive language for describing the perceived qualities of sounds.[89] The detail and depth of this language enable its application to the analysis and composition of works that structurally differ from contemporary music by incorporating all forms of sound.[90] For these reasons, sound design's inter-modal compositional strategy could apply this language to define the complex intersonic qualities of the soundtrack. Moreover, this language could also be applied in soundtrack analysis to describe what Altman (1992) refers to as the perceived 'material heterogeneity' of film sounds.

The selective application of Schaefferian concepts to soundtrack analysis by Chion, has established a precedent for exploring theoretical links between electroacoustic music, sound design and film studies.[91] Outside of film studies, Chion (1983) presents a theoretical reinterpretation of Schaeffer's work, which includes a system of *spectro-typological* categories to describe the perceived qualities of sounds (Schaeffer 1966).[92] This raises the question of why Chion has not extended his application of Schaefferian reduced listening in soundtrack analysis to incorporate its complementary language of sound perception. Chion alludes to his reasons by arguing that Schaeffer's system "[...] is neither complete nor immune to criticism [...]" (Chion 1994, p.34). It is also apparent that Chion believes the scale of the system to be impractical for film studies, a view shared by Flueckiger (2009, p.152).

On further consideration, Schaeffer's work is not a theoretical 'dead end' in the search for a language of sound perception that may be practically applied in sound design and soundtrack studies. In fact, Chion's reticence to pursue this course is a signpost that points to the applied potential of alternative systems of perceptual analysis developed by post-Schaefferian theorists of electroacoustic music.

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[89]See Schaeffer (1966), Chion (1983), Wishart (1994), and Smalley (1986; 1992; 1997). Also, EARS (ElectroAcoustic Resource Site) is an online portal that reveals the scale and depth of research on sound perception within the UK electroacoustic music community (http://www.ears.dmu.ac.uk/).

[90]Meaning both pitched 'musical' sounds and unpitched sounds, both of which can be either concrete or synthetic in nature.

[91]Chion (1994) applies Schaeffer's theory of listening modes and acousmatic sound to soundtrack analysis. Chion (2009a) presents further limited applications of Schaefferian concepts, including *complex mass, tonic mass,* and *fundamental noise* (Schaeffer 1966; Chion 1983).

[92]*Guides des Objets Sonores* is Chion's reference guide to Schaeffer's *Traité des Objets Musicaux*. In 2009, John Dack produced an authorized English translation, *Guide to Sound-Objects* (Chion 2009b).

Denis Smalley's theory of spectromorphology (Smalley 1986; 1997), and the complementary theory of indicative fields (Smalley 1992), builds on the conceptual foundations established by Schaeffer's spectro-typology (Schaeffer 1966). Like the latter, spectromorphology is an extensive system of analytical categories that describe the perceived qualities of 'sound-objects' (Landy 2007). Subsequent sections will first introduce selected aspects of spectromorphology and indicative fields theories, prior to discussing their hypothetical applications in sound design practice. The three case-study chapters describe project work and present examples of how these theories were applied within the inter-modal compositional strategy. This combination of theoretical discussion and practice-based evidence also highlights possible applications of spectromorphology to soundtrack analysis.

4.2 Spectromorphology and Indicative Fields

The theory of spectromorphology is concerned with describing the perceived qualities of sounds and their organized structures as they evolve over time (Smalley 1986; Landy 2007, p.96). As defined by Smalley (1997), spectromorphology refers to "[...] the interaction between sound spectra (*spectro-*) and the ways they change and are shaped through time (*morphology*)" (p.107).

Spectromorphology was primarily developed as a perception-based system of descriptive analysis for electroacoustic music (Demers 2010). Consequently, Smalley refrains from overly promoting the compositional applications of his theory, but goes so far as to acknowledge "[...] descriptive and conceptual tools which classify and relate sounds and structures can be valuable compositional aids" (Smalley 1997, p.107). Smalley also aligns spectromorphology with the composer's concentration on sounds and structures in a reduced listening mode, describing the latter as "[...] an investigative process whereby detailed spectromorphological attributes and relationships are uncovered" (Ibid., p.111).

Spectromorphology focuses particularly on those perceived qualities that determine the *intrinsic features* of sounds and their structural relationships (Smalley 1986;

1997). In contrast, the *extrinsic features* of sounds are defined as being meaningful significations or "[...] relations with non-musical experience" (Smalley 1992, p.550). Smalley (1997, p.110) states that there is an interactive relationship between the intrinsic and extrinsic features of a musical work: "[T]he extrinsic is determined by the intrinsic and vice versa—it is a reciprocal relationship." (Smalley 1992, p.550). This recognition—that extrinsic features such as causal associations and meaningful significations are interdependent with the perception of intrinsic features (sound qualities)—reflects electroacoustic music's post-Schaefferian emphasis on soundscapes and metaphorical discourses that reference the real world (Field 2000; Emmerson 2007).[93]

Smalley (1997) describes musical works that carry causal and semantic significations as being *transcontextual*, asserting that the interdependency of intrinsic and extrinsic features means that "[s]pectromorphological qualities can often help qualify the power of a transcontextual message" (Ibid., p.110). Film soundtracks are also transcontextual, and it is clear that Smalley's notion of intrinsic-extrinsic feature interdependence is reflected in Chion's assertion that the perceived qualities of film sounds are fundamental to interpretations of cause and meaning (Chion 1994, p.31).

The idea of intrinsic-extrinsic feature interdependence is implicit to Smalley's concept of *indicative fields* (Smalley 1992). Indicative fields expresses the relationship between the spectromorphological details of a sound (intrinsic features) and significations (extrinsic features) that point to "[...] related experiences in the non-sounding world" (Ibid., p.521). Specifically, first-order significations constitute a casual index to the perceived object and to the material-behavioural properties associated with the sound source. Therefore, in transcontextual works, spectromorphological qualities do not point only to themselves, but also reveal event phenomena. Consequently, spectromorphology and indicative fields have potential applications to sound design and soundtrack analysis through their ability to link perceptions of intrinsic features to first- and second-order significations of the sound source. The concepts may also have particular relevance to our understanding of acousmatic film sounds, and how their intrinsic perceived qualities signify the identity

[93]See also Landy (2007) and Demers (2010).

of the sounding source and render impressions of diegetic phenomena in the absence of visual impressions.

The remainder of this section describes the key concepts of spectromorphology and indicative fields theories that have informed the sonic arts approach to sound design. It should be noted that the theoretical depth of spectromorphology is considerable and that its explication has been extended across several articles (Smalley 1986; 1992; 1993; 1997). Consequently, it was necessary to focus selectively on those aspects of the theory that have clear conceptual resonance and practical application for sound design.

In the case studies, certain spectromorphological concepts are not always supported by explicit descriptions of their sound design applications.[94] This reflects the fact that spectromorphological awareness is implicit to the author's creative mindset and practice approach to the inter-modal compositional strategy. Consequently, some aspects of spectromorphology are ubiquitously applied in sound design and constitute a form of tacit practical knowledge. For example, the author's consideration of *spectral typology* and *morphological archetypes* is a fundamental aspect of sound-object design (see section 4.2.1). Overall, the study has endeavoured to make its theoretical coverage of spectromorphology as comprehensive as possible in order to explicitly signpost possible applications to sound design and soundtrack analysis.[95]

[94]Case-study selection was also a factor in this. The practice phase of the study encompassed seven different film projects. Each sound design context evolved unique practice applications of spectromorphology and indicative fields theories. Concerns over the scale of the thesis determined that it could not meaningfully extend its scope to incorporate practice-derived evidence from projects that were not later formulated as case-study reports. The same rationale applies to other aspects of the interdisciplinary conceptual framework, including practice applications of sonic landscape theory.

[95]The theoretical coverage also reflects the fact that the greater proportion of spectromorphological categories and concepts are interrelated. Consequently, to introduce one category in isolation is counter to the interconnected principals of the theory as Smalley presents it. Nonetheless, the scale of spectromorphology as a theory, and the potential scope of its applications to sound design and soundtrack analysis, prompted the author to focus selectively on the relationships that Smalley establishes between spectromorphology and indicative fields.

4.2.1 Sound 'Spectra' and Morphological Models

Spectromorphology is based on a quasi-hierarchical structure of analytical categories. Smalley (1986) introduces a category based on *spectral types* that classifies sound-objects according to their position along a 'note-to-noise' continuum (Ibid., p.67). All sound-objects exist along this continuum and are shaped across their linked *onset, continuation,* and *termination* phases to create a perceived sense of energy and motion trajectory (Smalley 1997).[96] The category *morphological archetypes* describes perceived shapes and contours that may be applied as 'energetic profiles' to the onset, continuation, and termination phases of a sound-object (Smalley 1986, p.69). Morphological archetypes may be simply combined to form a *morphological model* covering all three phases of the sound-object's energetic profile, or chained to form a complex multi-phase *morphological string* (Ibid., pp. 70–71). Smalley notes how the temporal sequencing of repeating models and strings has a bearing on the perception of the *attack-effluvium* continuum. This continuum moves from perceptions of *separated* attack impulses, through perceptions of *iteration*, to impressions of *granular* or *effluvial* textures (Ibid., p.72).[97]

Smalley (1997, p.115) contends that the perceived qualities of a morphological model at the level of the sound-object have a second-order significance in a wider musical context, a concept he refers to as *functional attributions*. For example, an onset phase may signify *departure* or *emergence,* whereas a continuant phase may appear to be a *passage or transition* to a termination phase characterised by *arrival, disappearance*, or *closure*. These functional attributions are applicable at all levels of composition as *structural functions* (Smalley 1986, pp. 84–85).

[96]In sound engineering it is conventional to relate the onset, continuation, and termination phases of a sound-object to the *attack, sustain*, and *release* components of a signal's amplitude envelope (Smalley 1986; Landy 2007).

[97]In sound design, perceived transformations of sound 'attack-effluvium' may be effectively achieved using granular synthesis techniques.

4.2.2 Gesture and Texture Motions

Smalley (1997, p.111) defines *gesture* as an "[...] energy motion trajectory which excites the sounding body, creating spectromorphological life". Gesture is one of the archetypal indicative fields identified by Smalley (Smalley 1992). Central to the signification of gestures are perceived *motions* (Smalley 1986), spectromorphological qualities that describe "[...] the external contouring of a *gesture* and the internal behaviour of a *texture*" (Landy 2007, p.98). One hypothetical application of this concept could link the signification of a musical gesture, such as a 'bowing action', to a perception of external motion that corresponds to a particular energy contour. Regarding textural behaviour, perceptions of interior motion are evident in the effluvial morphologies of ocean-wave and wind sounds. With both gestural contours and textural behaviours, perceived motion may be spectromorphologically deconstructed to a morphological string or model that describes its energetic profile.

Smalley (1997) links the gesture indicative field to external 'interventionist' causality: "When we hear spectromorphologies we detect the humanity behind them by deducing gestural activity [...]" (p.111). Gesture is therefore a key indicative field in *source bonding* (Landy 2007, p.99), a concept that connects the intrinsic and extrinsic features of sounds in the perception of an identifiable source (Smalley 1997, p.110). Smalley (1992; 1997) argues that the recognition of the gesture and the sound source is bound to the perceived immediacy of their relationship, a variable that may be expressed in terms of *surrogacy*. This reflects a progression from *first-order surrogacy,* in which the both the gesture and source are recognisable (Smalley 1997, p.112), through increasing levels of remoteness, to a point of *remote surrogacy* where "[...] neither gesture-type nor source can be surmised" (Smalley 1992, p.524).

Smalley also views *motion* as an indicative field (Ibid., p.528) and states that a detailed spectromorphological classification of perceived motion is required to "[...] describe the often dramatic contours of electroacoustic gesture and internal motion [...]" (Smalley 1997, p.115). Concordantly, the extensive category of *motion typology* is designated to describe the inherent directionality and orientation of perceived motion (Smalley 1986). This category reflects Smalley's compositional interests in

engineering perceptions of "[...] real and imagined motions without the need for actual movement in space" (Ibid., p.73).

Motion typology breaks down into the *unidirectional, reciprocal, cyclic/centric,* and *bi/multi-directional* sub-categories (Smalley 1997, p.116).[98] Several motion forms are designated for each sub-category. For example, *reciprocal motion* includes the *parabola, oscillation*, and *undulation* forms (Ibid.). Motion perception is also deconstructed by a descriptive category of *motion styles* that "[...] delineate the boundaries affecting the internal progress of motion" (Smalley 1986, p.77). Motion styles therefore concern higher-level perceptions of the evolving patterns of motion forms. Smalley identifies several binary pairs of styles that describe motion progress, including *synchrony/asynchrony* and *continuity/discontinuity* (Ibid.).

In a theoretical development of spectromorphology, Smalley (1997) acknowledged that certain motion typologies and styles have a predominant perceived association with either gestures or textures. For example, the *flocking* motion style (Smalley 1986) is associated with texture-based motion and is described as a "[...] loose but collective motion of micro- [*sic*] or small objects elements whose activity and changes in density need to be considered as a whole [...]" (Smalley 1997, p.117). In summary, Smalley's detailed spectromorphological classifications of motion typology and style, reflects his general intention to establish meaningful links between perceptions of intrinsic sound qualities and indicative fields (e.g., gesture, texture).

4.2.3 Structural Relationships and Behaviour

Wishart (1996) and Smalley (1997) similarly argue that tonal music's structural hierarchies are inappropriate for describing the inner complexity of electroacoustic music. In contrast, spectromorphology theory offers a broad unrestricted view of structural concepts and their applications:

[98]Smalley (1986, p.74) describes more sub-categories within motion typology, but Smalley (1997, p.116) simplifies the model slightly and identifies it as "Motion and Growth processes". The later model incorporates the formers' sub-category motion forms.

> [T]he concepts of gesture and texture, motion and growth processes, behaviour, structural functions, spectral space and density, and space and spatiomorphology may be applied to smaller or larger time-spans which may be at lower or higher levels of structure. (Smalley 1997, p.114)

Smalley (1986) also establishes the rationale for conceptualising gesture and texture as dynamic *structural processes*:

> *Gesture* is concerned with action directed away from a previous goal or towards a new goal ... it is synonymous with intervention, growth and progress, and is married to causality.... *Texture,* on the other hand, is concerned with internal behaviour patterning, energy directed inwards or reinjected, self-propagating; once instigated it is seemingly left to its own devices [...] (Ibid., p.82)

Smalley (1992) implies that natural listening expectancies underpin the perception of behaviour in structural relationships when he states that "[t]he placing of sounds in a context automatically ensures that some kind of relationship must exist among them" (Ibid., p.526). The *behaviour* indicative field is also associated with a perceptual differentiation of simultaneous and successive structural components (Smalley 1986). Smalley develops behaviour as a spectromorphological concept over several articles (Smalley 1986; 1992; 1997), but its definition remains rooted in a series of oppositional pairs that describe the 'behavioural character' of structural relationships.

For example, a structural relationship that signifies *dominance-subordination* behaviour is based on a perception of the relative inequality of concurrent spectromorphologies (Smalley 1992, p.526). In contrast, the signification of *conflict-coexistence* is more directly linked to a perceived temporal pattern of exchange that emerges between different structural components. Combining the perspectives outlined in Smalley (1986) and Smalley (1997), we see that the impression of structural inequality is tied to a perception of *reactions* and their associated forms: *competition*, *causality*, and *displacement.* This is balanced by impressions of equality

that may be viewed in terms of perceived *interactions* that can be *confluent* or *reciprocal* in nature.

Smalley (1997, p.118) also introduces two motion-based continua that have a structural impact on behavioural relationship perceptions. *Motion coordination* concerns the relative 'looseness' or 'tightness' (loose-tight continuum) of a perceived synchronicity between concurrent sound events. Alternatively, *motion passage*, or "[...] how one context or event yields to the next" (Ibid., p.118), evokes a perceived sense of being *voluntary* or *pressured* to some degree (voluntary-pressured continuum).

The seeming categorical complexity of spectromorphology in regard to structural relationships and behavioural impressions masks a somewhat simpler conceptual essence. Smalley is effectively stating that individual sound-objects within a structural organisation (group) have perceived interrelationships that give an impression of behaviour. At a higher level of structural organisation, perceived relationships between groups of sound-objects also evoke behavioural impressions. In totality, behavioural impressions arise from an amalgamation of intersonic relationship perceptions emanating from within and between macro-structural arrangements (groups) of sound-objects.

4.2.4 Space

Spatial behaviour concerns how individual sound-objects and structures are distributed in a space relative to each other, and also how they move and interact within that space. The perception of concurrent spatial behaviours establishes an impression of the space, including its dimensions and material structure. Therefore, space itself is an indicative field (Smalley 1992). In parallel with spectromorphology, Smalley (1997) introduces the term *spatiomorphology* to denote a "[...] special concentration on exploring spatial properties and spatial change [...]", while noting that "[...] spectromorphology becomes the medium through which space can be explored and experienced" (p.122).

Smalley (1986, pp. 90–91) designates the concept of *spatial articulation* to signify relationships between spectromorphology and spatiomorphology. In this conceptual framework, behaviour is associated with movement, and motion typologies are applied to spatiomorphology to describe perceived motions in and through space. As an aspect of spatial articulation, the impression of texture is linked to perceptions of sound-object distribution. For instance, *flocked motion* is described as a spatial motion shared by a group of sound-objects with a uniform density of distribution (a texture). Spatial articulation also relates to gestural impressions, and in this sense may correspond to a perceived sound-object trajectory or motion vector through space.

Smalley (1997, p.122) further identifies *setting* as a dimension of spatial articulation, distinguishing between *composed space* and *listening space*. Moreover, the listening space is either 'personal' or 'diffuse' in nature, depending on the position of the listener and the number of loudspeakers used. The nature of listening space warrants attention because it can influence the spatial perception of sounds arranged in composed space on a recording (Ibid., p.122).[99] The concept of composed space introduces the *internal* and *external* categories. The impression of an internal space arises when "[...] a spectromorphology itself seems to enclose a space" (Ibid.). This idea is associated with the resonance of a sounding body, a phenomenon that allows internal space to be perceived as being source-bonded. Smalley further notes that various forms of external spaces may be defined along the 'real-unreal' and 'natural-artificial' continua. These spaces are perceived through spatial cues carried by sound-object spectromorphologies, including relative loudness and reverberation (direct vs. reflected sound) (Ibid.).

The theory describes other spatiomorphological aspects of the spatial indicative field. For instance, *image definition* refers to a perception of the relative clarity or focal sharpness of the 'aural image' (Smalley 1997, p.124). Another aspect, *spatial texture,* is described as an impression of spatial contiguity. Specifically, a sound-object moving through space gives rise to an impression of *contiguous space*, whereas an impression of *non-contiguous* space arises from a perceived separation between spatiomorphologically static sound-objects that occupy only a portion of the entire

[99]The potential impacts of the listening space on composed space perception is well known to sound professionals who mix in studios. It is a factor that is actively controlled using acoustic design.

space (Ibid.). The theory also refers to the *spatial style* of a musical work, which compositionally may feature singular or multiple spatial settings (Ibid.). Furthermore, the concept of spatial style addresses the idea that different spaces may be perceived simultaneously or in a sequential manner, thus evoking a sense of 'passage' between spaces (Ibid.).

4.2.5 Other Indicative Fields

Smalley (1992) examines a range of indicative fields impressions in terms of their perceived intrinsic qualities, which may be described spectromorphologically. In addition to gesture, motion, behaviour, and space, two other indicative fields have significance for this study's application of the theory to sound design.

Utterances are identified as a special category of indicative fields because of their inherent transcontextuality (Ibid., p.525). The transcontextual significance of human utterances is linked to listening predispositions that are naturally sensitised towards the emotional qualities carried by vocal sounds (Cherry 1953; Matlin & Foley 1997). Moreover, vocal gestures are typically perceived as being embodied, thereby implying a human presence, a factor that "[...] alters the significance of the context, redirecting the listener's attention to centre on indicative meanings associated with the perceived utterance" (Smalley 1992, pp. 525–526).

Smalley also refers to the indicative field *object/substance,* commenting that spectromorphologies reveal the material qualities or substance of the sounding body (glass, wood, metal, etc.) (Ibid., p.529).

4.3 Spectromorphology: Applications in Film Sound Design

Spectromorphology is a classification system and language capable of describing the perceived qualities of film sound-objects and soundtrack structural relationships. In combination with indicative fields theory, there is considerable potential for spectromorphology to be used as an analytical tool and compositional aid in sound design practice.

Sound design can apply spectromorphology and indicative fields to the inter-modal compositional strategy in a 'top-down' manner. In the audiovisual compositional mode, sound design requirements for sound-objects and soundtrack structural relationships can be defined in terms of indicative fields. Specifically, the sound designer can consider what perceived impressions of gesture, texture, behaviour, motion, and space are to be rendered in audiovisual relationships as aspects of soundtrack 'added value' (Chion 1994). Consequently, a set of soundtrack requirements defined in terms of extrinsic features and indicative fields can be used to inform sound design in the intersonic compositional mode. At this stage, the sound designer can re-analyse indicative fields requirements and break them down into the appropriate spectromorphological categories and forms. This requires mapping indicative fields requirements to spectromorphological requirements that formally define the intrinsic features of individual sound-objects, groupings, and intersonic structural relationships between soundtrack elements. A further mapping process is also implied to creatively enable sound engineering—specifically, the translative mapping of spectromorphological requirements to sets of parameters that control synthesis, signal processing, mixing routines, and so on.

In summary, sound design may apply the concept of indicative fields to define soundtrack requirements for audiovisual relationships (extrinsic features). This process is interdependent with an application of spectromorphological categories and forms to define soundtrack requirements for intersonic relationships (intrinsic features). These applications highlight the compatibility of spectromorphology and indicative fields theory with the inter-modal compositional strategy. Specifically,

Smalley's notion of extrinsic-intrinsic feature interdependence in sound perceptions (Smalley 1992; 1997), conceptually translates to the functional interdependencies of the audiovisual and intersonic compositional modes.

4.3.1 Applications to the Inter-modal Compositional Strategy

The sound design of acousmatic sounds is one creative context where the inter-modal compositional strategy can be supported by applications of spectromorphology and indicative fields. In film, one requirement for offscreen-diegetic sounds is to evoke the recognisable sound-images of unseen sound sources. This implies a process involving first-order surrogacy and source bonding, which leads to an identifiable first-order signification of a causal index. In response to such requirements for a sequence, sound design can specify the indicative field impressions that must be perceived to facilitate recognition of a sound source. Spectromorphological design can then focus on defining the appropriate spectral type and morphological model for the sound, as well as the motion forms that apply to the external gestural contour and the internal progress of textural motion.

Moreover, the selective combination and structural arrangement of identifiable offscreen-diegetic sounds is a critical factor in evoking a cohesive and meaningful aural impression that complements the visual diegesis. In this regard, sound design can focus on the indicative fields of space and behaviour in order to define spectromorphological and spatiomorphological requirements for intersonic structural relationships. In other sound design contexts, acousmatic sounds can be used to render atmospheric impressions that seem attached to the diegetic environment while carrying an 'emotional underscore' component that functionally substitutes for non-diegetic music. This use of atmospheric soundscapes is evident in *Forbidden Planet* and other films such as *THX 1138*, *Blade Runner*, and *Eraserhead.* When acousmatic sounds are used in this way, sound design can dynamically engineer perceived surrogacy, manipulating indicative fields to offset source-bonding and causal identification. In such cases, spectromorphological design can preserve selected perceived qualities of sounds to facilitate an abstract environmental association with

diegesis, and manipulate other perceptions to evoke an emotional response supportive of a required atmosphere.

Activation of the object-substance indicative field may also be a factor in the sound design of atmospheric 'emotive' soundscapes that have a diegetic association. Smalley (1992) notes that this indicative field has significance for the identification of the sound source and the evocation of sound-images. He states that 'objectness' as a quality of sound perceptions "[...] can be deduced from types of motion that suggest analogies with the motion of objects" (Ibid., p.529). Smalley also observes that the combination of a perceived material quality with analogous motion may evoke sound-images based on a memory, or stimulate an entirely imagined rendering (Ibid.).

Smalley introduces the concept of 'associative synaesthesia' to account for how acousmatic sounds in possession of indicative fields can evoke sound-images (Ibid.). This is particularly evident in the perception of the gesture indicative field, which is "[...] unimaginable without its visual correlations" (Ibid., p.530). Smalley concludes that the evocative power of electroacoustic music to trigger visual synaesthesia approaches a form of "[...] integrated, audio-visual art [...]" (Ibid.). The notion that acousmatic sounds can facilitate associative visual synaesthesia by evoking sound-images of unseen objects, phenomena, and locations is reflected in Murch's approach to metaphoric distance (Murch 1995). For example, in *Apocalypse Now*, Murch's sound design combines acousmatic sound-images to render an aural impression of the jungle that contradicts the images of a hotel room (Murch 1996). The concept of sound-images was introduced in chapter three in reference to focused sound perceptions. In Chapter five, sound-images will be further discussed as an aspect of the sonic landscape approach.

A soundtrack example from *The Bourne Identity* (2002) also illustrates how spectromorphology could be applied to sound design's compositional strategy. In a sequence in which two assassins face off in an overgrown field, Bourne[100] fires a shotgun into the air to disturb a group of birds. Bourne's intention is to use the flocked flight of the birds to indicate the position of his foe. In this sequence, the sound-object

[100]Played by Matt Damon.

of the birds forms a texture composed of individual bird sounds (e.g., flapping wings, bird calls) with complex internal motion (flapping 'gestures'). As the birds take flight, a flocked motion style is perceived in concurrence with a spatiomorphological motion across the sound field.

This example also suggests how spectromorphology and indicative fields can be applied to the sound design of onscreen-diegetic sound effects. In such instances, an analysis of the image can identify the various indicative field impressions that correspond to visible objects and phenomena. This analysis would involve specifying the perceived morphologies associated with visible gestures, textures, motions, and behaviours. Sound design could then re-map these visual morphologies to sound spectromorphologies to define the criteria for sound-object creation. This approach could have extensive applications in animation film sound design. In this context, the absence of location-based sound recordings requires an extensive and detailed sound design of synchronous and source-bonded relationships between sound-objects and visual objects. In these cases, spectromorphological analysis and design directly supports the engineering of audiovisual indicative field impressions.

During the requirements analysis phase of soundtrack post-production, sound design can focus on specifying the behavioural impressions that arise from a perception of intersonic structural relationships. This analysis can also take into account the required atmospheric qualities of sequences, qualities that can be supported by emotional resonances carried by intersonic behavioural impressions. The analysis can then proceed to the spectromorphological design of intersonic structural relationships. This approach has parallels to the visual mapping method for narrative themes and emotional undercurrents that Sonnenschein advances as an aspect of his conceptual development of a sound design (Sonnenschein 2001, pp. 13–14). Soundtrack examples can also illustrate the significance that intersonic behavioural impressions have for evoking emotive atmospheres. In *Close Encounters of the Third Kind* (1977), the complex intersonic relationships between sound-objects associated with a large number of alien spacecraft, evokes an impression of their interactive behaviour and 'harmonic' co-existence. In contrast, the progressive destruction of the atmosphere-processing facility in *Aliens* (1986) is signified by reactive structural relationships

between sound effects that suggest impressions of conflict (dissonance) between different energy sources.

The various perceptions that constitute space as an indicative field also have a bearing on how spatial impressions are rendered in film. In reference to spatial style, it is not uncommon for film's diegetic space to reflect a multiple spatial setting. For example, Chion (2009a, p.255) observes the presence of several simultaneous spatial impressions in *A Man Escaped.*[101] Other multiple spatial settings common in film include car journey sequences and instances in which the resonant qualities and dimensions of an internal space are revealed. Also, perceived spatial passages are ubiquitous in film and occur whenever the image follows a character moving from one space to another. Chapter five will return to the subject of spatial impressions in a discussion of Chion's tripartite model of film sound (Chion 1994; 2009a) and Wishart's sonic landscape theory (Wishart 1986; 1996).

4.3.2 Applications of Spectromorphology to Soundtrack Studies

Spectromorphology has also been conceptually applied to film soundtrack analysis. Gates and Rudy (2005) examines spectromorphological characteristics in the soundtrack of *Black Hawk Down*, focusing in particular on the significance of "timbral morphologies" carried by helicopter sounds and their synchronous and asynchronous structural relationships with music. This application of spectromorphology to film studies addresses the "material heterogeneity" that Altman (1992) states is missing from soundtrack analysis. On examination, one sees further evidence that spectromorphology can conceptually align with film sound studies. For example, Smalley's notion of intrinsic-extrinsic feature interdependency theoretically parallels Chion's view that film sound significations of cause and meaning are dependent on perceived qualities (Smalley 1997; Chion 1994). Also, Smalley's definition of the object-substance indicative field aligns with Chion's concept of materializing sound indices (Smalley 1992; Chion 2009a).

[101] Chion states that from the central perspective of the prison cell, there are other surrounding spaces indicated by sounds, including the prison and the city.

4.4 Chapter Summary

This chapter noted that a practised control over listening intentionality is a skill with specialist applications to soundtrack analysis and sound design. In these contexts, listening can be conceived of as being inter-modal, whereby the attentional focus of listening perceptions (intentionalities) shifts dynamically between the causes, meanings, and phenomenal qualities of film sounds. Moreover, the discussion of reduced listening highlighted that these aspects of soundtrack perception are interdependent. For instance, with acousmatic sounds, source-bonded causal associations are dependent on perceptions of sound-object intrinsic qualities. Reduced listening is therefore a valuable practice skill in sound design, one that can also facilitate generative creativity with sonic materials.

In conjunction with modal listening, spectromorphology and indicative fields theories are presented as descriptive languages of sound perception with potential applications to the sound design inter-modal compositional strategy. In this regard, indicative fields can be applied to define the extrinsic features of sounds in audiovisual relationships (audiovisual compositional mode). The subsequent deconstruction of required indicative fields using spectromorphological categories can, in turn, generate a criterion for sound design that specifies the intrinsic qualities of sound-objects and soundtrack structural relationships (intersonic compositional mode). In Chapters Seven to Nine, a series of sound design project case studies report on practical knowledge discoveries that demonstrate the effectiveness of these applications.

Modal listening is shown to have analytical applications to works of electroacoustic music (Landy 2007) and film soundtracks (Chion 1994). Therefore in principle, sound design applications of spectromorphology and indicative fields theories can indicate possible applications for soundtrack studies. Gates and Rudy (2005) also demonstrate this potential, and it is clear that selected aspects of spectromorphology theoretically align with Chion's soundtrack concepts. While Smalley's system is extensive, the call made by Altman (1992) for a descriptive language of sound perceptions to support soundtrack analysis, indicates the value of further research into selective applications of spectromorphology and indicative fields theories.

Chapter 5

Sonic Landscape

This chapter integrates Trevor Wishart's compositional theory of *landscape* within the interdisciplinary conceptual framework (Wishart 1986; 1996).[102] The proposed *sonic landscape* approach to sound design takes the form of an overarching structural concept that guides the inter-modal compositional strategy. This approach also meaningfully integrates applications of spectromorphology and indicative fields.

The discussion commences by examining structural concepts of the soundtrack advanced by film studies. This establishes a theoretical reference point for the subsequent proposal of sonic landscape as a sound design structural concept.

5.1 Film Sound and Structural Concepts

The predominant structural concepts of the soundtrack in film studies are encapsulated by the sound categories represented in Chion's tripartite circle model, with its single 'visualized' zone for onscreen-diegetic sounds, and two 'acousmatic' zones for offscreen-diegetic and nondiegetic sounds (Chion 1994; 2009). The model also incorporates 'special' categories of film sounds that resist clear diegetic or non-diegetic classification (Chion 1994, p.75). Subsequent sections will outline Chion's model and examine its significance for sound design's conceptual approach to soundtrack structure.

[102]Hereafter, the term 'sonic landscape' will be used to specify the audiovisual application of this theory.

5.1.1 Crossing the 'Three Borders'

Chion (2009a) defines the special category of *ambient sound* as

> [...] sound that envelops a scene, inhabits the space without raising the question of the location of its specific source(s) in the image. (Ibid., p.467)[103]

The locational ambiguity of ambient sound prompts Chion to position this category along the diegetic–nondiegetic border of his model (Chion 1994, p.78). Another category, *internal sound*, occupies both 'acousmatic zones' and is defined as sound with a source that is physically or psychologically interior to a character (Ibid., p.76).[104] Chion also designates the *on-the-air* category for sounds that emanate from an electroacoustic source. This category includes broadcast sounds (e.g., radio, television), and circumscribes the onscreen and offscreen diegetic zones of the model (Ibid., p.78). Chion (2009a) observes that sounds within these categories may transcend or 'cross' the borders of the model. Chion describes this general possibility for film sounds:

> Depending on the film, the three borders I have identified can become, on the one hand, stone walls or opaque doors that is [*sic*] difficult to pass through; or, on the other hand, they can be chain-link fences or dotted lines. (Ibid., p.252)

According to Chion, the model focuses primarily on the "[...] relationship between sound and image, not on the sound itself in its own space and with its particular qualities" (Ibid., p.250). This point underlines a previously noted tendency in Chion's work, which fails to establish the significance of intersonic relationships in determining audiovisual relationships.[105] Consequently, Chion does not overemphasise the significance of phenomenal qualities in his analysis of how sounds

[103]Chion also refers to this category as *territory sound*, reflecting its pervasiveness and association with a particular locale (Ibid.).
[104]According to Chion (1994, p.76), there are two forms of internal sound. The 'objective' form corresponds to sounds emanating from within the physical body (e.g., heartbeats, breathing). A 'subjective' variant corresponds to the sound of a character's mental voice or memories.
[105]See section 2.4.1.

cross the structural borders of film. This somewhat imbalanced view can be corrected by applying spectromorphology and indicative fields theories.

5.1.2 Spatial Setting and the Onscreen–Offscreen Diegetic Border

Chion (2009a) states that the soundtrack of *A Man Escaped* sustains simultaneous spatial impressions that are "[...] embedded within one another, each created and marked by a particular sound [...]" (p.255).[106] Smalley (1997) advances the concept of *multiple spatial setting* to describe how such impressions are dependent on spectromorphological qualities that form distinct perceptions of space. While Chion (2009a) acknowledges that reverberation effects are used in *A Man Escaped* to "[...] render the presence and dimensions of the prison's space" (p.255), his analysis of how the film's multiple spatial settings are formed does not fully explore the evocative powers of acousmatic sound qualities and intersonic relationships.

This can be brought into focus by examining the soundtrack of *Rear Window* (1954), which "[...] makes us aware of a larger sphere of activity" (Weis 1982, p.111) outside an apartment. Throughout the film, a multiple spatial setting is sustained by differentiated perceptions of sound-object spectromorphology.[107] From Jeffries's[108] apartment POV, different impressions of distance and spatial setting are conveyed via subtle variations in spectral density, loudness, and reverberation. These qualities are manipulated whenever Jeffries uses his camera or binoculars, devices that bestow on his voyeurism an unrealistic aspect of focused 'telephoto' hearing (Ibid., p.120).

Rear Window also illustrates how the spatial indicative field can dramatically signify the presence of the onscreen–offscreen diegetic border. In the climactic sequence, Thorwald's[109] unseen approach to Jeffries's apartment is inferred from sounds that resonate unrealistically throughout the building. Weis observes that this "expressionistic" technique of the horror genre signifies the terror associated with an

[106]Specifically, Fontaine's cell, the prison building (interior), the prison yard, and the city beyond.
[107]Like Fontaine's cell in *A Man Escaped*, a small interior space (Jeffries's apartment) is the central locus of the multiple spatial setting. From the apartment Jeffries perceives sound emanating from various surrounding spaces, including other apartments, a courtyard, and city streets.
[108]Played by James Stewart.
[109]Played by Raymond Burr.

unseen threat (Ibid., p.121).[110] The palpable tension, sustained by acousmatic spatial indicative fields and spectromorphologies, focuses dramatically on the apartment doorway as a portal between offscreen and onscreen diegetic space. Moreover, the over-articulation of the footstep reverberation signifies Jeffries's anxiety and heightened sensitivity towards sound in the darkened apartment. The effect is sharply attenuated as Thorwald approaches the door, so that by the time he is de-acousmatised on entering the apartment (spatial passage), the offscreen–onscreen diegetic border is acoustically 'transparent'.

5.1.3 The Onscreen Diegetic–Nondiegetic Border

According to Chion (2009a, p.260), the onscreen diegetic–nondiegetic border is typically crossed by film music.[111] Moreover, broadcast or 'on-the-air' music in particular appears to readily cross the "[...] boundaries of cinematic space [...]" (Chion 1994, p.76). This representational possibility suggests how diegetic radio music occasionally assumes the functions of a nondiegetic underscore in *American Graffiti* (Ibid., p.77).

Throughout the film, the impression of music emanating from car radios is sustained by spectromorphologies that are rendered from an application of Murch's worldizing techniques (Murch 2003). Radio music appears to cross the diegetic–nondiegetic border in both directions (Chion 2009a), an effect Murch accomplishes by worldizing sounds to render a subtle fluidity of spatial perceptions in relation to the musical source (Costantini 2010, p.38). Consequently the spatial indicative field of music is often conspicuous by virtue of its variation. This gives rise to unrealistic qualities of resonance, evoking momentary impressions of diegetic non-realism that shift interpretations of the music towards nondiegetic functional attributions (i.e., emotional underscore).

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[110]Weis notes that the 'unseen terror' effect is also used in *The Birds*. In the final act of the film, bird attacks are rendered almost entirely by acousmatic sounds.

[111]Chion (1994) refers to transitions from 'screen' music that is diegetic to 'pit' music that is nondiegetic, and vice versa. The reference to 'pit' music stems from the silent movie era, when underscore was played from the orchestra pit in the theatre.

Impressions of realism may also be undermined when music is perceived to be simultaneously emanating from sources within both diegetic and nondiegetic space. For example, In *Blade Runner*, Deckard[112] is shown playing a repeating note on his piano that harmonizes with Vangelis's electronic score. Likewise, in the musical outro sequence of *The Conversation*, Harry Caul[113] is de-acousmatised and revealed as the source of the lead saxophone part. In these exceptional cases, a perceived musical relationship between sounds transcends the border between diegetic and nondiegetic space.

5.1.4 The Offscreen Diegetic–Nondiegetic Border

Chion (2009a) describes the acousmatic border between offscreen–diegetic and non-diegetic space as "mysterious", noting: "[I]t is here that the most unsettling things can happen, undermining the film's spatiotemporal foundations in the most radical way [...]" (p.260). One instance in which acousmatic sounds conjure mysterious effects in film is when there is a partial or complete disassociation with a recognizable source. Flueckiger (2009, pp. 156–157) refers to this as the "unidentified sound-object", an undetermined sign that evokes strange feelings by creating an imaginative space for the audience to project their own meanings. These effects are evident in the soundtrack of *Forbidden Planet*, which conjures eerie atmospheric impressions that stem from the source ambiguity of acousmatic electronic sounds (an undetermined signification of a causal index). Windsor (2000) suggests that sound source ambiguity in *Forbidden Planet* is tied to similarities in 'synthetic' quality:

> [*Forbidden Planet*] manages to blur the distinction between sound effects and music through a use of identifiably 'synthetic sounds'.... [T]he sounds are virtual in the sense that their sources are supposedly from the future but quite real in the sense that they correspond to the operation of the machinery in the film and in that their real sources (oscillators and noise generators) are perceived. (Ibid., p.19)

[112]Played by Harrison Ford.
[113]Played by Gene Hackman.

Therefore, the homogenous synthetic quality of 'electronic tonalities' in the film unifies the soundtrack functions of sound effects and music within a single soundscape impression. Moreover, this blurring of the diegetic–nondiegetic borderline has profound representational effects in the film, re-casting electronic sounds as a "[...] seamless substance that moves between human and alien, human and machine ... the physical and the disembodied" (Laudadio 2007, p.345).

In *Forbidden Planet*, the strange atmospheric impressions evoked by electronic soundscapes with ambiguous sound sources and mixed representational functions, also implies the active participation of the audience in forming associations and discerning meanings. Ten Hoopen (1994, pp. 69–70) accounts for this by noting that source ambiguity can evoke "non-sounding analogies", thereby prompting listeners to relate to physical or psychological features that they recognise in sounds. Windsor (2000, p.17) similarly argues that source ambiguity can be resolved by an imaginary source and context for sounds, reflecting a form of *virtual event* and *virtual environment* perception.

In summary, acousmatic film sounds with ambiguous source associations may transcend the border between offscreen–diegetic and nondiegetic space. Chion (2009a, p.139) observes that in *Forbidden Planet* and *Blade Runner* this occurs because of the 'organic unity' of electronic music and sound effects. Therefore, as Windsor (2000, p.19) suggests, spectromorphological similarity[114] between sound effects and music can effectively blur the distinction between their storytelling functions.

5.1.5 Imagined Sounds

Chion (1994) notes that subjective internal sounds defy clear-cut association with just one of his model's three zones. In film, 'mental voices', or sounds associated with dreams, memories, and flights of imagination, give the audience impossible 'psychic' access to the inner consciousness of a character. This ability of film to contravene natural law allows such sounds to penetrate diegesis in unusual ways, thereby bypassing our expectations of realism. One somewhat clichéd way this occurs with

[114]Chion (2009a, p.139) refers to this perceived similarity of in terms of a 'material analogy'.

film sound is through an over-articulation of the spatial indicative field, taking the form of an unrealistic echo or reverberation that implies a 'mental space'.[115]

In *Dune*, the unrealism of the subjective internal sounds used to support representations of 'waking dreams' often highlights the absence of a clearly defined diegetic–nondiegetic border. In such cases, one may view the audiovisual representation of a character's inner consciousness as a singular 'place' in film, an imaginary diegetic space. This idea has considerable significance in this study as it informed the conceptual development of the sound designs for *The Immortal* and *The Lock*. In both films, the narrative is based on memories and the representational aesthetics reflect an imaginary diegetic space.[116]

5.1.6 Conclusions on the Three Borders

Chion's model was not devised to directly support sound design compositional strategies. Instead, its analytical value for sound design lies in its focus on how special sound categories may cross the borders of diegetic and nondiegetic space. In sound design, this knowledge can inform compositional strategies that relate to soundtrack structure and the engineered perceptions of sound sources and spatial impressions. For instance, *Forbidden Planet* illustrates how different atmospheric effects can arise from the source ambiguity of acousmatic sound effects and music.

Music is the primary emotional signifier in film soundtracks (Bates & Deutsch 2008).[117] Deutsch (2007a) highlights that while atmospheric sounds are not music, they may simultaneously carry an emotional referent and a more literal environmental component that supports an impression of diegesis.[118] Sound design can therefore explore the potential of acousmatic atmospheric sounds to simultaneously fulfil the literal functions of sound effects and the emotional significations of music. Moreover,

[115] *The Bourne Identity* deploys this spatial effect in its numerous flashback sequences. However, the effect is meaningfully extended by other spectromorphologies that degrade the fidelity of remembered dialogue (e.g., filter modulation effects). In combination, these effects signify the fallibility of Bourne's memory and his inability to recall 'aural' details.
[116] This will be discussed further in Chapters 8 and 9.
[117] See also Deutsch (2007b).
[118] Deutsch (2007a, p.4) introduces two broad classifications for *literal sounds* and *emotive sounds* in film, while noting that the categories are not "mutually exclusive". See also Deutsch (2008).

ambiguous perception of the acousmatic sound source can stimulate the audience's imagination to form associative interpretations. According to Murch (1995), such imaginative engagement of the audience should be a primary objective of sound design.

In summary, this discussion of film sound typology and Chion's three borders highlights that meaningful impressions of aural diegesis turn significantly on the relationship between perceptions of the sound source and sound space. The sound design inter-modal compositional strategy requires a structural concept that expresses this relationship, and for this purpose the author proposes an adaptation of Wishart's landscape theory to sound design's applied domain (Wishart 1986; 1996).

5.2 Sonic Landscape Theory

Natural listening seems to involve a cognitive effort to allocate or imaginatively derive a source 'identity' for a perceived sound-object (Windsor 2000).[119] Wishart (1996) further observes that in acousmatic listening situations, source recognition is linked to the formation of an evoked 'sound-image'. Combining these perspectives suggests the cognitive processes involved in sound-image formation are driven by the qualities of auditory perceptions, and reflect a listening predisposition to discover knowledge of the sounding source. For instance, memories of places or environments constitute a repository of sound-images and source associations that can be activated when we hear certain sounds (Flueckiger 2009, p.168). This cognitive activation of recognizable sound imagery is in turn dependent on those spectromorphologies that give rise to perceptions of indicative fields, including impressions of gesture and behaviour (Godøy 2010).

The relationship of the listener to the sound environment or 'soundscape' also influences the formation of sound-images (Schafer 1977). Westerkamp (2009) notes, "[...] each soundscape composition emerges out of its very own context in place and time—culturally, politically, socially, environmentally [...]" (p.117). Listeners relate

[119]See also Wishart (1996, p.129).

differently to these contextual factors and derive a unique soundscape impression based on the meaningful co-presence of sound-images. Consequently, the formed character of each sound-image is imbued with the contextual qualities associated with the soundscape. Westerkamp further observes that soundscape composers and film sound designers share a common goal: "We're both creating an atmosphere of tone and mood with our design. Atmosphere is the essence of place" (Ibid.).

As a compositional concept, the soundscape has its origins in Russolo's vision of futurist music that represented the concrete sounds of modernity (Russolo 1913).[120] Soundscape composition also reflects earlier 'anecdotal' forms of musique concrète that rendered imaginary impressions of place from a tableau of naturalistic sound-images.[121] The soundscape concept is also intrinsic to the post-modern (post-Schaefferian) course of electroacoustic music composition (Wishart 1996, Emmerson 1999). These later approaches to soundscape take into account that where there is no natural sound-image associated with a sound-object, the imagination must render a virtual sound-image from perceptions of indicative fields and spectromorphology (Windsor 2000). When this concept is applied to film soundtracks, visual imagery can establish the contextual cues that allow more abstract acousmatic 'soundscape-images' to be imaginatively associated with diegesis.[122]

Wishart (1986) reinterprets the soundscape concept to describe the 'landscape' of a composition: "A landscape can be seen as a particular kind of timbre-field applying to the space of sound images" (Wishart 1996, p.164). The sonic landscape is an imagined impression of a place, environment, or sound source, one formed by sound-images and the relationships between them (Ibid., pp. 139–140). Wishart (1986) succinctly defines the sonic landscape as "[...] the imagined source of the perceived sounds" (p.44).

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[120]See also section 2.1.1.

[121]Luc Ferrari's *Presque Rien No.1* is one such example. In this work a composed soundscape of a beach is formed from relationships between ecologically associated sound-images (e.g., sea birds, ocean waves) (Wishart 1996, p.159). See also section 2.1.2.

[122]*Forbidden Planet* presents an example. In sequences that explore the subterranean mechanized city of the Krell, it is the visual image that establishes the context that allows the sound-images of acousmatic electronic sounds to form associations with alien technology.

Wishart (1996) argues that compositional perspectives towards sound-objects must also meaningfully relate to their perceptions as sound-images. He refers to his own composition *Red Bird: A Political Prisoner's Dream* (1978), in which birdsong sound-objects evoke the recognisable sound-images of birds (Ibid., pp. 169–173), These bird sound-images are spatially arranged with other complementary sound-images to construct the imagined sonic landscape of a garden (Ibid., p.171). Therefore, the garden sonic landscape is an imagined place where the sources of sounds appear to exist, a perceived environmental source for sounds that is signified by the spatial disposition of naturally associated sound-images (Ibid., p.173).

5.3 Sound Design and Sonic Landscape

An argument based on principle as opposed to relevancy could be made against the application of any 'pure' sonic arts theory to film sound design. However, we may forestall any such objection to sonic landscape by briefly considering how acousmatic sounds contribute to film perceptions. In film, acousmatic diegetic sounds meaningfully extend story world impressions beyond the borders of the image frame. This gives the audience a wider appreciation of context and a sense of the unseen surrounding environment. One may posit this becomes possible because a 'realistic' selection and arrangement of acousmatic diegetic sounds can evoke a complementary impression of spatialised sound-images (a sonic landscape) in the imagination of the audience. This notion aligns with Emmerson's assertion that a 'mature' approach to audiovisual relationships must acknowledge that sound 'itself' is capable of evoking an 'aural landscape' in the mind (Emmerson 1999, p.139). In this regard, he cites sonic landscape as an effective compositional approach to sound-images, noting also that Wishart's emphasis on manipulating spatial impressions has potential storytelling applications (Ibid.).

Subsequent sections develop the argument that sonic landscape has a conceptual relevance to sound designs' inter-modal compositional strategy. The discussion begins by contextualising the notions of sound-images and sonic landscape impressions in

film perceptions. Following this, sonic landscape approaches to metaphorical discourse will be discussed in relation to soundtrack narratives.

5.3.1 Sound-Images and impressions of 'Place'

Bresson's erudite philosophy of film sound, as interpreted by Burch (1985), asserts that offscreen sounds always evoke an image.[123] Zaza (1985, p.3) concurs and argues that sound-images manifest 'allusions' and stimulate cinematic experience. Filimowicz and Stockholm (2010, p.11) further note that the stimulating effects of sound-images provide "[...] anchors of meaning and focal points for associations". Such associations may link to an imagined impression of 'place' for sound-images when acousmatic sounds carry the spatial cues of an acoustic environment (Wishart 1996; Kim 2010).

According to Balaz (1985), film evokes impressions of place by combining visual landscapes and acoustic landscapes.[124] The acoustic landscape combines perceptions of onscreen sounds source-bonded to visual objects, with perceptions of offscreen sounds that imaginatively evoke sound-images. In cinematic experience, these distinct modes of sound perception fuse to form the complete sonic landscape impression. This view is supported by Coulter (2010), who argues that acousmatic and audiovisual listening are closely aligned and naturally integrated:

> [T]he acousmatic (mode) includes a quasi-visual component, while both real and imagined materials constitute the experience of the audiovisual mode. (Ibid., p.26)

This implies that acousmatic sounds and their evoked sound-images enable the audience to imaginatively complete the audiovisual representation. Kim (2010) suggests that this is an entirely natural process:

[123] In Weis and Belton (1985, pp. 200–201).
[124] In Weis and Belton (1985, p.122).

> [W]e tend to move freely between what is perceived, which is given, and what is imagined, which is not given, so as to finally form an integrated whole. (Ibid., p.47)

As a compositional strategy for sound design, the sonic landscape approach directly expresses how the spatial articulation of acousmatic sound-images can evoke impressions of 'place' that meaningfully extend the story world beyond the borders of the image frame. Furthermore, the sonic landscape concept is coherent with the idea that film experiences are an amalgamation of impressions based on what is 'given' as formed audiovisual perceptions (images and onscreen sounds), and what is evoked in the imagination of the audience (acousmatic sound-images). In principle therefore, sonic landscape represents a viable and creatively enabling compositional strategy for sound design.

5.3.2 Sound-Image Indicative Fields and Spectromorphology

Barreiro (2010, p.38) states that sound-image formation is linked to impressions of extrinsic features (indicative fields) that are perceived through sound-object intrinsic features (spectromorphologies). Kim (2010) further suggests that causal listening focuses on the acousmatic sound-image in order to determine the sound source. When a sound-image is not naturally recognised, perceptions of spectromorphology that evoke indicative fields such as gesture can stimulate associations that form an imagined source impression (Barreiro 2010, p.38).[125]

Film sound design has various storytelling applications that involve engineering acousmatic sound perceptions to evoke identifiable sound-images and/or entirely imaginary sound-images. Reflecting the convention of most film sequences, sound design can render identifiable sound-images that form an offscreen diegetic sonic landscape that supportively complements the onscreen 'reality'. Alternatively, sound design can deploy ambiguous sound-images within the offscreen sonic landscape to prompt the audience to imagine a source and derive meaningful associations. In general, sound design can engineer acousmatic sound-images and sonic landscape

[125]See also Windsor (2000).

impressions to reflect the storytelling objectives of the inter-modal compositional strategy. This also underlines the applied significance of spectromorphology and indicative fields in the design of sound-images and sonic landscapes.

Wishart (1996, p.137) observes that dramatic uses of sound-images can be traced to 1950s radiophonic sound and the "[...] suggestion of real landscapes in the virtual acoustic space of the radio receiver [...]". Wishart attributes the listener's ability to identify the sonic landscape to the *contextualising cues* carried by acousmatic sound effects. He also notes that sound effects may be categorised by their degree of authenticity, with concrete recordings at one extreme, and simulation using studio techniques at the other (Ibid.).[126] Wishart argues that in the absence of images, authenticity must often be substituted for simulation to render sound effects with additional contextualising cues that are capable of evoking a strong impression of a phenomenon (e.g., fire):

> The recreation of the effect 'fire' by purely auditory means, can simply fail to evoke the power of the multi-media image of fire.... [W]here we are restricted to the medium of sound, the use of studio fabrication ... provides an aural image which is more acceptable than the real thing. (Ibid., p.138)[127]

Wishart contends that sound effects creation often aims to "[...] partly replace our visual and tactile experience" (Ibid.). This suggests that a simulated experience of a phenomenon can be sustained by sound-images that facilitate a degree of perceptual synaesthesia.

Aural simulation is ubiquitous in film and is implicit in the art of Foley, which produces sensorially enriched diegetic sound effects. In sound design, the rich detailing of 'synaesthetic' sound-images relies on the engineering of spectromorphologies and indicative fields that yield the right balance of

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[126]Wishart identifies four sound-effect categories that lie along this authentic-simulated continuum. These are *actuality, staged, studio,* and *mixed.*

[127]*Backdraft* (1991) demonstrates a use of simulated (as opposed to authentic) fire sound effects both on and off screen. In the film, hyper-realistic sonic renderings often imbue the phenomenon of fire with an added character dimension as a destructive organism.

contextualising cues and materializing sound indices. The sound design of film's diegetic sonic landscape must therefore compensate audience perceptions in the absence of certain sensory stimuli (e.g., tactile impressions). The approach to this is likely to vary according to whether the simulated diegetic sound effects are onscreen or offscreen, but in either case the facilitation of aurally driven synaesthesia relies on rendering sound-images that 'suggest' a phenomena within the boundaries of acceptable story world realism.

Wishart (1996) observes that in science fiction radiophonic drama, electronic music and sound effects often carry minimal contextualising cues that reveal the sound source. He also states that electronic sounds with no natural or discernible association with sources, makes its difficult for listeners to form coherent sound-images and sonic landscape impressions (Wishart 1986). In the context of science fiction productions, Wishart notes the appropriateness of the psychological effects that can follow:

> The inability of the listener to locate the landscape of sounds provided the disorientation and sense of strangeness which the producer wished to achieve. (Ibid., p.44)

The phenomenon of ambiguous sound sources preventing apprehension of the sonic landscape of sound-images is apparent in *Forbidden Planet* (Windsor 2000). Applying Wishart's reasoning, one sees that the ambiguity of sonic landscape impressions in *Forbidden Planet* atmospherically supports the 'alien' or 'other-worldly' quality of diegesis. Both in this film and in *Blade Runner*, spectromorphological relationships between electronic music and sound effects often blur the perception of distinct sonic landscape impressions corresponding to diegesis and nondiegesis. Film typically sustains this perceived structural superimposition of diegetic and nondiegetic sonic landscapes. However, previous discussions of Chion's three borders highlighted instances in which the sound-images of acousmatic sounds do not clearly resolve to just one of these sonic landscapes.

When the diegetic–nondiegetic border of acousmatic sounds becomes blurred, a single sonic landscape impression associated with the story world may be evoked. This diegetic sonic landscape may possess an unrealistic quality, which supports strange

atmospheric impressions that influence narrative interpretation. In the context of film sound design, this highlights the creative possibilities of sonic landscape composition to engineer emotional atmospheres and psychological effects, which could complement representations of alien worlds, supernatural phenomena, and altered realities. For example, in *Eraserhead* and *Dune*, spectromorphological similarities and intersonic relationships between sound effects and music occasionally form a 'surrealistic' sonic landscape impression. In both films the strange atmospheric qualities carried by such sonic landscapes effectively underscores the representation of altered realities and states of consciousness.

The previous discussion of how sounds cross the three borders of Chion's model provides an insight into the nature of intersonic and audiovisual structural relationships in film. Reframing this knowledge highlights that spectromorphological and spatiomorphological relationships between acousmatic sounds can blur the perceived separation of diegetic and nondiegetic sonic landscapes. This effect is compounded by acousmatic sound-objects that fail to evoke recognisable sound-images. Sound design can apply this knowledge to engineer the perception of different sonic landscape impressions.[128] Therefore, *sonic landscape design,* as an aspect of the inter-modal compositional strategy, could constitute a powerful storytelling approach to the soundtrack; one that opens up a rich seam of psychological and atmospheric effects to challenge the audience's perception and interpretation of film.

5.3.3 Sonic Landscape and Signification

Wishart (1996, p.163) notes that sound-images may be considered as the "working material" for sonic landscape composition. One aspect of this approach concerns how sonic landscapes can support metaphorical significations, particularly when sound-images undergo a form of transformation (Ibid.). Wishart refers to the example of *Red Bird,* in which the vocalisation *"listen to reason"* is spectrally morphed into a bird's song. This sound-image transformation metaphorically represents the psychological

[128]Section 5.4 will examine this in more detail by reviewing the various forms of sonic landscape impressions identified by Wishart (1986; 1996).

transformation of a captive spirit and its attainment of a liberated state of grace (Ibid., pp. 165–166).[129]

Wishart states that sonic landscape composition can construct a network of sound-image significations to establish "[...] a rich metaphorical field of discourse [...]" (Ibid., p.166). Barreiro (2010, p.39) also observes that a meaningful chain of sonic images can establish interconnected significations in a work. Wishart (1996) encapsulates his view in the assertion that the 'sonic' (sound *as* object) and 'metaphorical' (sound-image *as* metaphor) aspects of landscape are "[...] complementary aspects of the unfolding structure" of a composition (p.166).

The relationship between sonic landscape metaphorical discourse and sound-image chains also aligns with Murch's concept of metaphoric distance between film sounds and images (Murch 1995). In the opening sequence of *Apocalypse Now*, a metaphorical discourse is established by the gradual transformation of a realistic sonic landscape associated with a Saigon hotel room, into a jungle sonic landscape that is 'metaphorically distant' from the image (Murch 1996). This transformation is accomplished by successive replacements of Saigon city sounds with jungle "sonic analogues" (Costantini 2010, p.43). Each sound-image substitution is inherently metaphorical as it builds a meaningful audiovisual dialectic that signifies Willard's combat trauma. This sequence also demonstrates that the interpretation of metaphorical discourse can rely on the association of acousmatic sound-images with recognisable sources.

Wishart (1996, p.166) argues that a composer must be "[...] sonically and metaphorically articulate" to successfully develop a metaphorical discourse using sound-images. Throughout *Apocalypse Now*, Murch demonstrates an articulate approach to sonic metaphors that meaningfully support the narrative. Chion (2009a) also suggests that storytelling skills are required to use film sounds symbolically, stating the negative cases in which significations are misinterpreted, or otherwise pushed to extremes so that they become noticeable:

[129] In this sense, the bird and its song symbolise flight and the joy of freedom, states that are in stark psychological contrast to the confinement of a prison cell or birdcage.

> [A] sound does not necessarily resemble what it is meant to represent, since context (visual, dramatic, etc.) counts for a lot in identifying it. (Ibid., p.210).

In the domain of sound design, Murch (1995) and Sonnenschein (2001) similarly advocate the exploration of audiovisual poetic modes to extend the storytelling functions of the soundtrack. However, the cautionary tones of Wishart (1996) and Chion (2009a) underline the need for sound designers to develop both sensitivity towards narrative interpretation and an articulate compositional approach to metaphorical discourse.

5.4 The Structure of the Sonic Landscape

Wishart (1996, p.140) describes three elements in sonic landscape theory:

1. The nature of the perceived acoustic space
2. The disposition of sound-objects within the space
3. The recognition of individual sound-objects

While it is possible to analyse these elements separately, the theory views their respective perceptions as being meaningfully interdependent in the formation of sonic landscape impressions (Wishart 1986; 1996).

5.4.1 The Nature of the Perceived Acoustic Space

In accord with Smalley (1992), Wishart (1996, p.140) states that "[t]he nature of the perceived acoustic space cannot be separated from our perception of the sound-objects within it". Concordantly, recordings of a sound source often capture and preserve the acoustic qualities of the surrounding environmental space (Wishart 1986, p.45). As aspects of spatial indicative fields, acoustic qualities are primarily linked to sound-object perceptions of resonance and reverberation, as well as to distance cues based on variations in volume and frequency spectra (Ibid.). The significance of acoustic

qualities is reflected in film and television location recording. Two practice conventions are adopted that demonstrate the importance of preserving the nature of the acoustic space in which dialogue scenes are shot. For outdoor locations, a *wild track* recording is often made to capture the sounds of the surrounding environment, whereas for indoor locations, a *room tone* recording provides a subtle presence of ambient sound (Yewdall 2007).

Wishart (1996, p.141) acknowledges that digital audio technologies make it possible to create the illusion of natural or unrealistic acoustic spaces in the studio (see also Wishart 1994).[130] In the pre-digital era, Murch produced realistic spatial impressions using worldizing field re-recording and tape manipulation techniques (Kenny 2000, p.12).[131] On closer examination, one sees evidence of conceptual alignment between sonic landscape and an emphasis in Murch's approach on the perceived relationship of sounds to the space around them (LoBrutto 1994, p.88). As Murch notes,

> I almost think that sometimes I am recording space with a sound in it, rather than sound in a space. (Kenny 2000, p.8)

Balaz (1985, pp. 124–125) describes spatialised sound in cinema as facilitating a form of transference and immersion in the space where the film action takes place. The advent of sound design as an approach to 'surround' spatial mixing subsequently led to greater levels of sensory immersion in story-world space (Murch 1996; Lastra 2008).

The sound design of spatial impressions is a fundamental aspect of the sonic landscape approach and inter-modal compositional strategy. Hypothetically, this process begins with an analysis of the film sequence, which determines the acoustic

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[130]The sound design of acoustic spaces is technically enabled by convolution reverb software. Impulse Response (IR) recordings taken from any acoustic space or electroacoustic device can be 'multiplied' with a dry signal. In the case of reverberation IR's, this results in a convolved signal that sounds as if it were acoustically diffused in the 'sampled' space (Roads 1996). In principle, Murch's worldizing approach achieves similar audible results through an analog re-recording technique.

[131]In the sound design commentary of the 2007 DVD re-release of *THX 1138*, Murch explains how he integrated worldizing and tape manipulation techniques to create natural reverb. Murch would diffuse dry signals played at two or three times normal speed into acoustic spaces for re-recording. He discovered that he could 'magnify' the perceived size of the acoustic space by slowing the worldized recording down to its normal speed in the studio.

qualities of environmental spaces associated with diegesis. This in turn defines the perceptual requirements for spatial indicative fields evoked by sound-images. These requirements can be mapped to spectromorphologies and spatiomorphologies, thus forming design criteria for sound-objects and intersonic structural relationships.

In most film sequences, diegetic sonic landscape impressions of space are naturalistic and concomitant with the image. However, Wishart (1986, pp. 46–47) cites radio broadcasts and produced music as evidence of *formalised acoustic spaces.*[132] Film sound design conventionally formalises a 'perceptually transparent' nondiegetic acoustic space for the musical score and narration that does not conflict with diegetic spatial impressions. However, it is also possible for a formalised acoustic space to form part of a multiple spatial setting for diegesis. Throughout *American Graffiti*, the 'Wolfman Jack' show emanates from radios and becomes imbued with the acoustic qualities of various environmental spaces (e.g., car interiors, city streets, a burger 'joint').[133] In fact, the embedding of a formalised acoustic space within a multiple spatial setting is quite common in film, and occurs whenever produced music is diffused from an electro-acoustic device (e.g., radio, music system).[134]

5.4.2 The Disposition of Sound-Objects in Space

The second element of sonic landscape indicates the perceived dimensions and material properties of the space. It is interdependent with the first element because sound-objects can exhibit spatiomorphological behaviour (motion), leading to fluctuating perceptions of spatial disposition. This in turn alters perceptions of the nature of the acoustic space.

Wishart (1996, p.146) states that it is possible to subvert the 'ecological realism' of a sonic landscape while engineering sound-object spatial dispositions that are consistent

[132]Wishart specifically refers to the example of a radio DJ speaking over music (Ibid.). In music production, formalised acoustic spaces are used in mixing to support the illusion of an ensemble musical performance, one that is arranged from instrumental voices that are not recorded simultaneously, i.e., 'live' (Burgess 1997).
[133]Towards the climax of the film, the formalised acoustic space of radio is foregrounded when Curt (Richard Dreyfuss) visits the station from which Wolfman Jack broadcasts.
[134]In Chapter 7, formalised acoustic spaces are further discussed in relation to the sound design of radio sonic landscapes.

with natural acoustic spaces. For example, a naturalistic spatial disposition of animal sound-images that do not ecologically co-exist may still be perceived as a 'realistic' sonic landscape (Ibid.). Of course, the composer may opt to remain faithful to ecological realism when combining sound-images. In general, Wishart describes realistic sonic landscapes as combinations of *real sound-objects* and *real space* (Ibid.).

Wishart defines the composition of 'imaginary' sonic landscapes based on variations in the associative relationships between sound-objects and the perceived nature of the acoustic space (Ibid.). Taking the example of a forest sonic landscape, Wishart states that if ecologically realistic sounds are progressively substituted for unrealistic sounds while retaining spatial dispositions that are consistent with a forest acoustic environment, it becomes possible to form an imaginary sonic landscape impression defined by *unreal sound-objects/real space.*[135]

Another type of imaginary sonic landscape defined by *real sound-objects/unreal space* may be formed when ecologically realistic forest sounds are given random amplitudes (volumes), and processed with different degrees of filtering and reverberation (Ibid.). Wishart chooses not to elaborate on the perceived qualities of unreal space, although it is clear that a meaningful arrangement of realistic sounds (e.g., forest sounds) sets up a listening expectancy for a complementary space. Therefore, the qualities that constitute an 'unreal space' are somewhat relative to listening expectancies, and can be compositionally approached in different ways.[136]

Wishart does not explore the composition of imaginary sonic landscapes defined by *unreal sound-objects/unreal space.* This appears to reflect his predilection for meaningful subversions of sonic landscape realism that are limited either to space or

[135]The term 'unrealistic' is not used by Wishart. Instead, he describes the replacement of real sound-objects with arbitrary sound-objects that have 'unreal' source associations (Wishart 1996, p.146). Clarifying examples are not provided, but a plausible interpretation is that unreal sound-objects are those with unrecognisable or non-natural sound-images (e.g., synthetic or transformed concrete sounds).

[136]Wishart's example implies an impression of unreal space based on non-contiguity, which may also be interpreted as an unrealistic multiple spatial setting. Alternatively, a contiguous space with unrealistic (unnatural) acoustic qualities relative to those expected for forest sounds (e.g., a tiled bathroom) could yield a more cohesive sonic landscape impression. Both approaches are valid, but a contiguous space that is relatively unreal to the sounds has greater applications in sound design. For instance, in flashback sequences, realistic sounds associated with memory are often imbued with unrealistic spatial effects (i.e. echo, excessive reverberation). See section 5.5 for further explanation.

to perceived associations between sound-objects. This underpins Wishart's definition of an "ecologically unacceptable" type of *surrealist* sonic landscape (Ibid.), one where "[...] the sound sources are real and the perceived space is real, yet the relationship of the sound-images is impossible" (Wishart 1986, p.48). For example, a surrealistic sonic landscape could be formed from a spatial disposition of realistic forest sounds and choral voices that is consistent with the acoustic space of a cathedral. In this case, the sonic landscape impression has a perceptual coherency as an imaginary place and source for real sounds, but the sound-image relationships are surrealistic.[137]

Wishart (1996, p.147) further observes that "[m]otion in space may also be used to alter the perceived characteristics of a landscape". He claims that 'transitions' between different patterns of spatial distribution or between acoustic spaces can "[...] become an important structural and expressive ingredient in sonic art" (Ibid.). This translates to sound design, where spatial motions have dramatic applications in signifying environmental change. In *Twister* (1996), rapid changes in the spatial distribution of sound-images evoke perceived spatiomorphological motions that support the impression of high winds and tornado rotations. Spatiomorphological motions and changes in sound-image spatial distribution are also used in film to reinforce impressions of relative speed and trajectory (e.g., car chases, aerial combat).

Changes in spatial distribution also establish different listening perspectives (Ibid., p.148). Wishart notes that with quadraphonic sound, spatial motions can establish a point of perspective from which the listener perceives sound-objects as moving in different trajectories around a fixed position (Ibid.). Sound design spatial mixing in surround formats engineers this perspective to establish the position of the image POV (fixed or moving) relative to objects moving around it.[138] In contrast, Wishart observes, the perception of a uniform 'compass point' rotation of sound-objects can reverse the implied sense of motion, giving the listener an impression of spinning (Ibid.). In film, this effect is typically combined with visual rotation effects to signify character disorientation or imminent losses of consciousness. Spatial motions can also engineer

[137]Wishart (1996, pp. 146–147) gives two examples of impossible 'duets' between animal calls: howler monkey-budgerigar and whale-wolf.
[138]This audiovisual perspective reflects a previously mentioned sequence in *Close Encounters of the Third Kind* in which many alien spacecraft move with different trajectories relative to a fixed-position POV. Examples of surround-sound relative motion are also common in 'space battle' sequences.

other perspective effects, and Wishart notes that a perceived change in distance from a sound source can signify variations in "psychological or social distance" from a phenomenon (Ibid.). In *Rear Window*, the sound of approaching footsteps closes Jeff's psychological distance from a source of threat (Thorwald) and signifies his increasing anxiety (Weis 1982).

5.4.3 The Recognition of Individual Sound-Objects

The third element of sonic landscape theory relates the inherent recognisability of sounds to the formation of sound-images. Specifically, Wishart (1996, pp. 149–150) considers the effects of transforming acousmatic sound-objects in the sonic landscape, and how this interferes with the recognition of sound-images. Wishart also contends that such interference in the *intrinsic recognition* of sounds can facilitate reduced listening (Ibid., p.150).

Sonic landscape composition can meaningfully exploit this by establishing a 'context' that allows certain sounds to become recognisable by virtue of the qualities they possess. Consequently, *contextual recognition* becomes possible when a sound is perceived as having the appropriate spectromorphologies and indicative fields to support a mimetic suggestion of a real source (real sound-image) (Ibid.). Wishart gives an example of the substitution of electronic sounds for real concrete recordings in a sonic landscape 'context':

> By setting up the context of other sounds (for example, the sounds of frogs or other creatures living in the same habitat as crickets) within certain limitations it would be possible to pass off the electronic or mechanical sounds as the sound of a cricket. (Ibid., pp. 150–151)

Contextual recognition may therefore be a factor in the formation of virtual-source sound-images for acousmatic film sounds (Windsor 2000).[139] Moreover, the concept further explains how hyper-realistic sound effects readily form associations with

[139]In *Forbidden Planet* and other science fiction films, it is logical to assume that the story context of a futuristic alien world enables acousmatic electronic sound-objects with no intrinsic recognisability to form sound-image and virtual source associations with diegetic objects and phenomenon.

phenomena in an established diegetic context. In *The Birds*, contextual recognition suggests how electronic sound effects function effectively as mimetic substitutes for authentic bird sounds (Weis 1982; Underwood 2008). Wishart (1996, p.156) also highlights that contextual cues have a bearing on the success of metaphorical transformations between recognisable sound-images. However, it should be noted that the creation of surrealistic sonic landscapes can detract from the intrinsic recognisability of sound-images (Ibid., p.150).

5.5 Further Applications of Sonic Landscape to Sound Design

Preceding sections highlight the meaningful links between sound design and the sonic landscape approach to composition. As a structural concept for the soundtrack, sonic landscape can be applied to our understanding of how films sounds cross or transcend the three borders of Chion's model (Chion 2009a). For instance, in *Blade Runner* and *Forbidden Planet*, music often resembles ambient sound and vice versa, an interplay that forms momentary impressions of a single sonic landscape for diegesis. In these films, this perception appears to be driven by several factors, including contextual recognition, shared spatial dispositions (spatial indicative fields), and the existence of strong spectromorphological relationships between sounds (i.e., spectro-typological similarities of electronic sounds).

The spatial disposition of sounds and the perceived nature of the acoustic space may be critical factors in blurring the structural border between diegesis and nondiegesis. For instance, in *Blade Runner*, Vangelis's electronic music often seems to carry spatial qualities that are consistent with the vast expanse of the city. Similar sonic landscape effects may also explain how radio music in *American Graffiti* appears to drift eerily between diegetic and nondiegetic space.

The opening sequence of *Apocalypse Now* illustrates how a realistic sonic landscape impression (jungle) that conflicts with the 'reality' represented by visual diegesis (hotel room), can establish a metaphorical discourse. This sequence also demonstrates how transformations of sonic landscape can vary the metaphorical distance between

sounds and images. Moreover, the act of sonic landscape transformation itself can have a symbolic quality (i.e., Willard is 'trapped' in a combat psyche).

The distinction between realism and non-realism posited by sonic landscape theory becomes less absolute when it is applied to film sound design and the composition of audiovisual relationships. In film, to construct a realistic sonic landscape is to be essentially faithful to the realism depicted by diegesis, irrespective of whether the audiovisual representation accurately reflects a known physical reality or not. This highlights the importance of sound's contextual recognition in film genres such as science fiction.

In general, the structural concepts of sonic landscape can be readily applied to sound design's inter-modal compositional strategy when the intention is to render realistic soundscapes that complement the diegesis. However, the various types of imaginary sonic landscapes appear to have sound design applications that are more creative. Wishart (1996, p.157) notes that transformations of aural space have an inherent "dreamlike quality". Therefore, with visual diegesis as a reference, the substitution of a realistic acoustic space for an unrealistic acoustic space could signify an alternate reality (i.e., *real sound-objects/unreal space*). In film, such transformations in acoustic space often support a subjective turn to the awareness of a character who is experiencing reality in an altered state of consciousness.[140] Imaginary sonic landscapes defined by real sound-objects/unreal space are also commonly used in film to represent the subjective experience of a memory flashback.[141]

Film occasionally features an imaginary sonic landscape defined by unrealistic sounds articulated in a realistic space. While the sound design applications appear more limited, the horror genre frequently uses the penetration of unrealistic sounds into realistic diegetic space to represent supernatural phenomena. Moreover, these unrealistic sounds may simply be transformed realistic sounds that retain a degree of intrinsic recognition (e.g., utterances), while being supported by contextual

[140] *Dune, Rush* (1991), and *Requiem for a Dream* (2000) are all films that represent characters' drug-induced experiences of reality. The films often signify such altered states of consciousness through the use of imaginary sonic landscapes characterised by unreal space and real sounds.
[141] *The Bourne Identity* (2002) and *Memento* (2000) deploy this imaginary sonic landscape effect to signify characters' subjective experience of memory.

recognition. For instance, in *The Exorcist* the unrealistic vocal sounds of the possessing spirit are still intrinsically recognizable as speech, but their source-bonded association with the girl relies on contextual recognition.

One compositional application of sonic landscape to sound design could explore the various representational possibilities and effects of 'migrating' acousmatic sound-objects between diegetic and nondiegetic space. This could involve transforming the spatial indicative field of musical or atmospheric sound-objects, so that their sound-images appear to have sources located in offscreen diegetic space. If this spatial migration progresses to include more sound-images, then the perception of two distinct sonic landscapes may blur to give the impression of a single sonic landscape for diegesis. Moreover, the quality of such sonic landscapes could be surrealistic, stemming from the co-presence of apparently unrealistic sound-images (music and abstract atmospheric sounds) that are spatially distributed (in a realistic diegetic space) alongside realistic sound-images. This effect is similar to how electronic music and atmospheric sounds in the films *Forbidden Planet* and *Blade Runner* often appear to have sources in diegetic space. As previously noted, the surrealistic presence of unrealistic sounds in diegetic space can evoke strange atmospheric effects that support the story telling.

5.6 Chapter Summary

This chapter identifies that structural concepts of the soundtrack, such as those advanced by Chion's model, have an informative value for sound design. However, Chion's categories do not constitute the basis of a compositional approach to the soundtrack. The proposed sound design applications of sonic landscape adds this compositional perspective to our understanding of how sounds cross between the structural borders of film and transcend its representational spaces. As a concept that defines the imagined 'place' of sound-images, sonic landscape meaningfully relates perceptions of sounds to perceptions of space. This aligns with Murch's ethos of worldizing and sound design. The sonic landscape approach to developing a

metaphorical discourse also resonates conceptually with Murch's ideas on the sound design of metaphoric distance between film sounds and images.

Sonic landscape can be applied in film sound design as the form of approach to its inter-modal compositional strategy. In this regard, one obvious application of sonic landscape could be the design of realistic aural impressions of place associated with the story world. Compositional strategies can also explore the creative possibilities of using different imaginary sonic landscape designs. This could include sonic landscapes in 'dialectical' relationships with the image, as well as the representation of subjective experiences and alternate realities. The practice phase of this study set out to investigate these applications and generate practical knowledge of sonic landscape approaches to sound design.

Chapter 6

Methods

Chapters Two to Five collectively address this study's first research aim. The objective concerns the development of an interdisciplinary conceptual framework that supports a sonic arts approach to sound design. The definition of the framework identified applications of soundtrack studies concepts and electroacoustic music theory within an inter-modal compositional strategy. The second research aim examines these applications in sound design practice, with the intention of generating practical knowledge that can evolve the sonic arts approach and refine applications of the conceptual framework within the inter-modal compositional strategy.

A key challenge for this study was the formulation of a methodological approach to sound design practice-research that would facilitate the documentation of conceptual framework applications and practical knowledge discoveries, without hindering the objectives of project work. This chapter describes the methodological design that was subsequently developed and operationalised to realise the second research aim.

The chapter begins with a synopsis of practical knowledge research for professional practices. This research is subsequently contextualised to derive sound design practical knowledge categories for case study analysis. The discussion then focuses on the rationale and procedures for case study research methods that constitute the methodological approach to practice-as-research (PAR). The products of practice-research take the form of three case studies (Chapters' Seven to Nine) and an accompanying DVD of project work. Each case study presents a practice narrative that reports on conceptual framework applications and practical knowledge

discoveries. In Chapter Ten, the outcomes of case study research are evaluated in order for exploratory conclusions to be drawn about the sonic arts approach to sound design and its interdisciplinary conceptual framework.

6.1 Practical Knowledge and Professional Practices

Polanyi (1967, p.4) states that "[w]e know more than we can tell [...]", a seemingly innocuous statement that points to the epistemological significance of practical 'know-how'.[142] What has been otherwise termed *Practical knowledge* is a 'know-how' born of learning experiences implicit in work situations (Cook & Brown 1999). Moreover, practical knowledge is said to have both *tacit* and *explicit* dimensions (Sternberg, *et al.* 2000). Tacit practical knowledge is embodied in action (Eraut 2000) and enables both the automatism of skilled behaviour and the professional intuitions that operate largely outside of conscious awareness (Sternberg 1999). For this reason, tacit practical knowledge resists abstraction from behaviour, making it difficult to reflect upon or communicate explicitly (Scharmer 2001).

Studies of professional practices have revealed that the acquisition of practical knowledge is essential to the development of skilled expertise (Dreyfus & Dreyfus 1986; Dreyfus 2002). Practical knowledge is also acquired by applying theoretical knowledge in a work context (Sternberg & Horvath 1999). This makes it possible for explicit (communicable) forms of practical knowledge to inform or modify theoretical knowledge.

6.1.1 Sound Design Practical Knowledge

Like other professional practices, sound design relies on a common repository of explicit 'industry' knowledge that has theoretical and practical dimensions.[143] Within these established boundaries, the practice of sound design supports individual

[142]See also Polyanyi (1962).
[143]For instance, knowledge of technical standards, sound engineering principles, and soundtrack post-production conventions.

approaches stemming from a complex differentiation of theoretical influences, professional experiences, and practical bodies of knowledge.

This study investigates sound design applications of compositional approaches associated with electroacoustic music. This 'sonic arts' knowledge has theoretical and practical dimensions, and is integrated with sound-design and soundtrack-studies knowledge in the interdisciplinary conceptual framework. The integration of different knowledge bases is intended to support the practice development of a stylistically individuated (sonic arts) approach to sound design. This study aims to contribute to the field of sound design by generating context-specific practical knowledge of selected electroacoustic music theories. The case studies therefore describe explicit practical knowledge of spectromorphology, indicative fields, and sonic landscape, as applied aspects of the inter-modal compositional strategy. This knowledge is acquired through practice applications of the sonic arts approach on sound design projects (independent film soundtrack post-production).

In accord with the concept of tacit practical knowledge, one assumes that certain aspects of these applications became automatised and instinctive over the course of the practice period. The case studies focus on reporting explicit practical knowledge as it supports the research aims. However, research evidence suggests that acquired practical knowledge within a professional domain exists in both explicit and tacit forms (Sternberg & Horvath 1999).

The study's consideration of sound design practical knowledge was informed by research into other professional practices. The approach of Sternberg and Horvath (1999)—that of identifying interdependent categories of practical knowledge specific to a field of professional practice—was applied to sound design practice, and broad practical knowledge categories were defined to assist the analysis of case-study evidence. These categories are described in Table 6.1.

No.	Practical Knowledge Category	Description
1	**Conceptual Framework**	Practical knowledge acquired through application of the interdisciplinary conceptual framework to sound design practice
2	**Professional Relationships**	Practical knowledge acquired through effective collaborations with filmmakers and other stakeholders in the post-production project
3	**Sound Design Heuristics**	Practical knowledge resulting from 'in practice' development of heuristics and working concepts that enabled aspects of sound design
4	**Tools & Technological Affordances**	Practical knowledge of the affordances of music production software and hardware tools for sound design
5	**Project Management & Service Provision**	Practical knowledge concerning the management of a sound design project and the post-production responsibilities of the sound designer

Table 6.1: Sound Design Practical Knowledge Categories

The primary objective in analysing case-study evidence was to identify the key practical knowledge discoveries made in relation to the interdisciplinary conceptual framework (Category 1). However, all the categories described in the table are essentially interdependent in sound design practice. For instance, in this study the nature of the professional relationships (Category 2) had a direct bearing on the scope of sound design practice to explore experimental applications of the interdisciplinary conceptual framework. Creative collaborations are also impacted by contextual factors linked to project conditions that determine how sound design carries out its various roles (Category 5). The remaining categories (3 and 4) are for the most part internally relevant to practice, and support the execution of compositional strategies. In

summary, all of these categories of practical knowledge are important to the development of the author's approach to sound design practice.

6.2 Research Design

A research design may be defined as "[...] the strategic plan of the project that sets out the broad structure of the research" (Brewer 2000, p.57). In this study, practice-as-research (PAR) defines the overarching research framework while the case studies reflect the specific methodological approach. Frameworks such as PAR and practice-based-research (PBR) have evolved in the context of creative arts practice-research and have inherited aspects of *action research*—a flexible, contextually sensitive approach to enquiry that reflects the integration, interdependence, and interoperability of parallel research and practice objectives (Robson 2002). This relationship with action research is significant, as it gives PAR a foothold in qualitative research, adding leverage to the view that creative arts practices can be the objects of valid research.

Both action research and PAR require a flexible research methodology that can be applied to study practice development across a variety of contexts. As Robson (2002, p.217) concludes, "[t]he flexibility of case studies in design and approach, as well as the use of methods, encourages their use as a model for action research". A subsequent review of case-study methods in action research revealed the suitability of this approach for PAR.

The *case* is the nominal *unit of analysis* within case-study research and is generally defined as consisting of "[...] natural occurrences within definable boundaries [...]" (Bromley 1986, p.8). The case represents a bounded phenomenon and becomes the object of a contextually situated investigation, a *case study*. Yin (2003) states that case studies permit the rich depth of context-sensitive phenomena to emerge, thereby preserving "[...] the holistic and meaningful characteristics of real life events" (p.2). Case studies are usually temporally framed and concern events that unfold naturally over a period of time (Willig 2001, p.71). This suggests that the temporally bounded sound design project is a legitimate unit of analysis for case-study research. While

contextual factors differentiate projects and create unique variations in the unit of analysis, considering projects as a series allows for harmonious description, understanding, and explanation of a common *object of study* (Hamel, *et al.* 1993, p.39). The present research design identifies *sound design practice* as the object of study.

Yin (2003, p.22) notes that case-study research typically starts with a focused research question and logically ascribed propositions. This is entirely appropriate for researching measurable improvements in professional practices that intersect with social science. In comparison, the agenda of creative arts research may be more diffuse, and limited to evaluations of the artistic values in experimental extensions of practice. In this study the aims of research resisted formulation as a delimited research question. The research is instead directed by a general proposition that application of electroacoustic music theories may positively extend approaches to sound design practice by forming the basis of an inter-modal compositional strategy. Concordantly, the research design uses case studies as a basis for describing conceptual framework applications and critically reflecting on the practical knowledge acquired.

6.2.1 The Sound Designer as Practitioner-Researcher

A *practitioner-researcher* can be defined as one who carries out research relevant to his or her own practice and profession (Robson 2002). One variant of such research, *observer participation*, exploits an existing role to "[...] explore dimensions of a new setting or field in which the role naturally locates the observer" (Brewer 2000, p.61). In this study, the practitioner-researcher acts as an observant participant who gains access to the field (e.g., film post-production) via the sound designer role.

In recent years practice-research has merged with ethnomusicology to examine the social agency of sound engineers and music producers in the studio environment (Greene & Porcello 2004). Porcello (1998) notes that the studio-based practitioner-researcher works through the cohabiting and shifting discourses of the sound engineer and ethnographer, following the 'groove' of encounter (Keil & Feld 1994). Porcello (1998) claims that this has value for ethnographic research, as the experience of

moving fluidly between grooves brings the object of study (studio practice) into focus from different perspectives.[144] In this study, the author's interactions with project collaborators moved between the grooves of sound design practice and case-study research. The approach to ethnographic encounter was to make the research agenda largely 'transparent' to the project context (e.g., meetings, studio sessions). Therefore, case-study research methods were selected with the intention of preserving the naturalism of encounter.

6.3 Practice-as-Research (PAR)

A historiographical review of the PARIP[145] project noted failures to resolve concerns about the legitimacy of self-documenting 'recorded' media in PAR (Piccini 2002). Adams (2007) similarly argues that audiovisual media have an uncertain status in UK higher-education institutions (HEI's) as forms of research evidence.[146] This raises the question of whether a film soundtrack can be considered a legitimate form of evidence for sound design practice-as-research.[147]

The AHRC[148] broadly applies the term 'practice-led research' to all forms of research in which "[...] practice is an integral part of the whole research process [...]" (AHRC 2009, RGPLA, pp. 1–2). Reflecting action research definitions, the AHRC guidelines place emphasis on critical reflexivity in practice and on research outcomes that generate "[...] new knowledge and understanding in your discipline or in related disciplinary areas." (Ibid., p.2). The AHRC is more circumspect about research

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[144]See also Porcello (1996), Greene and Porcello (2004) for ethnographic studies of sound engineering and studio practices.

[145]PARIP (Practice-as-Research in Performance) was a five-year AHRB project, directed by the Department of Drama: Theatre, Film & Television at the University of Bristol, that attempted to define the goals and criteria for practice research in the creative arts. (http://www.bris.ac.uk/parip).

[146]Evidence from McLaughlin (2002) and Knudsen (2003) suggests the onus is on individual institutions to adapt their own regulations for practice based PhD's that incorporate audio-visual media as a component of the submission.

[147]See also Dowmunt and Thomas (2005) for a discussion of general issues regarding PAR in moving image disciplines. The article suggests that film media can make a scholarly contribution to knowledge by constituting a form of evidence of a creative process.

[148]The Arts & Humanities Research Council. This study refers to three primary sources of guidance in order to establish a more broadly based set of definitions for practice-research: *AHRC Funding Guide* (2007), *AHRC Funding Guide* (2009), & *AHRC Guidance Notes: Support for Practice-led research through our Research Grants— practice-led and applied route (RGPLA).*

methods, asserting only that they should have "[...] a significant focus on practice, as distinct from history or theory" (Ibid., p.2).

The PAR guidelines for UK HEI's described by Nelson and Andrews (2005) are consistent with the AHRC's general criteria for practice-research. According to Nelson and Andrews, the tangible material outcomes of creative practice contribute meaningfully to research as a form of evidence. As interpreted for this study, a mixed soundtrack for audiovisual media (film) constitutes a legitimate form of evidence of sound design practice-research. Nelson and Andrews's guidelines also outline criteria for PAR studies. In their terms, PAR is not a methodology but a flexible framework that accommodates a variety of research designs and complimentary research methods. To demonstrate this study's alignment with the PAR framework, three key criterion from Nelson and Andrews (2005) have been examined:

C1. "Any prescriptive model of creativity and reflection is avoided in order to enable students to develop their own praxis".
C2. "Practice should be accepted as a methodological process of research inquiry and a mode of dissemination of research in its own right".
C3. "The written outcome will contextualise the project and include a retrospective analysis of the process and outcomes, reflecting on chosen research methodologies and production processes and the relation between them".[149]

Criterion 1 implies that 'critical reflection' as a research activity should be integrated with practice. Dreyfus (2002) notes that expert practitioners naturally engage in critical reflection on their approaches. In this study the act of critical reflection was partly systematized and integrated with the daily practice routine, taking the form of a *practice log* (PLog). Also, the interdisciplinary conceptual framework does not function as a prescriptive model for sound design creativity in this study. Moreover, the author's previous work in electroacoustic music composition demonstrates that a practical knowledge of sonic landscape and spectromorphology was established prior to this study (Boland 2002). The intention was therefore to allow these natural tendencies of compositional practice to be expressed through the sound design approach.

[149]This criterion will be discussed in Section 6.7.1.

Criterion 2 expresses the integration of practice and research in PAR. In this study, practice applications of the interdisciplinary conceptual framework were evaluated as the practitioner-researcher worked through a series of sound design project scenarios (cases). In effect, this study depends on practice as the principal methodological process of research inquiry, as it was only through practice that the research objectives could be addressed.

The relatively recent development of frameworks like PAR signifies the need to define a clear pathway for creative arts practice-research. Studies conducted in accord with PAR are still pioneering and face considerable challenges in winning acceptance as 'real research'. The onus is therefore on practitioner-researchers to be methodologically rigorous in evolving context-specific applications of PAR. In this regard, a concerted effort has been made to demonstrate that case-study research methods are viable for PAR conducted in the sound design context.

6.4 The Case Study Design

In this research design the case studies are *exploratory* and *explanatory* (Yin 2003), in so far as they explore and explain different practice applications of the interdisciplinary conceptual framework. The three cases form a *multiple case-study design* and follow a *replication logic* (Ibid., p.47). The demonstrated power of multiple case-study design stems from its repeated focus on the same object of study (sound design practice) and unit of analysis (sound design project) across different contexts. In a multiple case-study design, the comparative analysis of cases relies on each case being an effective exemplar of a prototypical case (Willig 2001).

The multiple case-study design permits cross-case comparative evaluation of interdisciplinary conceptual framework applications. Moreover, project variations in film form, context, and sound design requirements provide a comprehensive test of the interdisciplinary conceptual framework in practice. The three case-study projects have intrinsic differences but are related closely enough to be comparable. In each project

case, the practitioner-researcher assumed sole responsibility for sound design and soundtrack post-production. Also, each project film was non-commercial and had links to academic institutions.

6.5 Case Study Research Methods

Across all three case studies, a consistent approach was taken to research methods, analysis of evidence, and the structure of the case-study reports. Each case generated several categories of evidence that adhere to the criteria established in Yin (2003) for case-study research.

Following data collation, a *triangulation of analyses* (Hamel, *et al.* 1993) is performed with the aim of "[...] corroborating the same fact or phenomenon [...]" (Yin 2003, p.99) using various sources of case evidence. This strategy is effective at bringing the object of study into focus, as any single research method may fail to capture the inherent complexity of contextual factors affecting a temporally bounded phenomenon (Willig 2001, p.76). In accord with criteria extracted from Nelson and Andrews (2005), the research methods were not forced upon the project context by a prescriptive agenda. In this study, practice is the principal mode of research inquiry, and therefore the various forms of generated case-study evidence are either by-products of sound design practice or records of practice events that otherwise occur naturally within the project context.[150]

[150]In all cases, the project informants gave permission for collected data to be used in this study.

6.5.1 Practice Log (PLog)

The practice log or 'PLog' is the author's term for 'field notes' taken over the course of the sound design project. The PLog took the form of a work diary that recorded project progress, practice agendas, and details of the evolving rationale for sound design.

Yin (2003) identifies this format as a *personal records* sub-category of *archival* case-study evidence. Classical ethnography regards the diary as a form of primary document-based evidence (Brewer 2000) that reflects the observer participant's viewpoint or "[...] the insider's perception of reality" (Fetterman 1998, p.20). In this study the written PLog entries form the evidentiary backbone of the case-study report.

6.5.2 Communiqués

In this study, *communiqués* generally refer to the digitally archived and (later in the process) printed email communications between the practitioner-researcher and various project informants.[151]

In case-study research, emails and other modalities of written communication constitute a largely unbiased and unobtrusive form of document-based evidence (Yin 2003). The value of email as an ethnographic modality of writing has been borne out in this study. The primary function of email was to exchange progress reports and discuss post-production schedules. However, later analysis revealed that emails also generated a valuable project discourse on the interpretation of soundtrack requirements and aspects of the conceptual development of sound designs.

[151] Typically the film director or (in the case of independent productions) the filmmaker.

6.5.3 Audio Recordings of 'Ethnographic Encounters' and Interviews

In case-study research, audio recording is employed as a means of avoiding the distractions caused by interview note taking. It is also thought that note taking hinders the emergence of naturalistic patterns of oral and non-verbal communication (Willig 2001, p.24). Ethnographic research views audio recordings made in the field as a form of primary documentary evidence, compiled at the time of the event under natural conditions (Brewer 2000, p.72). Porcello (1998) also notes the effectiveness of audio recording for studio-based ethnography. In such contexts, this relatively unobtrusive form of data collection allows the practice 'groove' to remain dominant, and minimises the tendency of research agendas to skew the natural patterns of studio work.

In this study, audio recordings were primarily used to capture naturalistic dialogue in situations of ethnographic encounter between the practitioner-researcher and project informants. This included project meetings and studio sessions. Audio recording was also employed for informal interviews focused on a post-project review of sound design. These recordings were later edited and transcribed in preparation for data triangulation and analysis.

6.5.4 Post-Production Session Data

Yin (2003, p.96) identifies computer-generated sources of evidence as *physical* or *cultural artefacts*, a broad categorisation that includes "[...] a technological device, a tool or instrument, a work of art, or some other physical evidence".

In each project case, session data[152] was digitally archived to coincide with logical project milestones. Moreover, the files were electronically date-stamped to enable possible later reconstructions of the developmental timelines of sound designs. These

[152]This data included project files generated by the practitioner-researcher working on a variety of DAW software platforms (e.g., Pro Tools, Digital Performer, Logic). Other project files were associated with generative sound design tools, including Metasynth, MAX/MSP, and Kyma X. Folders containing audio file renders of sound objects used in the design were also archived periodically.

digital archives are important for case-study analysis, as they permit key stages in the compositional process to be re-examined long after the project has been completed. This provides a reference to production activities that may be linked with the PLog, and other sources of document-based evidence, to highlight the compositional strategies and conceptual framework applications that were active at different points in the sound design project.

6.5.5 Practice 'Ephemera'

This miscellaneous category of data collection and evidence also falls within the physical and cultural artefacts category (Yin 2003), reflecting that project informants produced and supplied document-based evidence in the form of scripts and storyboards.

Other artefacts of sound design practice were produced by the practitioner-researcher. These include hand-written *sound maps*, a variant of the sound effects cue sheet often created by sound editors as a guide to mixing (Sonnenschein 2001). In a further transfer of compositional practices from electroacoustic music, basic *graphical scores* were occasionally generated for sound design sequences. Graphical scoring techniques solve the problem of visually representing the temporally unfolding structure of a multi-layered work that features unpitched sounds with complex spectromorphologies. Wishart (1994) promotes graphical representations of sound-object morphologies and structural relationships as useful conceptual aids to composition.

6.6 The Analysis of Case Study Evidence

Case-study research benefits from the analysis of multiple sources of evidence that illuminate the object of study in different ways. Understanding the evidence requires a strategy for *data triangulation*, a process in which analysis and consideration of different forms of evidence ultimately converge to corroboratively substantiate a single point, fact, or conclusion (Yin 2003). For this process to succeed, the data must

be meaningfully organised to create a coherent chain of evidence (Ibid., p.105). In this study's research context the most appropriate organisational strategy was determined to be based on *chronologies*, which examines the "[...] relevant 'how' and 'why' questions about the relationships of events over time [...]" (Ibid., p.127).

A chronological strategy for data triangulation and analysis aligns appropriately with this study because the post-production project follows an organisational timeline and sequence of processes. In each project case, the development of the sound design has its own internal chronology, and the purpose of data triangulation and evidence analysis is to draw out the meaningful sequence of sound design events in this chronology. To facilitate chronological analysis, all sources of evidence collected or archived throughout the case period were given a time stamp/marker.

The process of chronological triangulated analysis is as follows: A source of evidence was chronologically organised with reference to a 'master timeline' for the sound design project. Each evidence set was then separately analysed in reference to the practical knowledge categories shown in Table 6.1.

The analysis scheme was designed to highlight significant relationships, as expressed by the evidence, between chronological sound design events and categories of practical knowledge. For instance, a PLog entry combined with session data evidence could highlight a particular application of the interdisciplinary conceptual framework to the sound design of a particular film sequence (Category 1). Following this, the chronology of project events could yield a communiqué or studio session audio recording that documents a related issue within the professional relationship (Category 2), which has a bearing on that particular application. This could take the form of a disagreement over soundtrack requirements, which focuses on the sound designer's interpretation of the film and compositional approach. This chronological triangulation of analyses enables one to review the sources of evidence collected on or around a particular date, and use as many as needed to corroborate particular references to practical knowledge.

Overall, this analysis strategy is designed to bring the relationship between practical knowledge and the sequence of practice events into focus through the perspectives of differing evidence forms. What emerges is a multi-dimensional view of the sound design project chronology. This picture of the sequence of practice events permits the practitioner-researcher to retrospectively trace practical knowledge discoveries made during the course of the project. Furthermore, corroborating practical knowledge references by triangulating evidence forms adds contextual depth to the case-study report.

6.7 The Case Study Report

Yin (2003, p.145) states, "[...] the preferences of the potential audience should dictate the form of your case study report". This includes one's use of language, which should be cogent to the professional and/or academic domain. As an emerging domain of creative arts research, sound design has yet to evolve a recognisable presentation style and language for intellectualising its field of practice. For sources of guidance, this study has referred to texts that discuss compositional practices in electroacoustic music (Wishart 1994) and film sound design (LoBrutto 1994; Kenny 2000; Sonnenschein 2001; Sider, *et al.* 2003).

In accord with Yin's recommendation, the case studies are structured to present information accessibly and meaningfully to an intended readership of sound designers, electroacoustic music composers, and soundtrack-studies theorists.

6.7.1 The 'Contextualisation' Section

The *contextualisation* section of each case-study report broadly establishes the background to the sound design project. It chronologically covers the interlocking phases of requirements analysis, research and conceptual development. This section also describes the life cycle of the post-production project. In accordance with Nelson and Andrew's (2005) criterion for PAR (Criterion 3), this section contextualises

soundtrack post-production, and frames the objectives of sound design in reference to the filmmakers' rationale and the subject of the film.

6.7.2 The 'Commentary' Section

The *commentary* section relates the conceptual rationale for sound design to the composition and production of the soundtrack. The structure of the commentary follows the film's internal chronology and is essentially a sequence-by-sequence presentation of the sound designer's 'programme notes'. The primary function of the commentary is to inform interpretations of the film's sound design by clearly defining the compositional intentions in particular sequences. The commentary discourse therefore explains how the interdisciplinary conceptual framework was applied in sound design practice. The commentary is intended to combine with the experience of the film to establish the evidence of practice-research conducted in the project context.

Where appropriate, the commentary refers to source evidence to illustrate how the context, social agency, and dialogue between collaborators influenced the course of the creative process. This ethnographic framing of practice outcomes is also firmly established in the discourse of the contextualisation and critical reflection sections of the case-study report.

6.7.3 The 'Critical Reflection' Section

The period of post-project analysis is the terminal node of the chronological case study. The *critical reflection* section summarises the key practical knowledge discoveries in their appropriate context and formulates working conclusions as a closure to the case study.

In general, the stance of the writer in case studies tends to be ethnographic and critically reflexive. Ideally, this should produce a mediating analytical awareness that prompts the researcher to reflect upon the social processes that "[...] impinge upon and influence data [...]" (Brewer 2000, p.127). Therefore, case-study conclusions should

always account for a range of influential factors, including location/setting, topic sensitivity, power relations, and the qualities of social interactions between the researcher and the researched. In this study, the contextualisation section identifies the contextual factors that framed the sound design practice case. At the close of the project chronology, the critical reflection section takes a reflexive stance in order to readdress those contextual factors and consider their impacts on sound design.

6.8 Chapter Summary

This chapter describes a methodology for sound design practice-research. A consideration of PAR criteria suggested case-study research methods could be employed in directing a practice-led evaluation of interdisciplinary conceptual framework applications. The still-evolving nature of creative arts practice-research highlights that this study is akin to a pilot in methodological terms. This need not detract from the study's intrinsic value as valid research, so long as methodological rigour is pursued to the extent that the context permits. As practice-led research grows in many domains of the arts, there is a need for practitioner-researchers to evaluate the potential of different research frameworks and methods in their areas. It is in this direction that this study attempts to contribute to the field of sound design practice-research.

Chapter 7

Song of the Falklands

This case-study documents the sound design project for *Song of the Falklands* (2008). Directed by Clive Myer (Eclectic Films), this nonfiction film dissects the links between collective consciousness and British identity in the social-cultural aftermath of the Falklands War (Myer 2009). The film also constitutes a statement that is antithetical to the representation of social myth in mass-observation movement films such as *Song of Ceylon* (1934). A key challenge of the sound design project was the interpretation of the filmmaker's conceptual framework and vision.

7.1 Contextualisation

This section provides an overview of the project's phased approach to soundtrack post-production and details the research that informed the development of the sound design.

7.1.1 The Post-Production Project

The sound design project for *Song of the Falklands* started on January 4th 2007, and ended with an informal project review on June 12th 2008. This timeline encapsulated four distinct phases for the sound design project. This phased approach arose largely in response to circumstantial factors connected to the filmmaker's schedule for

doctoral research.[153] Phases I and II included background research, sound design conceptual development, and the restorative re-recording of location sound. A rendered 'draft' sound design was also prepared to enable the filmmaker's review of progress on the soundtrack.

Phase III moved towards the completion of sound design and the production of a mixed soundtrack. A Phase IV was necessary for enacting change requests following critical feedback from the filmmaker's examiners. Appendix 1.1 details the activities of sound design in each phase of soundtrack post-production.

7.1.2 Representational Dialectics in *Song of the Falklands*

Reflecting a post-Marxist social ideology, Myer adopts Eisenstein's *intellectual montage* (Eisenstein 1949) as the principal structural grammar for his exploration of the nature of "[...] collective consciousness and collective memory in the diegetic space of the nonfictional film subject" (Myer 2009, p.27). Myer infuses his montage approach with post-structuralist semiotics to engineer a network of signs that dissect the constituents of a mythical 'Britishness': a characteristic of islander collective consciousness that is socially reinforced by the colonial power (Ibid., p.40).

During requirements gathering, Myer stated that sound design should reinforce the film's chain of significations through strongly voiced image-sound dialectics:

> I'm relying on the sound to be contrapuntal. Given that the film has visually got straighter and straighter, I need the soundtrack to be less and less straight. (Myer 2007, *Phase II Requirements Review*)

This comment also reflects Myer's intention to use sound to 'fracture diegesis' and foreground the mechanisms of representation. Mauer (2008, p.147) notes that asynchronous audiovisual relationships can dispel the naturalistic illusion of truth in nonfiction film. This idea is reflected in Myer's rationale for using contrapuntal

[153] *Song of the Falklands* was included in Clive Myer's practice-based PhD submission to the Royal College of Art (Myer 2009).

audiovisual relationships to reveal the illusory nature of nonfiction film 'realism' and ethnographic authenticity:

> I am not a naturalist, a realist ... so it has to be fractured.... [I]t's an attempt to say, 'Don't be deluded by the illusion of cinema and television, there is no real world it's pointing at'. (Myer 2008, *Phase IV Dubbing Session*)

Consequently, Myer instructed sound design "[...] to make it clear, in my view, how diegesis is misused" by nonfiction film (Ibid.). Murray (2010) observes that sonic verisimilitude in nonfiction film often hides the artifice of process by departing from aural authenticity. Myer's principles initially opposed soundtrack post-production conventions that might otherwise eliminate the sonic artefacts of process or augment a diegetic illusion of reality.[154]

These general edicts constituted the initial requirements for sound design. Myer also instructed the author to interpret his research and integrate its themes within the soundtrack's conceptual vision. Myer reasoned that facilitating a dialectical 'clash' of creative rationales would ultimately benefit the film. In practice, Myer's strategy eventually gravitated towards an 'action and reaction' approach to soundtrack post-production in phases III and IV (Sider 2003; Lynch 2003).

The sound design's conceptual development also incorporated ideas previously outlined in this study relating to the symbolic qualities of film sounds and sonic landscape metaphorical discourse. To reiterate, a perceived 'metaphoric distance' in dialectical audiovisual relationships can actively engage the audience in the interpretation of meaning (Murch 1995). To facilitate this, a sonic landscape compositional approach can be applied to establish a chain of significations that builds into a metaphorical (symbolic) discourse (Wishart 1996). Also, previous discussions of Godard's *Breathless* noted how sounds could be used to fracture diegesis and subvert narrative flow. Collectively these aspects of the interdisciplinary conceptual

[154]In phases I–III, Myer was keen to partially preserve the wind noise distortions that dominated outdoor location recordings. His instructions also extended to not using library sound effects to augment the realism of aural diegesis. These instructions were eventually overturned following complaints by Myer's examiners about the noisy qualities of location recordings in the soundtrack.

framework informed research into Myer's rationale and the development of sound design strategies to meet his general requirements.[155] Table 7.1.2 summarises a number of compositional schemas derived for structuring dialectical montage and diegetic fracture using external logic.[156] The soundtrack examples referenced in the table are described more fully in the commentary section.

Strategy	Description	Film Example
Montage: 'Substitution'	A realistic sonic landscape is substituted entirely for an unrealistic sonic landscape in dialectical contrast to the images.	*'War Climax'* TC 32:46
Montage: 'Layered Narrative Counterpoint'	A realistic sonic landscape is layered with a sonic landscape that expresses a narrative counterpoint to the images.	*'Prelude to Invasion'* TC 09:33
Fracture: 'Exaggeration'	The overemphasis of sound-object qualities associated with events in diegesis.	*'Stamp Collectors'* TC 10:02
Fracture: 'Artificiality'	A transformation of diegetic sound qualities that conflicts with expectations of realism	*'Church Radio'* TC 24:57
Fracture: 'Unreal / Surreal'	An unrealistic or surrealistic structural organization of sound-objects associated with events in diegesis.	*'Sheep to Sweater'* TC 11:20
Fracture: 'Engineered Synchresis'[157]	The engineered relationship between a sound and an event in diegesis, irrespective of the irrationality of the association	*'Horse Cut'* TC 21:17
Fracture: 'Silence / Absence'	A conspicuous silence or absence of sound	*'History Radio Narrator'* TC 01:53

Table 7.1.2 Compositional Schemas for Montage Dialectics and External Logic

[155]Myer (2009) also refers to the influence of Godard on his filmmaking approach, which involves subverting the illusion of realism through diegetic fracture.
[156]The abbreviation 'TC' used in the table refers to 'time code' in the format [minutes : seconds].
[157] The term *synchresis* is advanced by Chion to describe the perceived concomitance of a sound and image event as being associated with a single phenomenon, irrespective of whether the relationship is logical or natural. The synchresis effect relies largely on a perceived synchronisation of a sound and image that establishes causal links between them (Chion 2009a, p.492).

7.1.3 Radio and Re-figuration

Much of the footage used in *Song of the Falklands* was produced originally for two commercial travel films in 1985 and 1995.[158] Myer applies Rancière's concept of *de-figuration* to describe the recycling of this footage (Rancière 2001, p.8), identifying a process of *re-figuration* that gives "[...] new meaning to recontextualised [*sic*] images and sounds [...]" within a new work (Myer 2009, p.27). According to Myer, the re-figuration of nonfiction film recodes contextually embedded signs, a process that signifies new alternate meanings (Ibid., p.69). This concept of re-figuration clearly aligns with the principles of musique concrète to re-contextualise the significations carried by sounds (Dack 1994).[159]

Field (2000) states that sounds can be transcontextual and acquire alternate meanings in the different soundscapes (contexts) of a work. However, Lane (2006) suggests that clear compositional intentions are required to meaningfully re-use sound materials. In *Song of the Falklands,* re-figured 'on the air' broadcast sounds acquire a transcontextual meaning in radio sonic landscape designs. During Phase I, Myer made available an archive of radio recordings that documented events surrounding the Falklands War.[160] The recordings included political commentary by the international media, and the intimate social discourse of the infamous FIBS[161] 'Invasion Phone-In' show (Eddy, *et al.* 1982). As Myer observed, "the whole point of the Falklands War for the islanders is that it took place on radio" (Myer 2008, *Project Review Interview*). Sound design subsequently determined that a soundtrack re-figuration of radio recordings could extend Myer's narrative discourse on the war through montage dialectics.

Myer (2009, p.41) acknowledges the importance of radio sonic landscapes in *Song of the Falklands*, which "[...] incorporate signs of overt and invert cultural meaning ... and their effect on the islanders' themselves, their history and their future". The film's fixation on the importance of radio communications within island society is

[158]Commissioned by the Falklands Islands Tourism Board.
[159]See section 2.1.2.
[160]These radio recordings were given to Myer by an islander during his first visit in 1985.
[161]Falklands Islands Broadcasting Service.

meaningfully extended by sound design into nondiegetic representational space. Within dialectical montages, acousmatic radio sonic landscapes establish a discourse on colonial conflict while reinforcing a signification of the medium in determining the islanders' collective consciousness.

Chion (1999, p.21) notes that radio voices are acousmêtres. The film presents radio acousmêtres in various representational guises: as voices of colonial authority figures[162], of islanders situated across 'the camp'[163], and of historical messengers. As a component of the soundtrack's conceptual vision, sound design explores the theme that the radio medium gives voice to the true 'song' of the Falklands—a cacophony of communications signifying various dimensions of islander collective consciousness.

In several sequences, radio sonic landscapes embed significations of collective consciousness regarding colonial conflicts. The film's first section, '1. History', examines this through a dialectical montage of a coastal landscape diegesis and a non-diegetic historical radio docudrama that investigates "[...] the conflict between discovery and colonization by different nations" (Myer 2009, p.21). This radio sonic landscape has a single imaginary source: an acousmatic 'history receiver' that tunes into transmissions signifying the "[...] complex history of the occupation of the Islands" (Ibid., p.41). Overall, the film treats the 'Falklands War' as one node within this history of disputed sovereignty and colonial conflict. In the sequences *'Prelude to Invasion'*, *'The Invasion Show'*, and *'War Climax'*, re-figured radio sonic landscapes are used within dialectical montages to signify the impacts of the war on the islanders' collective consciousness and their sense of nationhood.

7.1.4 *Song of the Falklands*: References to Mass Observation Movement Film

Myer (2009) observes that *Song of the Falklands* developed as a critical and ideologically opposed response to the mythical significations of false consciousness in mass-observation movement films like *Song of Ceylon* (1934). According to Myer, the romantic illusion of island life presented by the latter serves vested colonial interests,

[162]This includes "Siggy", the radio telephone exchange operator and an FIBS announcer.
[163]'The camp' is the term used by the islands' residents to refer to the dispersed settlements.

particularly commercial enterprises like Ceylon tea and timber. On Myer's recommendation, the author researched the soundtracks of *Song of Ceylon* and *Listen to Britain* (1942), and this yielded ideas that influenced the sound design of *Song of the Falklands.*

Sexton (2004) observes that in *Song of Ceylon,* Albert Calvacanti's dramatic use of radio and electronic sound represents modernity as a "[...] source of both chaos and terror, as well as excitement and wonder" (p.13). *Song of the Falklands* evolves a parallel theme in the *'War Climax'* sequence, by using bursts of communication signals to signify the machinery of war as a terrifying consequence of modernity. In both *Song of the Falklands* and *Listen to Britain,* broadcast radio is portrayed as the artifice of state control that appeals directly to collective consciousness by calling for solidarity and resistance in the face of external threats. The re-figured discourse of FIBS radio broadcasts in *'The Invasion Show'* and *'War Climax'* sequences highlights the solidarity of the camp community in response to Argentine occupation.[164]

In conversation, Myer was critical of how nondiegetic music is used in *Song of Ceylon* to perpetuate a romantic illusion of collective consciousness, this being an example of "[...] how we read a documentary is set up in advance" (Myer 2008, *Project Review Interview*). Myer's objection to the use of musical underscore to exert emotive influence on interpretation (Deutsch 2008) underpins *Song of the Falklands'* post-modern documentary approach to using diegetic music (Ruoff 1992).[165]

In *Song of the Falklands,* one sequence, *'Sheep to Sweater'*, constitutes a critical response to *Song of Ceylon* and its poetic use of composed 'work songs' to underscore images of tea and timber production. In the latter film these romanticized work songs acquire an illusory ethnographic authenticity because they incorporate sounds with diegetic sources. *'Sheep to Sweater'* overtly signifies this quality of illusion by using musique concrète to establish the rhythmical mimetic discourse of an industrial-process 'work song' for a wool production sequence. This sequence also parallels the

[164]The Argentine forces were aware of the strategic importance of the FIBS station and of controlling radio communications across the camp. Consequently, taking over the station and regulating its output was a key military priority (Eddy, *et al.* 1982).
[165]In the film, diegetic sources of music include an accordion player who is de-acousmatized, a social dance band, a church choir and a military band.

composition of industrial mechanised rhythms that underscore images of war production in *Listen to Britain* (Myer 2009, p.35).

7.2 Commentary

The commentary describes those film sequences where sound design went beyond the simple production of realistic sonic landscapes. The first step in sound design involved re-recording the original location sound from tape and re-syncing it to the visual edit. Requirements to fully restore the location soundtrack did not emerge until Phase IV.[166] This involved processing outdoor recordings to attenuate wind noise, and mixing library sound effects to produce realistic sonic landscapes that complement the image diegesis.[167] The commentary is structured according to the temporal organisation of sequences in the film.[168]

7.2.1 Opening Titles and '1. History' Section

[DVD Ch.1 - 00:00]

Over the titles, signal noise and tuning sound-objects form an abstract radio sonic landscape. This signifies a 'tuning in' to the historical discourse of the first section, which is presented as a radio docudrama. The sound design of the history section is based on the composition of two interacting sonic landscapes. The diegetic *coastal surroundings* sonic landscape is constructed to create a realistic illusion of the coastal environment and its natural ecology. The nondiegetic *history radio* sonic landscape presents a docudrama radio play describing a history of sovereignty and colonial disputes (Myer 2009). The imaginary source of this sonic landscape is an acousmatic 'history radio' receiver that self-tunes into transmissions broadcast on different 'time' frequencies.

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[166]See appendix 1.1.

[167]The 'History' section of the film combines both techniques to craft the realistic *coastal surroundings* sonic landscape. However, the sound design for most outdoor sequences required some balance between production strategies for location sound restoration and sound effects replacement.

[168]Each sequence commentary is linked to a corresponding 'film chapter' number on the DVD, and a time code reference.

A spectromorphological analysis of AM radio broadcasts informed sound design's development of a 'radioizing' re-recording process for docudrama voices and sound effects.[169] Inspired by Murch's 'worldizing' approach (Murch 2003), this process was designed to spectromorphologically engineer sound-objects and intersonic structural relationships with perceived qualities that suggest source-bonding to the sound-image of an acousmatic radio receiver. The studio production techniques for rendering radio sonic landscapes evolved through experimentation and practical knowledge discoveries. Appendix 1.3 presents a detailed description of the sound design of radio sonic landscapes using the radioizing process.

The history radio sonic landscape is composed of six rendered (radioized) tracks that are mixed dynamically to vary the radio sound aesthetic along a continuum from relatively 'dry' signals to those heavily saturated by effects. These radioized effects constitute an attempt to reproduce the spectromorphological qualities of AM radio transmission and reception (e.g., filter modulations, distortion).

The sound design engineers dynamic structural relationships between the history radio and coastal surroundings sonic landscapes. In spectromorphological terms, their respective mimetic discourses often interact reciprocally, alternating in their perceived dominance. The audibility of docudrama voices is prioritised over environmental sounds. Following each historical transmission, a signal 'squelch' sound-object is introduced to activate a gestural indicative field that signifies the radio tuning into another message. Between transmissions, the coastal surroundings sonic landscape is dynamically articulated and assumes perceptual dominance. This allows contrasting structural relationships characterised by reaction and conflict to come briefly into existence before the history radio sonic landscape re-establishes its dominance.

The perceived morphologies of the loudness and intensity relationships within and between the two sonic landscapes were designed to have synchronous-asynchronous motion styles and undulating motion typologies (Smalley 1997). The spectromorphologies of the coastal surroundings sonic landscape align with the visual morphologies of ocean waves. Wave motion morphology is also reflected within the

[169]See appendix 1.2 for a table that summarises the spectromorphological analysis of AM radio sound.

history radio sonic landscape by the engineering of filter and amplitude modulations with periodic-aperiodic motion styles and oscillatory-undulating motion typologies. Overall, the inter-modal compositional strategy highlights spectromorphological similarity between the two sonic landscapes by making an analogy between the undulating audiovisual rhythms of the ocean and the sinusoidal periodicities of radio tuning 'drift'. In summary, the swelled graduated continuant of sinus wave motion forms a morphological motif for intersonic structural relationships within and between the sonic landscapes.

The radio sonic landscape design applies the concept of 'mixed signals' as a structural metaphor for competing messages by colonial powers. At one point, the English narration is heard above two competing foreign language translations (DVD Ch.3 - 01:34). Following this, the coastal surroundings sonic landscape is attenuated so that the narrator's voice and radio signals are heard in isolation (01:52). This conspicuous absence of ocean sound deviates from listening expectancies and engineers a fracture of diegesis.[170] The break also reflects compositional strategies aimed at counteracting listening habituation to the synchronous /asynchronous motion style of sonic landscape relationships, and their structural pattern of alternating perceptual dominance. This strategy also involved engineering brief instances where the two sonic landscapes enter into reactive-competitive structural relationships. In general, for shots of ocean waves breaking dramatically against the cliffs, the intersonic compositional mode focused on developing and breaking patterns of spectromorphology in sonic landscape relationships. This supports the intentions of the audiovisual compositional mode, which aimed to reflect the perceived dynamism of ocean rhythms and energy suggested by the images.

For several images of energetic wave crashes, radio static was dynamically articulated in synchrony with ocean sounds. This took advantage of the spectro-typological similarities between these sound-objects as forms of noise. Their resultant fusion unifies the energy of the two sonic landscapes in a manner analogous to the anti-nodal superimposition of two signal waveforms. The effect is also explainable in terms of Gestalt principles of perception (Matlin & Foley 1997). The principle of similarity

[170]See Table 7.1.2.

groups together the ocean-wave and radio sound-objects based on spectro-typological qualities (noise form), while the combined principles of symmetry and common fate cement the grouping based on shared motion characteristics.

The author performs the English male docudrama parts. The performance emphasises the dramatic qualities of the voice as a signifier of history (Lane 2006). To the detriment of the historical narrative, the majority of the foreign language voices lack sufficient dramatic quality. To compensate for this, sound design sought to develop drama by engineering surrealistic sonic landscape alignments of docudrama elements and imagery within the montage dialectic. The resolutions of these dialectics point to significations of colonial disputes. In the sequence '*Sea lions*' (DVD Ch.4 - 03:33), the surrealistic sonic landscape design manipulates the spatial indicative fields of simultaneous French and British declarations to suggest their source location in offscreen diegetic space. Echo and reverb effects were applied to craft a spectromorphological illusion of the voices projecting into diegesis via a P.A. system. The illusion suggests that the voices are directly addressing a raft of sea lions—the animal proxies for human residents. The semantic masking of competing messages forms a sonic metaphor that signifies the conflict between two colonial powers.

The sequence *'Bird Parliament'* also features a surrealistic sonic landscape design (DVD Ch.5 - 04:40). Sounds associated with a dramatic recreation of a House of Commons debate appear to surrealistically align with the diegesis of a penguin colony. Shrill birdcalls are merged with the MP's calls of "*here here*" to metaphorically signify that the amassed penguins are the animal proxies for uniform banks of noisy parliamentarians. The next part of the sequence continues the rhetoric of the parliamentary debate over shots of two birds facing each other on a small mound that signifies the parliamentary dispatch box.

The surrealistic sonic landscape of *'Rights & Property'* (DVD Ch.6 - 05:32) builds on the continuity established by the previous two sequences. In the first series of shots, the declaration is directed at a group of basking and 'uninterested' elephant seals ("*Be it known that...*"). The acousmatic source of the declaration is revealed as a bird standing on a small island 'addressing' a group of swimming birds. The signified

inference is that the land-based bird is a representative of the establishment, while the swimming birds are residents gathering to hear the declaration. The sequence ends at a point of synchresis where the swimming birds scatter after appearing to be startled by the sound of hammering. This signifies the intention of the residents to flee the authorities that are putting up a plaque to formalise British sovereignty.

Myer professed to enjoying the inherent absurdity of these surrealistic montages, but more importantly he valued their function in emphasising the narrative significations carried by the historical docudrama. Moreover, in the author's opinion, these momentary impressions of surrealistic sonic landscape have a structural function in counteracting the habituation of audioviewer attention to the co-presence of the diegetic coastal surroundings and nondiegetic history radio sonic landscapes.

7.2.2 'Commerce, Communications, Transport' Section: 'Radio Acousmêtres' [DVD Ch.7 - 07:53]

In this sequence, radio is signified as the medium by which the apparatus of state control exerts its regulatory influence on islander collective consciousness (Myer 2009, p.77). The section intertitles are accompanied by an FIBS broadcast and the de-acousmatisation of the radio presenter acousmêtre as a 'voice of commerce'.[171] This is followed by a sequence showing school education by shortwave radio.[172] Sound design extends the girl's reading from the book *The Old Red Bus* over subsequent shots. The girl therefore remains 'present' in diegesis as a radio acousmêtre.

As the girl reads, diegesis fixates momentarily on a shot of a satellite dish and Union Jack. The reading and the image combine to form a Barthian signification of state communications technology as a tool of indoctrination. In the next shot, the crew of a supply plane are communicating their position via the radio. An unrealistic 'reply' to their transmission comes in the form of the girl's voice as a transcontextual agent (Lane 2006). Spectromorphological transformation supports the impression that this

[171] In *Song of the Falklands,* the intertitles of the film's three sections are based on those used in *Song of Ceylon.* However, the intertitle '3. The Voices of Commerce' is directly re-figured from *Song of Ceylon.*
[172] DVD Ch.8. Menu title: 'Calling you over'.

radio acousmêtre has now penetrated the cockpit sonic landscape.[173] Re-figured excerpts of her previous call to Fox Base School—"*We've been calling you. Over.... I'm fine, how are you? Over*"—forms a transcontextual signification of the colony's remoteness. The audiovisual illusion gives the impression that the pilot (a state representative) is listening intently to the girl's message before turning to camera and saying, "*Let's go*" (to the Falklands) (Myer 2009, p.42).

7.2.3 'Commerce, Communications, Transport' Section: 'Prelude to Invasion' [DVD Ch.10 - 09:33]

This sequence establishes a chain of significations that thematically focus on territorialism as an aspect of British nationhood (Myer 2009, p.42). Within the montage dialectic, a radio sonic landscape of re-figured news broadcasts reports on a pre-invasion breakdown in diplomatic relations.[174] The radio sonic landscape was produced by pre-mixing the edited and arranged re-figured broadcasts with additional signal noise sound-objects. Additional radioizing processing focused only on bonding the sonic landscape's sound-objects to one radio source, as the original broadcasts already carried the spectromorphological characteristics of AM radio.[175]

The sequence's imagery lingers on totemistic significations of national identity, in the form of a UK military signpost and a 'Keep the Falklands British' T-shirt.[176] A gestural radio tuning sound-object suggests that the signpost functions as an aerial receiving an incoming transmission, while a nostalgic musical ident signifies that the following transmission is a newsreel broadcast (Bates & Deutsch 2008). The sonic landscape design deploys the concept of signal interference as a structural metaphor for overlapping significations carried by different broadcasts. Competitive intersonic relationships between broadcasts are spectromorphologically articulated using volume variations and spatiomorphological 'oscillatory' motions across the stereo field. This

[173]The application of filters and a short delay effect supports this sonic landscape re-figuration of the girl's voice.
[174]The invasion of the Falklands Islands by Argentine Forces commenced on April 2nd 1982.
[175]In this case, the radioizing processing involved broadcasting (FM) the premix to a valve radio and re-recording it. This was done to bond the different radio sound-objects to a single sonic landscape source. See also appendix 1.3.
[176]Myer (2009) cites this sequence as an illustration of Durkheim's ideas on the functions of totemistic emblems as overt signs of collective consciousness (Durkheim 1972).

facilitates an attentional conflict leading to a binaural perception of two temporally aligned and semantically comparable phrases: "*imminent danger*" and "*deepening crisis*". The words "*crisis*" and "*Argentina*" are also repeated in a further broadcast.

The montage of radio news and an image of a woman wearing a 'Keep the Falklands British' T-shirt (09:42) reinforce the signification of a threat to nationhood. The chain of signification is meaningfully extended by aligning the final broadcast—"*Britain now believes that Argentinean forces are about to invade*"—with a shot of the ship Society Explorer (10:01).[177] The radio sonic landscape is then terminated to coincide with a cut to shots of 'invading' philatelists inside the ship. This abrupt return to representational realism sets up a diegetic fracture, arising from the unrealistic loudness of stamps being torn from cards.[178] The sound-images of these offscreen gestures contrast those seen in the image. The sequence ends with a playful reference to cultural documentary as a mode of anthropological study. This is caricatured by the sound design illusion of a slide show of first-edition stamps—a presentation of cultural commodities as ethnographic tokens of 'being there'.

7.2.4 'Commerce, Communications, Transport' Section: 'Sheep to Sweater' [DVD Ch.12 - 11:12]

This sequence visually animates the process of commercial wool production while revealing the islanders' tenuous grip on modernity (Myer 2009).[179] The sound design complements this with the mimetic discourse of a 'work song', abstracted from an analysis of visual work 'rhythms' (human and machine). This analysis identified visual gestures and motion indicative fields, which were subsequently translated into spectromorphological designs for synchronous diegetic sound-objects that are source-bonded to onscreen phenomena. For example, the spectromorphological designs of factory machine sound-objects detailed various morphological models describing attack-impulse/iterations and various motion forms (e.g., centric/cyclic, reciprocal,

[177]Myer (2009, p.42) describes the ship's name as being ideologically self-referential, quite possibly because the invading Argentine forces disembarked from ships (Eddy, *et al.* 1982).
[178]See Table 7.1.2. As an effect designed to fracture diegesis, this example parallels Godard's use of unrealistic sound volume levels in *Breathless* (see section 3.4.2).
[179]As Myer noted, "[...] they (the islanders) are still using machinery from the industrial revolution" (Myer 2007, *Phase II Review*).

linear, curvilinear, uni-directional). The sonic materials for sound-object design were taken from the footage (re-figuration) and also from sound libraries.[180]

The compositional approach reflects the principles of musique concrète, in so far as the work song's structure is based on a 'musical' arrangement of realistic sound-objects associated with wool shearing and mechanised processes. The primary compositional aim was to imbue the representation of industrial process with a sense of rhythm and forward momentum. The perceived audiovisual rhythm of the work song is illusory, and relies on the ability of sound to temporally animate the image (Chion 1994). The representational effect is somewhat surrealistic, and similar to the audiovisual poetry of industrial production sequences in *Listen to Britain* and *Song of Ceylon*. However, Myer was adamant that his adaptation of the approach should not lapse into the romanticism of *Song of Ceylon*: "I am trying to enter into the domain of the poetic but not fall into the romantics of poet" (Myer 2007, *Phase II Review*). Accordingly, sound design compositionally applies musique concrète to establish a poetic rhythm of process that is stripped of romantic illustration. This brings the sequence into alignment with Eisenstein's concept of rhythmic montage (Eisenstein 1949; Myer 2009).

The sequence begins with pastoral shots of sheep herding. Diegetic realism is undermined by a sonic landscape that evokes the impression of a 'stampede' with an unrealistic foreground of sound-images (e.g., sheep baa's). The stampede increases in intensity over a c/u of running sheep, and functions as a metaphorical 'drum roll' introduction to the shearing house section of the work song (11:20).

A review of unused footage revealed that the shearing-house work rhythms were supported by pop music on the radio. Of the songs recorded, the 6/8-shuffle rhythm of Michael Jackson's *The Way You Make Me Feel*[181] formed a strong synchronous relationship with the gestural rhythms of shearing. A re-figured two-bar instrumental loop taken from this recording incorporates the ambient drone of electric shears. This

[180]In many cases, the location recordings made inside the factory were unusable due to high levels of distortion. Replacement sound-objects were selected from libraries and transformed by processing.
[181]A song from Michael Jackson's album - *Bad* (1987), Epic Records.

mixed sound-object forms the fundamental rhythmic pattern of the section.[182] The composition builds on this rhythm by arranging the sounds of sheep-pen door slams and "baa" utterances. This montage surrealistically emphasises the mechanistic nature of the shearing process and signifies the source of the wool commodity.

The factory section commences with a switch throw sound-object followed by the whine of machines stirring into action. The synchronous sonic landscape that supports images of factory machinery is realistic while retaining a cohesive work song rhythm. Re-figured sound-objects and library sound effects were edited, time-stretched, and sequenced to engineer the audiovisual synchrony. At the point where wool fibres are being manually stretched (Plate 7A), the work song refers back to the commodity's animal origins. This reference is made by synchronising the stretching gesture with a spectromorphological transformation of a sheep's "baa".[183]

Plate 7A: Sheep 'Stretch' Morph (12:16)

The knitting shop section breaks the continuity of the work song rhythms. The loudness of a knitting machine's 'scraped' percussion is unrealistic to emphasise mechanistic process and exaggerate the operator's physical gestures. In the next shot, the rotational deceleration of a hemming machine is spectromorphologically emphasised by the unrealistic synchronisation of a pitch-shifting transformation. The

[182]The shearing house sonic landscape is dominated by the mixed sounds of electrical shears, thus forming a continuous drone. The diffusion of music from an unseen radio source into this sonic landscape spectromorphologically alters the sound quality and adds a mechanistic quality to the musical loop. This alteration of musical quality is sufficient for the re-figured loop to lose its association as 'music' and thus acquire a new signification that suggests mechanised process.

[183]A phase vocoding patch in Kyma X used a time-stretched sheep's "baa" sound-object as the carrier signal. This signal was modulated by a machine drone sound-object with an amplitude morphological model that traces the dilatory motion of the stretching gesture.

work song's closing statement is a crescendo of acousmatic knitting machine scrapes that signifies the termination of industrial processes. The sequence ends by returning to the farm with its 'distressed' sheared sheep, the discarded sources of the precious commodity (Myer 2009).

7.2.5 'Commerce, Communications, Transport' Section: 'The Invasion Show' [DVD Ch.14 - 14:19]

As with *'Prelude to Invasion'*, the re-figured radio sonic landscape for *'The Invasion Show'* sequence forms a narrative counterpoint to visual diegesis. The sequence's imagery and realistic sonic landscape represents the commercial exploitation of natural resources.[184] Through dialectical montage, the radio sonic landscape evolves a parallel signification of an exploitative threat to Falklands' life posed by an interloper attempting to penetrate islander collective consciousness with its own propaganda. The radio show's constructed narrative is fictional, albeit based on actual events. The sonic landscape is formed by the montage of re-figured excerpts from the infamous 'Invasion Phone-In Show' broadcast by FIBS.[185] No additional radioizing was applied to the re-figured broadcasts, but signal noise sound-objects were judiciously used to complete the radio sonic landscape.

The montage of images showing a solitary peat cutter, with a conversation between DJ Mike Smallwood and an anxious islander, signifies how radio communication transcends physical isolation and sustains the 'community spirit' aspects of collective consciousness in the face of adversity.[186] This is followed by images of a woman fishing paired with a constructed naturalistic sonic landscape.[187] Still 'on air', the DJ receives a phone call and says "*Hello*". Unrealistic birdcalls and signal 'bleeps' are

[184]The imagery includes shots of peat cutting, fishing to promote tourism, and a hydroponics farm.
[185]During the invasion, FIBS broadcast news continually and took calls from anxious residents. Aware of the station's significance to the dispersed camp community, the Argentine forces asked FIBS to relay a reassuring message, which when played was garbled and largely incomprehensible. The station was eventually taken over 'live on air' (Eddy, *et al.* 1982). The *Invasion phone-In Show* recording was obtained from the tape archive passed to sound design by the filmmaker.
[186]Comparable significations are evident in sequences from *Listen to Britain* that feature radio broadcasts intended to galvanize wartime spirit.
[187]The sonic landscape is created using library sound effects. The original location recordings were considered unusable by Phase IV of sound design, given the significant distortion introduced by strong winds, indicated visually by the movement of river water.

synchronised to represent the caller's response. At this surrealistic synchretic juncture, the two sonic landscapes enter into an interactive structural relationship. As the DJ prepares to take the call, his link "*Carry on with a bit of music*" introduces the incongruous musical interlude 'L'Homme et une Femme'. This ironically romantic choice signifies by its contextual inappropriateness, the emotive influence of music on the interpretation of film narrative (Deutsch 2007b).[188]

This reverie is disturbed by the intrusive sounds of radio signal tones and speech fragments that represent the incoming call. The spectromorphologically similar chirps of unseen birds orchestrate an unrealistic response from within the diegesis. The music is stopped abruptly by the DJ, who informs the listeners that the call carries a message from the Argentine forces. The sonic landscape presents the garbled Argentine transmission as re-broadcast by FIBS (Eddy, *et al.* 1982). Sound design applied restorative signal processing in order to improve the audibility of a phrase that signifies a warning: "*...and for the purpose of avoiding bloodshed...*".

While the images of a hydroponics farm seem rather innocuous, the aforementioned warning montaged with shots of ripening tomatoes signifies islander vulnerability. The fadeout of the inaudible message signifies the invader's inability to penetrate the radio space of islander collective consciousness. Structured as a sonic metaphor, this signification remarks on the failure of Argentine propaganda to intimidate the islanders and win the battle of 'hearts and minds' (Eddy, *et al.* 1982).

7.2.6 'Death, Desolation, Emptiness' Section: 'Church Radio'

[DVD Ch.22 - 24:57]

The church sequence provided sound design an opportunity to engineer a diegetic fracture.[189] Analysis of the film revealed the intriguing behaviour of one female chorister (Plate 7B) who reaches down to make an unseen 'adjustment' gesture to the side of her (25:09).

[188]The re-figuration of radio music here draws attention to what Myer termed 'misuses' of nonfiction film diegesis. In this example, the misuse consists of deploying nondiegetic music to emotively influence narrative interpretation, which also occurs in *Song of Ceylon* (Myer 2009).
[189]See Table 7.1.2.

Plate 7B: 'Adjustment' Gesture

Sound design contrived to extend the film's radio theme by manufacturing synchresis between this mysterious gesture and a 'tuning-in' to a diegetically realistic sonic landscape. The effect was accomplished using a mix transition between an unrealistic *radio choir* and a realistic church sonic landscape. The sequence starts with a tuning squelch into the noisy radio choir signal emanating from an acousmatic radio source inside the diegesis.[190] The radio nature of the sonic landscape is reinforced by synchresis between the chorister's gesture and radio tuning sound-objects. The tuning gesture coincides with a cross-fade between the radio choir and church sonic landscapes. A volume increase is also engineered to emphasise the 'tuning in' illusion.

Later in the church sequence a noticeable loss of vocal sync engineers a minor diegetic fracture. Image quality issues prompted Myer to edit in several shots of the congregation singing another hymn, "Guide Me O My Great Redeemer", over the sound of "Fight the Good Fight". This audiovisual asynchrony actually serves the film's narrative by metaphorically signifying a congregation slightly out of step with the collectivising imperatives of religious messages (Myer 2009, p.160).

[190]The noisy signal was produced by radioizing the original location sounds.

7.2.7 'Death, Desolation, Emptiness' Section: 'Magnificent Men'
[DVD Ch.24 - TC 30:26]

This sequence explores the relationship between demonstrations of military power and the reinforcement of nationhood in collective consciousness (Myer 2009, p.160). The sonic landscape is largely realistic, but also surrealistic at selected points to support the montage chain of significations. The performance of *Those Magnificent Men in Their Flying Machines* is re-figured from unused footage and mixed with a marching sound-object to complete the illusory aural diegesis of a parade. The comedic qualities of the raucous brass arrangement are exploited to undermine the intended seriousness of the spectacle. This supported Myer's intention of signifying the irrelevance of the military showpiece as an ideological tool, one employed to reinforce a remote farming community's collective sense of 'Britishness' (Ibid.).

Displays of colonial territorialism are signified throughout the sequence. The sound of a London Cab draws attention to a 'British' cultural icon.[191] Following this, the spatiomorphological transit of loud aircraft sounds during the 'fly-past' emphasises the presence of war machinery. Later in the sequence, the unrealistic sound of 'spurs' during a troop inspection (32:02) signifies how uniforms affirm colonial authoritarianism.

The principal contribution of sound design is to the forming of a montage that combines images of a memorial salute, with a surrealistic sonic landscape that mixes the national anthem and re-figured lines from the Lord's Prayer. This sound design exploits the familiarity of the prayer and anthem texts by deconstructing their meanings to signify metaphorical reflections on the Falklands War. The montage chain of significations implies the forgiveness of Argentine 'trespassers', and acknowledges the quality of 'constancy' in collective consciousness that led to Britannia's victorious deliverance of the islanders from an 'evil' occupation.[192]

[191]The London Standard Cab is used by the governor as the official car on state occasions.
[192]Shots of the memorial show its inscriptions 'Constancy' and 'Victory', and a statue of Britannia.

This mawkish sentiment is crudely interrupted when the rousing musical crescendo of the national anthem is resolved by a comedic trombone slide and segue back into *Those Magnificent Men in Their Flying Machines*. This absurd musical transition metaphorically signifies the inherent hypocrisy of the colonial power, which acts as a protective motherland in times of crisis, but neglects its subjects in times of peace.[193] A diegetic fracture is also engineered by repeating the penultimate bar of music as it fades. The Boy Scout's curious expression suggests his 'awareness' of this diegetic fracture, which is underscored by the shrieking calls of acousmatised seabirds. This conclusion attempts a dual signification. The musical theme, which fades without resolution, signifies a cycle of nationalistic influence on the next generation, whereas the perceived proximity of the birdcalls signifies the boy's vulnerability to the threat of future sovereignty conflicts. The birdcall sound-objects also have a structural function in forming a sonic landscape transition to the next sequence.

7.2.8 'Death, Desolation, Emptiness' Section: 'The Birds'

[DVD Ch.25 - 32:17]

This sequence extends the signification of colonial territorialism with images of avian aggression and fights over food. A dialectical montage is formed with an unrealistic diegetic sonic landscape and a nondiegetic radio message. The complete signification suggests that political sentiments may often mask the truth of conflicts fought to secure the rights to resource exploitation.[194] At the end of the previous sequence, the bird sounds signify a threat of attack before a sonic landscape transformation articulates them in an unrealistic space. Echo and reverberation effects are applied to bird sound-objects to establish the spatial indicative field. Sound design was influenced by a similar use of effects in *The Birds* (1967) to intensify the sounds of flapping wings and birdcalls. In this sequence spatial effects emphasise the avian territorial aggression.

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[193]The themes of neglect and exploitation are not overtly explored in the film. Myer noted that public demonstrations of patriotism often masked private frustrations with government failures to sustain investment in development. The film alludes to this neglect obliquely, through a speech made by Sir Jack Hayward urging the community to be patient for "the prosperity that is surely coming to you".
[194]Eddy, *et al.* (1982) speculated that the war was fought partly to secure future rights to oil and gas reserves thought to exist in the region. This assertion appears to have been borne out. Recently, in the run-up to the 30th anniversary of the war, British exploration of these reserves in Falklands territorial waters has reignited the political debate over sovereignty.

The disquieting combination of the images and the *birds* sonic landscape is contrasted with Margaret Thatcher's softly spoken sentiments about "family and friends". The speech is re-figured from a rehearsal take for a Forces Radio Christmas message.[195] The performative nature of Thatcher's apparent sincerity is revealed by her mistakes, and signifies that political speech may mask political truths.[196] This and previous sequences indirectly examine the impact of the Falklands War on collective consciousness and identity. The film's climax builds on this chain of significations by reflecting on the conflict's turbulent history.

7.2.9 'Death, Desolation, Emptiness' Section: 'War Climax'

[DVD Ch.26 - TC 32:46]

The sound design for the climax consists of a single imaginary sonic landscape. In conceptual terms, it constitutes a symbolic representational space for reflections on the war's impacts on collective consciousness. Sound design imposes a reversed historical timeline on the imagery, looking back from a post-conflict period of remembrance to the governor's 'farewell' speech to the islanders.[197] The sonic landscape is unrealistic and compositionally combines abstract-aural discourse and mimetic discourse. Its structure comprises a formalised acoustic space in which re-figured radio sound-objects, dramatic sound effects, and synthetic atmospheres are articulated.

I) Remembrance

The sequence begins with overt signs of war remembrance. Over a slow pull-out from a memorial cross on Mt. Tumbledown, the sounds of a needle 'drop' and vinyl record noise precede the pipe-band piece *The Crags of Tumbledown.*[198] A record player is subsequently de-acousmatised and revealed as the diegetic source. This sequence

[195]This recording was included in the tape collection provided by Myer.
[196]The sequence raises the question of whether political rhetoric about the war and the sovereignty issue are entirely honest.
[197]The speech made by then Governor Rex Hunt was broadcast by FIBS following the surrender of the small British army detachment to Argentine forces. The governor was then flown out of the islands.
[198]Both the memorial and the music commemorate a key battle fought between the Scots Guards and the Argentine forces on Mt. Tumbledown.

constitutes a transition from 'pit' (nondiegetic) to 'screen' (diegetic) music (Chion 1994; Myer 2009).[199]

Over images of the record player, a synthetic drone sound-object forms a dissonant relationship with the music. The sonic landscape now evokes the sound-image of a radial telephone dialling the numbers 1 and 9.[200] The darkening of atmosphere marks a transition formed by synchronising the visual cut to the evoked sound-image of a 'switch throw'. This synchresis coincides with an abrupt termination of the music, to imply the act of switching off the record player. This signifies that the period of remembrance is now over.

II) Residues of Conflict

The historical timeline moves backwards towards a direct confrontation with the physical and psychosocial residues of armed conflict. The transition to images of aircraft wreckage is spanned by the sound-images of the numbers '1...9...8...2' being dialled. This metaphorically suggests 'calling up' this period of the conflict's history. The ringing tone results in a call that is answered by the voice of Margaret Thatcher, who was prime minister in 1982.[201]

The sonic landscape comprises two distinct parts. One is primarily atmospheric and supports the stark representation of the conflict's physical residues (plane wreckage). This part has complex internal textural motion arising from the combined spectromorphologies of sound-objects organised into atmospheric layers. The first layer is a dissonant drone with slow periodic undulating motion morphology. A second layer is a synthetic sound-object that mimetically references an air raid siren. Spectromorphological design and contextual recognition combine here to allow this sound to function as a symbolic echo of aerial battles. Another layer, composed of intermittent signal noise bursts, enriches the dissonant quality of the sonic landscape.

[199]An earlier sequence in the film that features accordion music similarly involves a de-acousmatisation of the source.
[200]Archetypal library sound effects were used here and throughout the sequence when there was a requirement to use a concrete sound-object to evoke a contextually recognisable sound-image.
[201]The phone call is also an oblique reference to one made by Governor Rex Hunt to Whitehall that informed the British Government that the Argentine invasion was under way. The fact that this happened underlined significant problems in communications and intelligence gathering at the start of the war (Eddy, *et al.* 1982).

Symbolically these sound-objects represent the final 'utterances' of stricken war machines, while structurally they anticipate the use of electronic signals to represent battle sounds in the *'Communication War'* sequence. To facilitate the build-up to this transition, the regularity and intensity of signal noise bursts are gradually increased. A final layer is based on a simple synthetic tone sequence designed to structurally bridge the atmospheric and voice parts of the sonic landscape.

The vocal part of the sonic landscape signifies the psychosocial residues of conflict, taking the form of a dramatic re-figuration of a speech made by Margaret Thatcher.[202] The structural arrangement overlaps several speech elements, and spatiomorphological separation was employed to facilitate comprehension.[203] The montage took advantage of Thatcher's penchant for potent imagery in order to focus on significations of the invasion, the British military campaign, and personal sacrifices. Table 7.2.9 summarises the structure of the chain of significations.

The montage uses repetition to reinforce significations of the island's remoteness ("*very long way away*") and the difficulties this engendered for the British military campaign ("*many difficult worrying days ... many difficult battles*"). The synchronised union of the word "*people*" spoken in two different excerpts signifies the joint sacrifices of the military and civilians. The last word of the montage, "*fighting*", is synchronised with a crescendo of signal noise to symbolically mark a transition to the *'Communications War'* sequence.

[202]The speech was made in Port Stanley shortly after the war and broadcast live by FIBS. The recording was included in the tapes archive provided by the filmmaker.
[203]This strategy is similar in its effect to the way in which psychology experiments use binaural presentation to facilitate the comprehension of simultaneous speech (Cherry 1953).

<table>
<tr><th colspan="2">Re-figured Speech</th><th>Signification</th></tr>
<tr><td colspan="2">(1) You know what happened...</td><td>(1) Memory is selectively reinforced in the retelling of events.</td></tr>
<tr><td colspan="2">(2) A silent armada...
(3) ...very long way away...</td><td>The British Task Force (2) travelled a great distance from the UK to reach the remote colony (3).</td></tr>
<tr><td>(4) ...put ashore ... a hostile enemy coast...</td><td>(5) ...many difficult worrying days to follow...</td><td>(4) The landing of the Task Force on occupied territory

(5) Uncertainty about the progress of the military campaign in the UK</td></tr>
<tr><td>(6) ...very long way away...</td><td>(7) ...many difficult battles to fight...</td><td>(6) Re-emphasis of the remoteness of the colony and the conflict

(7) Connection between remoteness and the difficulties of conducting the military campaign</td></tr>
<tr><td>(8) History ... is something which happens to other...</td><td>(9) ...always the young</td><td>(8–10) Reference to the islanders' unexpected position at the centre of the making of history

(9–10/11) The "young people" are implied to be military personnel.</td></tr>
<tr><td colspan="2">(10) ...people</td><td rowspan="2">(10–11) Special emphasis on the word "people" to signify the joint sacrifice of the islanders and military personnel during the conflict</td></tr>
<tr><td colspan="2">(11) ...who have to bear the brunt of the fighting</td></tr>
</table>

Table 7.2.9: Significations within the montage of Margaret Thatcher's re-figured speech

III) Communications War

During requirements discussions, Myer was somewhat embarrassed by his low-tech visual depiction of battle using the stroboscopic illumination of abandoned artillery guns. Myer advanced no requirements for this sequence, so sound design was permitted to develop a concept that would convey the dynamic impact of battle with appropriate significations. The sonic landscape concept dispensed with the notion of evoking battle realism in favour of a symbolic 'communications war' between the two

sides. The conflict is therefore one of ideology and propaganda, with both sides using the radio medium as a weapon of influence on collective consciousness. This builds on themes developed by previous sequences. In *'Prelude to Invasion'*, the media offers its supposedly impartial perspective on a breakdown in diplomacy. *'The Invasion Show'* illustrates the failure of propaganda to penetrate the radio space of collective consciousness. This is later contrasted by re-figurations of Margaret Thatcher's speeches, which suggests how the communications war for 'hearts and minds' can be fought and won over the airwaves.

The communications war concept was also influenced by a number of facts about the conflict. Following the occupation, radio communications and FIBS broadcasts were subject to Argentine restrictions, leading to a sense of isolation for many islanders. Furthermore, overstretched lines of communication with the Task Force undermined Whitehall's operational control of the military campaign. Finally, the significant losses sustained by both sides placed both countries' media at the centre of a communications war focused on bolstering public support in their respective homelands (Eddy, *et al.* 1982).

In the communication war 'battle', telecommunications equipment and signals are the symbolic substitutions for weapons and ammunition. The sonic landscape mixes sound-objects associated with a broad category of devices, including mobile phones, modems, and fax machines. In loose synchrony with the strobe's periodicity, a cacophonous arrangement of telecommunications sound-objects creates a mimetic spectromorphological reference to the rapid attack impulses of automatic-weapons fire. Also, the images of weaponry enable the contextual association of communication signals with battle sounds. Within the sonic landscape, intersonic relationships are designed to evoke a sense of conflict and reciprocal exchange. This discordant, chaotic sonic landscape impression of battle is completed with bursts of signal noise to imply explosions, while garbled speech sound-objects recorded from SW radio suggest battle commands.

The communications war has no clear sides or outcome. However, an image of a radar screen, paired with the re-figured broadcast of the Argentine takeover of FIBS,

signifies the imminent suppression of islander collective consciousness. Apart from the word "*Argentines*" and the phrase "*We have everything recorded on two tapes*", these transmissions are garbled by a spectromorphological transformation. This takes the form of a filter cut-off frequency modulation synchronised to the rotational periodicity of the radar sweeps. Broadband signal noise was also mixed and similarly filtered to create the illusion that the radar device is acting as a sound receiver.

IV) Governor's Farewell and End Credits

The film concludes by reflecting on the transfer of colonial authority. This is represented by a re-figured FIBS broadcast of the governor's 'farewell', including its introduction by an embittered announcer. According to Myer, the final shot prior to the end credits is suggestive of 'papal smoke', the traditional signal given by the Vatican when a new Pontiff is selected. The montage signifies the transfer of authoritarian power, or as Myer put it, "[...] the King is dead, Long Live the King" (Myer 2007, *Phase II Review*). This sequence asks the question of what happens to collective consciousness during such transitions. The suggestion is that collective consciousness defines itself partly in terms of its relationship to authority, either in terms of conformity or of resistance (Myer 2009).

The additional radio sound design that frames the governor's speech complements the nostalgic sentiments of his message. Moreover, it concludes the film's narrative discourse with a re-assertion of the significance of radio as a metaphorical space for collective consciousness. The sonic landscape design introduces several 'interference signals' that have confluent and interactive structural relationships with the speech broadcast. These sound-objects were recorded from a multi-band AM radio receiver.[204] One signal, a music broadcast, provides an ethereal emotional underscore to the speech. The considerable spectromorphological motions within this radio sound-object produce a shimmering tremolo effect that disguises the music's semantic content.[205] A secondary layer of abstract signal sound-objects was used to complete

[204]The Eton R5 receiver in combination with a dipole aerial was used to pick up world radio signals across a wide frequency range (e.g., SW/MW/LW).
[205]The signal was broadcast by a French radio station. It was received on the SSB (single side band) channel of the radio receiver with significant modulations.

the radio sonic landscape. This includes Theremin-like radio tones that are articulated as a solo voice accompaniment in harmony with the musical signal.[206]

Following the conclusion of the governor's speech, the radio announcer has the last word, ending the transmission with the phrase "*and now its a little bit more music*". At this point, a signal squelch sound-object evokes the sound-image of a radio tuning gesture. This signifies a 'tuning out' of diegesis, mirroring the sonically similar 'tuning in' that began the film.

7.3 Critical Reflection

The sound design project for *Song of the Falklands* required a deep engagement with the filmmaker's subject matter and conceptual framework. The project's academic research context enabled the author to acquire valuable practical knowledge of the sonic arts interdisciplinary conceptual framework. With both sides of the collaboration pursuing separate practice-research agendas, the project was creatively challenging and open to experimental approaches.

7.3.1 Conceptual Collisions Leading to a Synthesis of Ideas

The filmmaker's idiosyncratic collaboration with sound design can be retrospectively viewed as an 'action and reaction' strategy for achieving a shared soundtrack vision.[207] At the beginning of the project, Myer gave only general guidance for sound design. His opinion was that an interesting synthesis of interpretations could arise from sound design's research into the film's conceptual framework and social themes. Myer's approach therefore extended dialectical process into the collaboration's ideological domain. During dubbing sessions, Myer appeared to revel in the heated debates that often arose when a sound design interpretation of a sequence collided forcefully with his own. In essence, Myer trusted the practical outcomes of

[206]The pitch modulation and vibrato effect is created by adjusting the 'fine tune' control of the radio once a distinct tone has been isolated.
[207]See Sider (2003).

compromise (synthesis) driven by a mutual need to surmount ideological differences over the structure and function of the soundtrack.

Reflecting critically on the action and reaction approach suggests that time was a key factor in enabling a synthesis of ideas to coalesce into a shared vision for sound design. This time-consuming collaboration strategy was not entirely successful, as both parties were forced to accept compromises in conflict with their personal visions:

> There are some things which I wouldn't have done, and you did them. But there was never enough time and energy to make that point and that would have to be a complete wholesale commitment in both ways.
> (Myer 2008, *Project Review Interview*)

These comments allude to the practical realities of the dialectical process within 'action and reaction' approaches to sound design collaborations. The resolution of creative conflicts requires "wholesale commitment" to achieving acceptable compromises. Compromising becomes difficult if one or both collaborators remain more committed to preserving the integrity of their own ideas. On balance, a synthesis of creative ideas did yield several powerful sound design statements in the film. However, this pattern of collaborative exchange incurred a time cost on the project and occasionally created tension in the professional relationship.

7.3.2 Sound Design and the Filmmaker's Conceptual Framework

Sound design's research identified key requirements to extend a chain of significations that examine the representation of collective consciousness in nonfiction film diegesis (Myer 2009). Inter-modal compositional strategies explored this in different ways. The primary strategy involved engineering concept significations from the resolution of dialectical (intellectual) montage. For instance, in *'Prelude to Invasion'* and *'The Invasion Show'*, nondiegetic radio sonic landscapes form a meaningful counterpoint to the imagery.

Another strategy involved letting 'the ear lead the eye'. In *'Sheep to Sweater'* and *'War Climax'*, the sonic landscape dominates the image and foregrounds its metaphorical discourse to steer sequence interpretations. One consequence of pursuing these strategies was the creation of additional narrative subtexts. During the project Myer did not voice any concerns about this. He was later questioned on the issue, as his application of montage had avoided 'linear' narrative construction (Myer 2009):

> Yes, I was aware of what you were doing, and yes, I was happy for you to carry on making narratives that I wouldn't have done.... I was conscious of the fact that I was giving you freedom. At first you took it ... rather than me giving it to you, but after I realised what you were doing, then I came to terms with it. (Myer 2008, *Post Project Interview*)

This reference to a non-intervention strategy reinforces the notion that Myer intended to engineer a synthesis of ideas. In fact, dialectical collision characterises the structural tendencies of the sound designer and filmmaker, who worked towards and against narrative, respectively. On reflection, Myer's acceptance of sound design's narratives appears to be based on two conditions. The first was that the collision of structural approaches (narrative vs. non-narrative) works in coherence with the ethos of intellectual (dialectical) montage. The second condition was that sound design's narratives contribute to appropriate concept significations that support his inquiry into the representational nature of collective consciousness in nonfiction film. Concordantly, Myer concluded:

> The whole point of what you call counterpoint, what I would call a dialectical montage on sound and image, and image and image and things within the shot ... they stand on their own as mini intellectual montage precepts, and together they form a whole concept of the film. (Myer 2008, *Phase IV Dubbing Session*)

In the latter phases of post-production, Myer's requirements for sound design to engineer diegetic fracture became a contentious issue. To comply with his request, several 'external logic' sound design strategies were applied.[208] During Phase III,

[208]See Table 7.2.1.

Myer maintained that diegetic fracture had not gone far enough in the film. He subsequently sought opportunities to remedy this deficit by deconstructing the sound design.[209] This fuelled robust disagreements as the author sought to preserve the conceptual integrity of sonic landscape designs. For example, Myer insisted on an over-articulation of modulation and spatial effects within the *history radio* sonic landscape. This effectively destroyed the impression of an imaginary radio source for docudrama sounds. Myer's attempt to fracture diegesis in this way was a disaster, and he was instructed by his examiners to remix the 'History' section as the docudrama had become unintelligible in parts.

Where sound design did engineer diegetic fractures, Myer was genuinely appreciative as this directly revealed the illusion of realism in nonfiction film diegesis. One of the more unusual instances occurs when the chorister appears to 'tune in' the sound of diegesis.[210]

> Thank you for raising the volume inside the church; my god, this is someone inside diegesis saying, 'Hello, I am your diegesis!'. (Myer 2008, *Phase IV Dubbing Session*)

In contrast to the approach taken by Myer, sound design's general strategy was to engineer momentary fractures of diegesis that subverted impressions of realism. This includes a forced synchresis between the sound of a horse's exhalation and a turning gesture made by a woman in a bar (21:17). In this case, a diegetic fracture appears to function well when it coincides with a transition to a new sequence. For Myer, the strategies pursued in Table 7.2.1 were too subtle. Sound design defended its interpretation on the basis that an over-determination of external logic obliterates the impression of diegetic realism, rather than subverting it so that it may be signified as an illusion.

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[209]Myer was driven by a concern that *Song of the Falklands* did not adequately reflect his conceptual framework. Mindful that his examiners might uncover this and that is was too late to re-edit the film, he turned to look at how the sound design could be subverted to engineer diegetic fracture.
[210]See section 7.2.6.

7.3.3 Radio Sonic Landscapes

The studio production of radio sound aesthetics proved to be a considerable technical challenge that yielded valuable practical knowledge of sonic landscape and spectromorphology as aspects of the inter-modal compositional strategy. This included applications of reduced listening and spectromorphological analysis to AM radio sound, which in turn generated design criteria for radio sound-objects and sonic landscapes.[211] This process subsequently extended conceptual knowledge of sonic landscape composition by prompting the development of formulaic representation to describe the 'nested' structure of complex sonic landscape designs (see appendix 1.3). Moreover, the development of the 'radioizing' production process also advanced practical knowledge of Murch's worldizing approach.

In Phase IV, practical necessity forced the conclusion of sound design experiments aimed at refining the radioizing process. By this stage, practical knowledge had evolved a mixing approach that combined six radioized track stems to create a dynamic radio sonic landscape for the film's 'History' section (see appendix 1.3). It was discovered that articulating variations in the mix balance of these radioized tracks could yield different strengths of radio sound quality, ranging from relatively clean signals to signals heavily saturated by effects (e.g., noise, distortion, modulation). During the Phase IV dubbing session, this strategy gave the filmmaker an opportunity to direct the sound designer's fine control over the radio sound aesthetic.

For the film's 'History' section, this attention to sonic detailing was entirely necessary to establish radio as a metaphorical-representational space for collective consciousness; a theme that Myer acknowledged was meaningfully extended by sound design in other sequences:

[211] See appendix 1.2.

> I think that was the most important decision that you took, and I agreed with it because that was the most synchronous kind of space between us when you came up with that idea that radio on the sound should be as important, in a sense subliminally, as it is in the image. (Myer 2008, *Post Project Interview*)

In the 'History' section, radio is conceived as a receiver of historical echoes that reveal past collective consciousness. Other radio sonic landscapes represent a more recent 'received' history of collective consciousness as shaped by the events of the Falklands War. These radio histories establish continuity with the film's representation of radio as being at the heart of community life – or a 'present' collective consciousness. Myer remarked on how the film uses radio to bring together these different histories:

> No matter how fractured these histories are, they finally come together in this soundtrack. Someone is trying to bring together these disparate sounds by mechanism, which becomes the radio play; it's a dialectical process. (Myer 2007, *Phase II Project Review*)

In summary, the success of the radio sound concept as viewed by the filmmaker, can be reflected upon as an effective demonstration of the sonic arts approach to sound design. Moreover, the development of the radio sound concept is closely tied to the inter-modal compositional strategy that integrated applications of sonic landscape, indicative fields and spectromorphology.

7.3.4 Project Management and Professional Relationships

In general, Myer's expectations for soundtrack post-production were firmly rooted in his experiences of working alongside television dubbing mixers. Therefore, he did not initially appreciate the extended functions of sound design, nor its potential to make a strong storytelling contribution. However, Myer welcomed the opportunity to try a different approach that would offload creative responsibilities for soundtrack development.

A respectful and collegial professional relationship persisted for most of the project. This occasionally faltered when Myer was confronted with a sobering appraisal of his expectations for sound design. The professional relationship would then assume a greater formality, with Myer reverting to an assertive 'client-service provider' pattern of dominance. Most issues stemmed from Myer's ad-hoc, cavalier approach to project management, which resulted in unrealistic deadlines for sound design. This reflected a project work pattern characterised by intense periods of collaboration interspersed with lengthy breaks where contact was minimal.[212] Inevitably, overlapping project commitments compounded the scheduling problems for sound design.

These aspects of the project experience did offer lessons for professional development. One key piece of practical knowledge acquired is the importance of exercising caution when setting expectations with the client about the post-production schedule. For instance, in contexts where the client fails to commit to a schedule, or is prone to changing it, the sound designer is faced with the considerable challenge of evaluating the feasibility of deadlines. Also, on *Song of the Falklands,* the qualities of the collaboration and the professional relationship were susceptible to change. This suggests that the sound designer must remain vigilant towards newly emergent client attitudes and adapt accordingly. It should also be noted that acquiescing to an unrealistic client demand sets a dangerous precedent and may not serve the post-production project as a whole. Where possible, it is better to attempt to address the issues that underlie any scheduling problems and offer assistance. Caution is advisable in this, as clients may feel that their working approach is under critical scrutiny.

In summary, practical knowledge acquired on *Song of the Falklands* highlights the need for sound designers to identify and remain sensitive towards contextual and inter-personal factors that may derail productive collaborations. In this case, sound design was also accorded considerable creative freedom by the filmmaker, but the significant investment of time and patience required to see the project through implies that such open opportunities can be something of a double-edged sword.

[212]This was partly attributable to the fact that Myer was writing his doctoral thesis and still taking commercial work while trying to finish *Song of the Falklands.*

Chapter 8

The Immortal

This case study documents *The Immortal* sound design project. Produced and directed by Ewan Jones-Morris,[213] the film is an adaptation of Jorge Luis Borges's existential parable (Borges 1949). The film dramatises the fictional reminiscences of a Roman Tribune, Marcus Flaminus Rufus, who embarks on quest to seek the fabled 'City of the Immortals' and its adjoining river that grants eternal life.

8.1 Contextualisation

The filmmaker described the *The Immortal* as a nostalgic homage to the aesthetics of silent cinema: a work that is "[...] technically sophisticated, uses modern digital techniques, and looks like old film" (Jones-Morris 2007, *Phase I Handover*). Digital effects, including vignette and sepia colouration, are applied to the film's integration of live action footage, back projections, and animations, in order to evoke the image qualities associated with the silent-film era.

8.1.1 The Post-Production Project

Sound design commenced on January 14th 2007 with a meeting to discuss the project's requirements and schedule. The filmmaker proposed a two-phased approach to post-production, with the first phase scheduled around his MA submission. A second phase

[213] *The Immortal* was Jones-Morris's final project for his MA in Film at IFSW (International Film School Wales, University of Wales, Newport).

was to focus on preparing a shorter version of the film for festivals. Jones-Morris offered sound design a free hand to interpret soundtrack requirements. He provided a script, a 'working' edit, and a copy of Borges's story. An analysis of sound design requirements was subsequently prepared and emailed to Jones-Morris for his approval. This was accepted with the addition of one request that a dramatic orchestral theme should bookend the story—a stylistic trait he associated with classical cinema. At this stage, several animation sequences were in development, and a studio session to record the narration had yet to be arranged. However, the project estimates indicated a sufficient lead-time for the completion of sound design requirements following a handover of the final edit. In the meantime, sound design pressed ahead with conceptual development and preparatory work on sonic landscape arrangements.

Unfortunately, Jones-Morris encountered problems in booking the voice-over actor and studio for the narration recording.[214] In an email on the 27th of February, he highlighted the impacts of the resultant delay on his editing process:

> One troubled thought, I can't finish a final edit until I have the narration.... [W]e'll have to eat into audio time as I re-edit according to dialogue. (Jones-Morris, *Email Communiqué*)[215]

Jones-Morris's prediction of a time reduction for sound design was borne out by subsequent events. The narration recording was eventually re-arranged for March 15th. This was promptly followed by an exchange of narration audio files edited by the author. A completed film edit was finally handed over on March 21st. Jones-Morris also set the date of March 27th for the completion of Phase I sound design, a significant reduction on his previous estimate of a three-week turnaround.[216]

[214]The voice-over actor (Peter Birmingham) had been recovering from a bout of illness and had cancelled several bookings in succession. This made it increasingly difficult for Jones-Morris to find alternative dates when the actor and studio (Loft Studios, Cardiff) were available.
[215]Previously, Jones-Morris had provided sound design with a working edit of the film that included his own guide track narration. The project plan did account for a re-editing period to integrate the produced narration. However, there was no contingency in the schedule for booking delays.
[216]Jones-Morris's reason for this change was that he had misinterpreted his thesis submission date as the date for the film's submission. In fact, it was required that the film media be submitted several weeks before the thesis.

In response to these changes, a pragmatic approach was taken to the completion of key sound design requirements. This focused on producing a soundtrack inclusive of narration, atmospheric backgrounds and action sound effects. Other requirements for animation sound design and music composition took a lower priority and were only partially completed. The resulting soundtrack was highly 'vococentric' (Chion 2009a).[217] This solution was acceptable to Jones-Morris, who expressed his appreciation of the work carried out in the timeframe. Both parties also renewed their commitment to collaborating on fully realising the sound design in a second phase of post-production.

On April 12th the author attended a screening that revealed technical issues with the soundtrack attributable to the mixing of an additional layer of music and sound effects.[218] Jones-Morris was later contacted to organise the Phase II schedule, but his ongoing commitments to commercial projects effectively shelved plans to resume collaborative work. With Jones-Morris's permission, the author elected to independently complete the film's sound design as a practice-research project.[219] This decision was based on an assessment that the film's experimental qualities and narrative themes represented an inviting creative opportunity to explore applications of the conceptual framework.

The development of the sound design for *The Immortal* extended beyond the initial phase of practice-research (January 2007–September 2008). This allowed practical knowledge acquired on the film projects completed during that period to inform inter-modal compositional strategies for *The Immortal*. The project also benefited from field recordings made in India (August–September 2007), and in Japan on several trips (July 2008–August 2009). Many of these field recordings were used as source material for sound design. When work on the film fully resumed in November 2009,

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[217]Meaning that the sound design was structured almost entirely around the narrator's voice, with very minimalistic sonic landscapes.

[218]The screening of IFSW graduate films took place at Chapter Arts Centre in Cardiff. Jones-Morris explained that after the sound design handover, he had made several editing adjustments, and had also elected to 'fill out' the soundtrack by adding some music and sound effects produced in conjunction with a friend (Chris Benyon is credited). A failure to sufficiently balance these new elements in the soundtrack remix introduced some distortion on playback in the theatre.

[219]Jones-Morris provided the author with a final cut of the film. It should be noted that this version of the film retains the credit of 'additional sound effects and music'. The credit should be ignored, as only the author's work features in the soundtrack of the film provided on DVD.

the soundtrack was comprehensively re-developed from the Phase I version. The project was finally completed in May 2010.

8.1.2 Sound Design Conceptual Development

The Immortal is a mythologised cautionary tale signifying the ontological paradox of immortality as an aspiration of mankind. The film's narrative compresses and extends time in its chapterisation of Rufus's quest. This structural metaphor continually illustrates the passage of time and its varying significance. Jones-Morris's script dispenses with the geographical locations of Borges's story to remove historical references. Instead, the representation of culturally ambiguous locations (e.g., desert, wastelands) facilitates a reading of the story as myth. In keeping with this strategy, sound design supports Rufus's reference to "*many lands unfamiliar to me*",[220] by using sounds with Asian cultural associations to signify a generic exoticism in sonic landscape impressions.

The film is structured around a narration script that preserves Borges's chronology of Rufus's quest. To emphasise the temporal dislocation between Rufus's oral reminiscences and the film's imagery, the author suggested to Jones-Morris that an older actor be cast as the narrator. In the film, the gravitas of the narrator's aged vocal sonority reflects Borges's literary characterisation of Rufus's 'timeworn' voice.

I) The Sourcing of 'Exotic' and 'Spiritual' Sonic Materials

The sound design of imaginary sonic landscapes for the quest's exotic locations involved re-contextualising cultural significations associated with concrete sounds. This can be viewed as an application of musique concrète principals.[221] As a precursory step, the author sourced sonic materials with extrinsic associations to

[220]Borges notes that Rufus's quest begins in Thebes (Luxor), the ancient capital of the Egyptian Middle Kingdom. From there, the quest moves westwards across North Africa to a region near Garamantas in Libya where Rufus encounters the Troglodytes. Borges's story draws on Homer for inspiration, with Rufus's arduous quest evoking parallels to Odysseus's fateful return from Troy. Borges may have also derived elements of his story from Plutarch, who refers to an expedition made by Alexander the Great into the Egyptian desert to search for a legendary eternal spring.
[221]See section 2.1.2,

exotic cultures. To this end, field recordings made in India and Japan were combined with library sound effects to create a repository of musical sounds, ambient sounds and sounds associated with religious practices. This latter category of sounds was to be used to signify spirituality and altered states of consciousness in connection with the film's immortality theme.

Wishart (1994; 1996) contends that any type of sound (e.g., musical vs. non-musical, concrete vs. synthetic) may be the starting point for sonic arts composition. Moreover, within electroacoustic music the compositional 'syntax' of a work may be 'abstracted' from concrete sounds (Emmerson 1986).[222] Both these ideas influenced how concrete sounds associated with spiritual practices were compositionally re-contextualised and structured in sonic landscapes. For example, in the sequences *'Time Passes'* and *'The Troglodytes'*, the rhythms of Buddhist chant sound-objects form an 'abstracted' structural syntax for sonic landscape design. This constitutes the starting point of a 'bottom-up' intersonic compositional strategy. In contrast, *'Rock Dreams'*, along with other animation sequences, employ a 'top-down' audiovisual compositional strategy. In these cases, the structural syntax for sonic landscape design is abstracted from an analysis of the image.

II) The Sonic Landscape of the Cartesian Theatre

The narrator Rufus speaks with his 'inner voice' or *I-voice* (Chion 1999), which possesses an evocative *iconogenic force*, being "[...] a voice that seems to conjure up the images that then 'illustrate' ... the words spoken" (Chion 2009a, p.478). Rufus's I-voice expresses its iconogenic force through recollections and gives an audiovisual form to his memories and imaginings.

Throughout *The Immortal*, the visual aesthetics of silent film highlight the presence of the screen and a projection source. The blackened space outside the vignette implies the borders of diegetic space. Sound design conceived of this void as Rufus's

[222]Jonathan Harvey's *Mortuos Plango, Vivos Voco* (1980) represents an example of what Emmerson (1986) refers to as abstracted music syntax. In this work, the pitch structure of the composition is abstracted from an analysis of the partials of a bell.
(http://www.bbc.co.uk/radio3/cutandsplice/mortuos.shtml)

consciousness, an imaginary diegetic representational space that is the 'place' of the I-voice and its iconogenic mental projections. This concept interprets the qualities of the image as indices to an imperfect reconstruction of timeworn memories. Moreover, Rufus's I-voice evokes memories and imaginings that are 'projected' onto his 'mental screen' in consciousness. These ideas align with the concept in consciousness research of the *Cartesian theatre*: a metaphor for a central place of mind where consciousness gathers the totality of our feelings, imaginings, and perceptions, giving a sense of a situated 'I' (Dennett 1991; Blackmore 2003).

The Cartesian theatre metaphor had a conceptual resonance for sound design because the film portrays different states of consciousness (i.e., dreaming, delirium) as well as Rufus's transformation from mortal to immortal consciousness. Sound design subsequently developed the concept of the Cartesian theatre sonic landscape. This diegetic sonic landscape is unrealistic and represents consciousness as the imaginary source of the I-voice and of all sounds associated with memories and imaginings. The Cartesian theatre space is infinite and featureless, and consequently has no defined acoustic character. However, Chion (1999, p.5) notes that the voice in film dominates the perceptual hierarchy and structures the acoustic space around itself. Therefore, the locus of the Cartesian theatre sonic landscape is the realistic sound of Rufus's I-voice. Other realistic sounds are associated with imagery representing Rufus's direct memories of events, while unrealistic sounds signify Rufus's unspoken thoughts and emotions evoked by these memories. Unrealistic sounds are also associated with animations that represent the products of Rufus's imagination, as well as altered states of consciousness not founded on memory (i.e., dreams).

Within the sonic landscape, unrealistic atmospheric sounds often carry significations that reference the environment and feelings associated with Rufus's experience. These sounds also tend to cross the diegetic–nondiegetic border into a second sonic landscape reserved primarily for musical underscore. The perception of two distinct sonic landscapes (diegetic, nondiegetic) is not consistent throughout the film. Where possible, sound design favoured the amalgamation of realistic and unrealistic sounds into a single diegetic sonic landscape impression representing the aural dimension of the Cartesian theatre.

III) Animation Sound Design

A key sound design requirement was the development of a meaningful audiovisual concomitance for the film's animation sequences. The process of designing animation sound-objects began with visual analysis. Deutsch (2008, pp.101–102) notes that for abstract animation sound design, a "synchronous attachment" of visual and sonic gestures is required to establish mutual 'roots' in diegesis. In *The Immortal*, abstract animations do not suggest causal associations with realistic sound sources. Animation analysis therefore focused on abstracting perceived visual gestures, motions and other qualities, such as material texture. The perceived structural relationships between animation elements were also analysed.

These visual indicative fields were subsequently translated into spectromorphological criteria for animation sound-object designs and structural relationships within the sonic landscape. This took into account how audio-visiogenic effects can be engineered to render impressions of causal association and temporal phrasing (Chion 2009a). In practice, the process of refining animation audio-visiogenic effects to render a perceived audiovisual concomitance was iterative. In *The Immortal*, the majority of animation audio-visiogenic effects are temporal and focused on achieving a perceived synchrony of motion morphologies between visual and sonic gestures (Deutsch 2008). This also reflects the fact that many of the abstract animations are quite simple and not suggestive of multiple indicative fields.

8.2 Commentary

The commentary is structured according to sequences that sound design identified and worked on separately. The order of sequence presentation follows the film's timeline.

8.2.1 Sequence: 'Opening Credits'

[DVD Ch.1 - 00:00]

The opening sequence combines cinematic functions (e.g., credits, titles) with the narrator's prologue, which establishes the story's philosophical themes. The sound design balances three main requirements and elements. Firstly, Rufus's I-voice is signified as the iconogenic force behind subsequent representations of his recollections. Secondly, a classical orchestral theme is introduced to establish a saturnine atmosphere and evoke the story's epic, mythological quality. A third abstract component comprises sound-objects in synchronous audiovisual relationships with animations.

The film begins with a wind noise that references images of the desolate rocky wastelands. Throughout the film, wind represents the fundamental noise of consciousness, signifying the psychological desolation of Rufus's immortal existence. This is an application of Chion's concept of *fundamental noise,* which is a "[...] continuous and undifferentiated sound into which symbolically all the other sounds of the film can fall or dissolve" (Chion 2009a, p.478). Wind noise also functions structurally as an *establishing sound* that sets "[...] the general character of the surroundings" (Altman 1992, p.250). The use of wind noise as a fundamental establishing sound for the sonic landscape is evident in the transition to the *'Deserts'* sequence.

I) Orchestral Theme

The theme was influenced by James Bernard's macabre opening score for *The Devil Rides Out* (1968). A powerful horn section states the motif while a string section extends the harmony and provides melodic movement across the registers. Percussion (i.e., ride cymbal, gongs) is used as a dramatic punctuation to engineer tension and release. These timbres also add a dissonant, noisy coloration to the arrangement's harmony.

II) Animations

The sound design of audio-visiogenic effects focused on bonding visual and sonic 'gestures' by engineering synchronous temporal phrasing. Minimal animation sound is rendered to reduce the potential for attentional conflicts to arise from structural relationships with narration and music.

Plate 8A
Helix Development

Plate 8B
Black-Hole Dilations

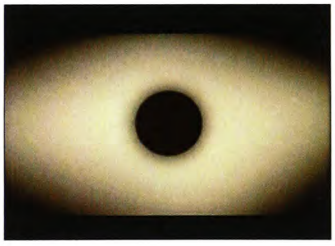

Plate 8C
Rotating 'Cogs' Dilation

Figure 8.2: Visual Morphologies in the 'Opening Titles' Animations

The animation begins with the development of a helix whose expansion is synchronised to four strikes on a Japanese wood block (Plate 8A). The hollow quality of this sound-object is subtly modified by reverb to emphasise the helix's lack of solidity. A series of black-hole dilations are synchronised to spectromorphologically-transformed cymbal and gong sounds (Plate 8B). This establishes a degree of spectro-typological and structural consistency with the use of metallic percussion in the orchestral theme. This choice of noise spectrums also reflects the material indicative

field of the featureless black hole, which suggests a complementary sound-object of high spectral density.

The spectromorphological design of dilation motions applied reversed morphological models to filtered cymbals, which produced sound-objects with noisy attack phases that build to nodal spectrums at their transient points. This spectromorphological motion was designed to align gesturally with the dilation motion of a black hole. The final dilation in the sequence triggers a sustained crash that signifies the black hole as a metaphor for a psychological void.

The watch face is a symbolic reference to immortality and the passage of time (Plate 8C). A realistic 'ticking' sound-object implies a clock mechanism suggested by three rotating cogs. A series of cog expansions from the watch face is synchronised to the reversed morphological models of filtered cymbal sound-objects. Sound design experiments aimed at rendering spectromorphologies synchronised to cog rotations were abandoned, because this conflicted structurally with the resolution of the orchestral theme.

8.2.2 Sequence: 'Deserts'

[DVD Ch.2 - 01:38]

Rufus's narration reflects on an arduous journey across the desert. Two distinct sonic landscapes are perceived, respectively corresponding to the diegetic 'Cartesian theatre' and to nondiegetic music. The music emotively underscores Rufus's loneliness while its cultural associations signify an exotic location.[223]

The music's instrumentation incorporates a *sarangi* and a *santoor*.[224] The santoor establishes the piece's harmonic foundation and fractured sense of rhythm, while the

[223]The music was produced in New Delhi, India (September 2007). Both artists were briefed by the author and shown sequences from the film. The performances were improvised and later edited for use in this and *'The Storm'* sequences.

[224]The sarangi is a short-necked bowed string instrument. The santoor is an Indian variation on a hammered dulcimer.

sarangi improvises an expressive melody over this accompaniment.[225] During the piece, the sound design reinforces images of an oppressive desert sun and Rufus's words "*the fervency of the day was unbearable*", by engineering a dissonant harmonic relationship between a synthetic tone and a tense crescendo on the sarangi (02:43).

Atmospheric sounds in the form of vocal drone sound-objects transcend the diegetic–nondiegetic border. Throughout the film, sonic landscape designs employ drones to define ambience and establish the character of a background texture (Hanssen 2009, p.129). The overlapping vocal drones are articulated in a large reverberant space and possess extended graduated-continuant morphological models that evoke perceptions of undulating motion. These qualities reinforce environmental impressions of desert topography and space. However, the primary symbolism attached to these meditative sounds signifies the spiritual aspects of Rufus's quest for immortality.[226]

The fundamental wind noise and minimal action sounds represent Rufus's memory of his physical exertions. The sound of a water bottle signifies Rufus's fragile mortality and highlights the life-preserving qualities of water. This latter signification is developed in later sequences that feature sources of water (i.e. the river, the storm).

8.2.3 Sequence: 'The Garden'

[DVD Ch.3 - 02:58]

Rufus's encounter with a stranger establishes the origins of his quest to seek the 'City of Immortals'. The dreamlike imagery of the garden suggests that his partial memories are supplemented by an imaginative re-construction of events. The imaginary garden sonic landscape reflects these unrealistic qualities.

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[225]In ethnomusicological terms, the composition has a distinctly Indian flavour. However, the timbral similarities of the sarangi and santoor to other instruments across North Africa and the Middle East allow the film's ambiguous cultural context to suggest a generic exotic origin for the music, one that evokes the lands traversed by Rufus.

[226]These sounds were recorded in the Matrimandir Temple in Auroville, India (September 2007). The temple structure is geodesic and highly reverberant as an acoustic space. The performer was adept at sustaining long vocalizations that produced harmonic overtone resonances in the acoustic space. Throughout India, such performances are common and have a spiritual and meditative quality.

Animated plant life grows to engulf the frame, and the sound of crushed leaves marks a transition to the garden. The garden's sonic realism is over-determined, implying an imaginative focus on its organic vitality in contrast to the barrenness of the desert. Rufus's mortal existence is circumscribed by time, so when he looks at his watch, a distinct ticking is heard. Several layers of ambient sound signify atmospheric qualities that reflect Rufus's feelings about the encounter. These include the resonances of a Tibetan singing bowl processed using granular synthesis, and several synthetic pads, which provide injections of tonal contrast. The atmospheric texture is completed by vocal drone sound-objects that signify the men's mortal souls.

Complementary spectromorphologies and confluent structural relationships allow these ambient layers to be perceived as one atmospheric texture. Controlled variations in structural balance render impressions of interior textural motion that emotionally underscore the encounter. For instance, when the stranger approaches, the singing bowl and vocal drone layers of the texture are foregrounded to evoke tension. This change also anticipates a scrape and strike on the singing bowl that synchretically align with the gesture of drawing a 'resonant' sword. This unrealistic sonic landscape effect, which uses percussion sounds to reinforce physical gestures and movement, is redeployed in later sequences.

The atmospheric texture is attenuated to allow wind noise to form an environmental reference to the map. At this point two sound-objects are introduced that signify the mysterious City of Immortals. The first is a vaguely musical sound-object derived from an excerpt of a *gagaku* performance.[227] Re-synthesis techniques were applied to retain the haunting quality of the concrete sound, while recognisable source cues were removed.[228] The spectromorphological transformation and re-contextualisation of the gagaku sound-object engenders a new signification: the mythological civilisation of 'The Immortals'. A second sound-object signifies the city's 'voice', which calls out to Rufus. The intention was to evoke the sound-image of a colossal horn played from the

[227]Gagaku is the traditional music of the Japanese Imperial Court. It is revered for its spiritual importance within the Shinto religion. The sound of gagaku is a blend of three instrumental timbres: the *ryuteki* flute, the *hichiriki* double reed flute, and the *sho*, a form of harmonica made of bamboo. Original field recordings were made at Hikone Castle (April 2008).
[228]The re-synthesis was carried out using the 'image synth' in Metasynth.

city's walls.[229] The city horn sound-object was created from a tone played on a didgeridoo.[230] Through the subsequent repetition of audiovisual associations, both sound-objects are developed as 'leitmotifs' for the city (Flueckiger 2009, p.163).

The return to the garden sonic landscape introduces a series of synthetic pitched tones that form a harmonic relationship with the atmospheric texture. These tones resolve to a tonic, and this marks the transition to the next sequence.

8.2.4 Sequence: 'Delirium and Dreams'

[DVD Ch.4 - 04:28]

In the desert, a delirious Rufus lapses into unconsciousness and dreams of a sacred well and the City of Immortals. The ambient texture from the previous sequence maintains its presence in the sonic landscape. Several dissonant synthetic sound-objects signify the onset of Rufus's delirium, and a series of singing-bowl strikes emphasises his final steps before collapsing. The gagaku sound-object is reintroduced to coincide with a hazy vision of towers on the horizon, thus implying Rufus's proximity to the city.

The transition to dream consciousness is marked by a sonic landscape focus on a single tone with a 'pulsing' amplitude modulation. In the dream animation sequence, the tone's modulation rate is loosely synchronised to the cyclical motion period of counter-rotating borders that frame the well. The impression of rotational motion is reinforced by the cyclical melodic contour of a repeating musical sound-object. The sonic landscape design utilises this sound-object to evoke a hypnotic pattern that atmospherically supports the representation of dream consciousness. The melodic loop was created from a choral sample that was processed and sequenced using Metasynth's Spectrum Synth tool.

A second animation of the rotating city forms a back projection to an image of Rufus falling backwards while trying to touch the well. The sonic landscape extends the

[229]This aspect of the story was influenced by Homer, who in the *Iliad* describes vast horns positioned atop the walls of Troy.
[230]The resonance of the didgeridoo is magnified using a delay/reverb effect (Roland RE-3 Space Echo).

audiovisual synchrony into a lower octave by introducing a sawtooth synthesised tone with amplitude modulation. As Rufus recedes visually, the sonic landscape fades as a whole, heralding his emergence from the dream.

8.2.5 Sequence: 'Wastelands'

[DVD Ch.5 - 05:11]

Rufus awakes from his dream to find himself in a wasteland of rocky prominences. Driven by thirst, he locates a river and drinks its water before discovering the City of Immortals.

Reflecting the imagery of Rufus's iconogenic recollections, the sonic landscape establishes the bleak environment and oppressive atmosphere of the wastelands. In an abstraction of the environment, atmospheric sound-objects are stratified like layers of rock. The sound design re-applies a compositional strategy to render impressions of textural motion by engineering spectromorphological variations in the structural balance of atmospheric layers. Moreover, changes in textural motion are articulated dynamically to reflect shifts in the emotional tone of Rufus's memories.

The dissonant quality of the atmospheric texture is formed by combining wind noise with two layers of sound-objects that have continuous morphological models and interior 'tonal' and textural motions. Both layers were created using a granular synthesis technique, which was separately applied to samples of a Buddhist chant and a china crash cymbal.[231] Other atmospheric sound-objects punctuate the sonic landscape at key points. For instance, when Rufus awakes, a filtered sarangi phrase forms a cultural signifier that suggests a change in geographical location. Also, a sustained electric guitar tone is used to develop tension. The spatial articulation of these sound-objects environmentally references the mountainous walls of the valley.

Rufus's memories of the environment are selectively reinforced by the realistic sounds of rock scrapes and slides. The rhythm arrangements of cymbal sound-objects are used to emphasise the relative dynamism of his physical movements. Specifically, the

[231] A Patch in Kyma X was used for the granular re-synthesis of the samples.

energetic contrast between his laboured crawl and his sprint to the river underlines the significance of seeking and discovering water. Both the rock and cymbal sound-objects have noise-based spectral typologies that add to the dissonant 'gritty' quality of the sonic landscape impression.

As Rufus drinks, a vocal drone signifies his imminent transformation from mortal to immortal consciousness. Also, the presence of the city is heralded by its two 'leitmotif' sound-objects. First the city horn calls out to Rufus, who then raises his head to see the city before him. This coincides with a reprise of the gagaku sound-object. Both sounds combine to signify the mythical civilisation that once occupied the city. A second sounding of the city horn marks the transition to the next sequence.

8.2.6 Sequence: 'Lost Time'

[DVD Ch.6 - TC 06:33]

Rufus succumbs to a state of unconsciousness that is devoid of dreams and memories. The sequence's imagery represents the passage of an undetermined period of days and nights. Rufus is shown lying motionless at the centre of an animated watch dial illustrating the diurnal cycle. In similarity with the sequence *'Delirium and Dreams'*, the sonic landscape utilises the perceived melodic motion of a repeating musical phrase to form a loose audiovisual synchrony with the rotation period of the dial.

To complete the sonic landscape, a Buddhist chant phrase was pitch-shifted and processed using a vocoder to create three harmonised sound-object layers.[232] The sound's processing was designed to mask linguistic distinctness while allowing the utterances indicative field to remain recognisable as chants. In this and subsequent sequences, the sound design develops a signification between chant sound-objects and the state of immortal consciousness. This association meaningfully exploits the spiritual significations attached to chanting as a form of religious and meditative practice.[233]

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[232] A patch in Kyma X was used to process the chant phrase sample.

[233] Studies also suggest that the rhythmic entraining qualities of chants and other 'meditative' sounds facilitate patterns of neurological activity associated with altered states of consciousness (Ornstein 1977; Boland 2002).

8.2.7 Sequence: 'Troglodytes'
[DVD Ch.7 - 06:50]

Rufus recalls his first encounter with the Troglodytes, who are in fact immortal men. The sound design divided the sequence into two sections. The first concerns the lone Troglodyte's approach towards the river, while the second focuses on Rufus's walk among the Troglodytes lying inert like rocks in the landscape.

Rufus remarks that the Troglodytes "*neither spoke nor moved*". However, the sonic landscape renders their 'inner' voices, locked in the entrainment of a chant that signifies their immortal state of consciousness. This departs from the film's narrative and also the Cartesian theatre concept, as Rufus does not know the Troglodytes are immortal men. The decision was taken to sonically signify the subjective torpor of immortal consciousness because the images and narration seemed insufficient in this regard. The Troglodytes' inner voices are represented by spectromorphologically transformed Buddhist chants. Pitch-shifting and vocoding processes were once again applied to de-humanise the voices and render their language (Japanese) unintelligible. The essential 'chant' quality of the utterance is retained to signify the Troglodytes' debilitated mental state.

The Troglodyte's approach towards the river is accompanied by a progressive increase in the pitch and volume of its inner voice. This impression is atmospherically supported by a synthetic pad that provides additional tonal colouration and contrast in the higher registers. In the background, an atmospheric texture includes a layer based on the granular synthesis of a Buddhist mantra.[234] Spectromorphological variations were created by moving the granularisation boundaries across different syllable/formant structures in the vocalisation "*Na-mo-a-mi-da-bu-tsu*". Wind noise and synthetic tone 'bursts' with a nodal and noise-based spectral typology structurally complete the discordant and environmentally mimetic atmospheric texture.

The sonic landscape progressively increases in tension to a point when Rufus, having awakened and picked up a rock, is just about to throw it at the Troglodyte. His

[234]A Kyma X granular synthesis patch was used to create this sound.

throwing gesture is anticipated by a harmonic resolution to a powerful synth-pad chord and a glissando of high-pitched tones. The transition to the sequence's second section follows bell sound-objects synchronised to the impact of the rock and the Troglodyte's drinking gestures.

To articulate this transition and underscore Rufus's realisation that the Troglodytes are all around him, the sonic landscape foregrounds a morph in the atmospheric texture to the mantra syllable "*oh*". Then, the crescendo-ritardando and decrescendo-accelerando patterns of a temple bell[235] impart a sense of motion and space to Rufus's exploration of the Troglodytes' habitat. This sound design also exploits the cultural associations of tolling bells with spirituality and death to signify the Troglodytes' wretched immortal existence. Single bell strikes are also synchronised with the probing gestures Rufus makes with his sword. The bell pattern contracts and dilates time and injects energy into the sonic landscape. A contrasting structural relationship is formed by the ambient arrangement of musical sound-objects. A simple progression of echoed octave tones generated by a marimba and an organ is used to evoke an ambiguous atmosphere that reflects Rufus's curiosity and confusion.

Throughout the sequence, realistic sound-objects are selectively paired to Rufus's movements and gestures. The compositional intention was to emphasise that in Rufus's iconogenic recollections, his realistic memories of events are secondary to unrealistic reconstructions of the imagination. The sequence ends with Rufus falling asleep, signifying a transition to a dream state that is framed by a final crescendo of bell percussion and the resolution of the musical arrangement.

8.2.8 Sequence: 'Rock Walls'

[DVD Ch.8 - 09:54]

This animation sequence represents a symbolic dream, and uses the visual metaphor of building a rock wall to signify that Rufus has been trapped by fate. Visual analysis informed the sonic landscape and spectromorphological design by abstracting a

[235]The bell pattern is re-figured from a field recording made in Japan. The bell pattern is used at the start of temple ceremonies in the Jodo-Shinshu tradition of Buddhism. A full recording was made in the Kosenji Temple in Hikone (August 2009) and later edited.

mimetic discourse from the material qualities and temporal phrasing of the wall's construction.

A granular chant sound-object functions as the atmospheric foundation of this, the *'Troglodytes'*, and *'City Quest'* sequences. This structural continuity creates a sense of passage between sonic landscapes. Two categories of sound-objects in interactive-confluent structural relationships are temporally arranged in synchrony with the wall's construction pattern. One category—based on the sounds of rock, sand, and soil impacts—emphasises material and textural indicative fields associated with the wall's composition. The activation of gestural indicative fields and the perception of synchronous block impacts are carried by Gamelan sound-objects, including gongs and tuned percussion.

The Gamelan sounds provide a further cultural signification of exotic foreign lands. They also possess strong percussive transients that give the necessary impact quality to the audiovisual temporal phrasing. The sequencing of Gamelan sounds was arranged to create a musical pattern that resolves to powerful low tones. Also, an impression of rising tonal pitch forms a sonic metaphor for the increasing height of the wall. Over the course of the sequence, the spectrums of resonant gongs overlap and make the sonic landscape spatially denser and texturally more complex. This becomes a spectromorphological analogy to the wall that progressively fills the visual space.

8.2.9 Sequence: 'City Quest'

[DVD Ch.9 - 10:14]

The second half of the film focuses on the search for meaning in the context of Rufus's fate. Rufus is compelled to complete his quest by entering the City of Immortals. A short prelude to his departure features a realistic rock-fall sound, which awakens him. Rufus's change in consciousness (dreaming to awake) is reflected by a change in atmosphere when the granular chant sound-object resolves to an invariant drone on the syllable "*ah*". The foreground sound of Rufus sheathing his sword highlights the significance of a gesture that galvanises his spirit.

A sounding of the city's horn invites Rufus to explore its mysteries. The sonic landscape is then pared down to the I-voice and fundamental wind noise, creating a diegetic near-silence that fixates momentarily on an impression of environmental and psychological desolation (Théberge 2008). This conspicuous absence of sound allows the silent watch to signify that time has stopped for Rufus. The resolution of this ambient prelude creates a narrative space for music to make a dramatic impact when Rufus sets off towards the city.

The sound design of Rufus's ascent to the city takes the form of a musical interlude. Breaks in the narration suggested that it was appropriate to engineer a structural contrast to the continuity of previous sonic landscape designs. The music's pronounced linear rhythm underscores the forward motion of Rufus's arduous climb, while in melodic and harmonic terms the composition aimed to evoke a sense of anticipation. In the background, the subtle presence of wind is a reference to the environmental space.

Japanese folkloric music influenced the compositional arrangement and further served sound design's strategy of developing exotic cultural significations. Several sample-based plucked string instruments based on the timbres of the *shamisen* and *koto* establish the piece's harmony and driving rhythm. The Japanese *Hirajoshi* scale adds a distinctly East-Asian melodic quality, while a harmonised run of ascending and descending triplet patterns creates an ambiguous perception of 'spiralling' tonal motion. This motion impression underscores shots of Rufus climbing a rock face, and a vertical pan of the city's towering structure.

The compositional arrangement is completed using a series of haunting atmospheric tones with a horn-like quality.[236] These ambient tones have a consonant harmonic relationship with the main arrangement, but are spatially articulated to reference the diegetic environment and the ethereal presence of the city. In this respect, the ambient tones transcend the diegetic-nondiegetic border (Chion 2009a).

[236]These tones were created using a Nord Micro Modular Synthesizer combined with digital effects.

The musical sequence repeats twice with some subtle evolutions. The end of the second repeat coincides with Rufus's discovery of a fracture in the city walls. At this point the shamisen-koto rhythm resolves to a unison and is delayed to achieve a partial doubling, an effect designed to increase tension as Rufus approaches the portal. As the nondiegetic music fades, a breath-like sound-object associated with the labyrinth sonic landscape anticipates Rufus's entry into this mysterious environment.

8.2.10 Sequence: 'Labyrinth'

[DVD Ch.10 - 12:02]

A darkened map animation visually represents the subterranean labyrinth. Although Rufus refers to the labyrinth's 'hostile' silence, the sonic landscape aims to evoke the impression of a physical and psychological trap.

Rufus's tentative approach to the cave entrance is underscored by a transformation of sonic landscape. As the quest music fades, the sound of the city's 'breath' is rendered. The spectromorphological design of this sound-object applies re-synthesis to a human breath.[237] The preservation of gestural indicative fields associated with inhalation and exhalation allows this sound-object to signify that the city is a living entity with labyrinthine 'lungs'. Therefore, when Rufus enters the labyrinth, he is metaphorically 'inhaled'. The spatial transition to the labyrinth is represented by an animated fade-to-black that emanates from the entrance. As the blackness expands to envelop Rufus, audiovisual synchresis is engineered by a spectromorphological transformation. Using granular synthesis, a sustained organ chord is progressively morphed to noise.[238] The effect is then reversed in order to re-establish the organ sound-object as an atmospheric layer of the labyrinth sonic landscape.

Throughout the sequence, the city-breath sound-object establishes its slow laboured pattern. The concept of a surrealistic 'room tone' was applied to the sonic landscape design of the labyrinth's complex space. The room tone comprises vocal drones, a sustained organ chord, and a synth pad with a subtle Doppler effect. This sonic texture

[237]The re-synthesis was performed using Metasynth's image synth tool.
[238]The process was achieved using a Kyma X Granular synthesis patch.

is also mixed with a low-pitched hum derived from the sound of an air-conditioning system. The structural relationships between these atmospheric layers are principally interactive and confluent. In addition, a number of barely perceivable utterances are rendered to signify the echoes of anguished voices trapped in the labyrinth. The motion of synth-pad pitch modulations also suggests a loose synchresis with the city map's rotation. Overall, the sound design aimed to render only momentary impressions of vocal sound sources and distinct textural layers. The compositional intention was to facilitate a psychological effect: a strange sense of sonic landscape ambiguity that evokes a haunting atmosphere.

8.2.11 Sequence: 'Immortal City'

[DVD Ch.11 - 13:05]

This sequence begins when Rufus steps into a shaft of light (13:06). The significance of his escape from the labyrinth is marked by the resolution of sonic landscape dissonance to a dominant chord (organ tone). This forms the opening statement of an abstract, musical sonic landscape that underscores Rufus's exploration of the city. As Rufus ascends the staircase, the city-breath sound-object continues its cycle until he is 'exhaled' into the city. The sonic landscape's predominantly musical discourse is designed to atmospherically reinforce Rufus's recollections of the eerie deserted city. Moreover, the unrealistic spatial indicative fields of musical sound-objects are intended to mimetically reference the logical inconsistencies of the architectural landscape.[239]

The composition has three elements. Layers of plucked string tones establish a harmonic centre and are processed using a multi-tap delay. The spacings of the echoes are sub-divided rhythmically ($1/4^{th}$, $1/8^{th}$, and $1/16^{th}$ notes) to produce poly-rhythmic relationships. Variations of delay parameters are used to subvert synchronous patterns in favour of asynchronous structural relationships characterised by conflict and reaction. By virtue of a perceptual analogy, the echoes imply the city's expansive space, while pattern fluctuations signify the architecture's impossible geometrical

[239]Jones-Morris's architectural design borrows freely from different eras to create an irrational blend of classical and modern structures.

relationships.[240] Two other sound-objects complete the sonic landscape. A low vocal drone signifies the immortal consciousness of those who built and lived in the city. Finally, a repeating series of high-pitched synthetic tones extends the harmony and provides a sense of melodic motion.

As Rufus explores the city, he is on the verge of a psychological breakdown. In the next sequence this manifests as an overwhelming onslaught of sensory impressions. His breakdown is pre-empted by the insertion of several 'flash frames' of animation that disrupt the flow of images. These events are synchronised with corresponding bursts of signal noise to symbolise the intrusion of destabilising psychological impulses in the Cartesian theatre.

8.2.12 Sequence: 'Seizures'

[DVD Ch.12 - 13:52]

In this sequence a series of animations symbolises the collapse of Rufus's reason. Sound design supports this by progressively developing the discordance and intensity of sonic landscape impressions to signify a 'psychological seizure', an uncontrolled acceleration of thoughts.

Within the Cartesian theatre sonic landscape, structural relationships between abstract, unrealistic sound-objects are characterised by conflict and reaction. This represents the impulses of a fractured mind in turmoil. In a continuance of previous animation sound design strategies, audiovisual synchresis was engineered by sensory doubling (Chion 2009a) and the synchronous alignment of gestural indicative fields (Deutsch 2008). The process of animation analysis focused on abstracting the key visual morphologies, which could then be mapped to complementary spectromorphologies.

The first animation section stylistically reprises *'Rock Dreams'* by sequentially assembling 'layers' of city architecture (14:00). This metaphor symbolises the labours of immortal architects whose logic Rufus fails to understand. Three groups of sound-objects constitute the sonic landscape design. Transformed male vocalisations based

[240]The design of the city architecture is suggestive of the visual illusions in the works of M.C. Escher.

on Buddhist chants are synchronised with each building event. These sound-objects represent the 'utterances' of the immortal architects. The synchresis effect is strengthened by synchronising horn sound-objects that possess a defined transient. These sound-objects also enrich the harmonic discordance. In the background, a sound-object that emulates a tape loop effect is raised in pitch to facilitate a perceived increase in the intensity of sensory impressions. Various emulations of tape loop effects, including the manipulation of playback speed and cueing (e.g., fast forward and rewind), feature in the remaining animation sections.[241]

The second animation section superimposes Rufus against a back projection of the city (plan form) in counter rotation (14:08). The periodicity of visual rotation is referenced sonically by the period (frequency) of amplitude modulation for a low-pitched synthetic tone. Also, an approximate audiovisual synchrony is formed with the cyclical rhythm of a melodic loop. Musical loops with similar qualities and functions were used previously in the sequences *'Delirium and Dreams'* and *'Lost Time'*.

The section develops by superimposing Rufus against an abstract kaleidoscope of city images (14:14). This animation has visual morphologies characterised by angular dilation and contraction. The sound design emphasises a more linear increase in the speed of each kaleidoscope 'turn' than is visually articulated. Despite this, the synchresis between kaleidoscope turns and the periodicities of the low tone pulse/melodic loop remains intact because of the complexity of the visual motion. Also, the perception of visual motion is partly cued by relatively simple spectromorphologies that give a sense of accelerating motion (e.g., tape loop cueing effects). In essence, the sound design exploits the greater acuity of audition in the perception of temporal phenomena (Matlin & Foley 1997) in order to facilitate the temporalising effect of sounds on the image (Chion 2009a).

This temporalising audio-visiogenic effect is further applied to the sound design of a final sequence of kaleidoscope animations (14:26). This sequence represents the climax of Rufus's seizure and the flow of rapid audiovisual impressions in the Cartesian theatre. In this short sequence the timings of spectromorphological motions

[241] A tape loop effect patch in Kyma X was used. The patch emulates tape speed and pitch-shifting effects with an audio sample.

are impressed onto the perception of dilation and contraction visual morphologies. Also, the modulation period of the pulsing tone is reset to a lower frequency in order to initiate a new build-up towards a climax. To reinforce the impression of synchronous motion in audiovisual relationships, tape cueing effects linearly sweep the melodic loop in synchrony with the kaleidoscopic pattern of dilation and contraction. Another sound-object, a fast repetition of the melodic loop, also implies synchrony with the rapid internal motions of kaleidoscope turns. While these synchresis effects are essentially illusions, they function appropriately as dynamic significations of Rufus's psychological dissonance and the intensity of his seizure hallucinations.

The section builds to a climax by increasing the frequency of pulse modulation to the point where discrete iterations of morphological models within the morphological string fuse into a continuous drone. Granular synthesis is applied to spectrally transform this sound into noise. This engineers a transition back to the labyrinth sonic landscape structured previously. The sequence ends with an 'exhalation' of the city breath, which coincides with Rufus's emergence from the labyrinth.

8.2.13 Sequence: 'Time Passes'

[DVD Ch.13 - 14:55]

This longer sequence follows Rufus's transformation to a catatonic state of hebetude. Time is now essentially meaningless to Rufus as an immortal, and his existence becomes an unvarying purgatory.

In the previous animation sequence, the dynamic concomitance of the sonic landscape complements the abstract visual representation of Rufus's fractured mind. For this sequence, sound design applied the compositional strategies of ambient music to evoke contrasting impressions of timelessness, space, and stillness in the Cartesian theatre. The sonic landscape takes the form of an ambient lament that metaphorically signifies immortal consciousness as an entraining force to which Rufus ultimately succumbs. In structural terms, this sequence also arrests the pace of the film, giving

the audience opportunity to refresh their engagement with the narrative before the climax.

The sonic landscape's composition was influenced by ambient music, in particular by Brian Eno's *Ambient 1: Music for Airports* (1978) and *Ambient 4: On Land* (1982). This compositional process yielded unique practical knowledge that highlighted how the choice of generative tools can influence the resulting musical form. Therefore, the majority of sound-objects used in the sequence were created using three specialist production tools for ambient music: *Trope*, *Bloom*, and *Air*.[242]

In the sonic landscape, a sample of overtone singing processed by granular synthesis forms an atmospheric drone that spatiomorphologically oscillates across the stereo field. This sound-object symbolises immortal consciousness. A choral sound-object generated by *Air* suggests the hypnotic call of a 'Siren'.[243] This sound-object signifies the erosion of Rufus's will as he progressively slips into a mental stupor. Also, a combination of wind noise and a low tone series generated by *Trope* establishes an atmospheric texture that mimetically references the wastelands environment. In the high registers, a separate layer of chime sound-objects created using *Bloom* forms an arrhythmic pattern of harmonically consonant tones. The light, ethereal qualities of the chimes evoke the impression of a meditative state of consciousness that borders on sleep. Overall, the composition was arranged in an improvisational manner, with a distinct focus on creating a sonic landscape impression of space and timelessness.

The transition to the next sequence is marked by Rufus's words "*Until one morning, something very much like joy occurred*". At this point, the ambient sonic landscape fades, and an impression of sonic resolution is created by the structural alignment of the choral sound, a clap of thunder, and a subtle transformation of the male vocal drone.

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[242]These generative applications for ambient music production were developed by Peter Chivers and Brian Eno. The hardware platform consisted of an iPod Touch and an iPhone 3.

[243]This sound design idea draws on Greek mythology, which refers to the call of the Sirens that hypnotised sailors and lured them to their doom on the rocks. In Homer's *Odyssey,* Odysseus is lured by a siren.

8.2.14 Sequence: 'The Storm'
[DVD Ch.14 - 17:46]

In narrative terms, the storm symbolises a spiritual rebirth and the hope of salvation. The immortals' catatonic states are broken by external sensations of the storm. This event is therefore a catalyst for their partial reconnection to the outside world. The narrative significance of the storm is reflected by a realistic sonic landscape design of wind, thunder, and rainfall sound effects. This emphasises the transformative power of physical sensations brought about by the storm's elemental forces.

As the storm begins, a short sequence of cymbal percussion underscores the physical rousing of the immortals. A terminating crash marks the moment when Rufus turns to regard another immortal rising from the rocks. As it starts to rain, a santoor solo processed using reverb and delay effects fades in slowly. The increasing regularity and percussive intensity of santoor tones form a mimetic reference to falling raindrops. Also, the expressive quality of the solo evokes the inner sense of joy that Rufus's refers to in the narration.

In the last part of the storm sequence, Rufus is overwhelmed by the feeling of reconnecting with life. Increases in echo and reverberation transform the santoor solo until it forms a continuous sound that merges with the sound of rainfall. This creates space in the sonic landscape for the sound of Rufus's breathing to signify his rebirth and salvation. Several laboured breaths are taken before Rufus turns to look at the immortal by his side. This marks the transition to the final sequence of the film.

8.2.15 Sequence: 'Finale'
[DVD Ch.15 - 18:59]

The film's conclusion forms a philosophical reflection on immortality. The sound design incorporates a simple musical arrangement to support the narration and a series of key images (i.e., infinity symbol, river, Troglodytes, city). The music structurally functions as a bridging section to the main orchestral theme. The arrangement conveys a light, airy feeling of expectation that facilitates the dramatic contrast of the main

theme. The bridging section resolves harmonically to a unison with the opening chord of the main theme.

The bridging section incorporates several layers of atmospheric synthesized pad sound-objects to establish the chordal harmony. A flute provides a focal point of restrained melodic expression. Filtered acoustic guitar tones processed with a multi-tap delay convey a sense of space and harmonic motion. The sonic landscape impression of space is reinforced by two soundings of the city horn, which support images showing the expanse of the city.

The main theme is structurally identical to the *'Opening Titles'* version, save for minor edits to the percussion arrangement. As with the *'Opening Titles'* sequence, animation sound design focused on engineering synchresis between visual morphologies and the spectromorphologies of sound-objects derived from metallic percussion. These sound-objects punctuate the sonic landscape when new animation elements are introduced. For example, the appearance of a clock face is synced to a cymbal crash. This masks the onset of a ticking sound-object that symbolises Rufus's awareness of the passage of time. The transient point of a cymbal's reversed morphological model is then synced to the clock face's disappearance and the termination of the ticking sound-object.

The insertion of an infinity symbol is also synchronised with a dark reverberant crash. Following this, a reversed cymbal sound builds to a gong crash sound-object on the beat of the music, and this sonic event is synced to the symbol's disappearance. The final image insertion of a black disc is also paired to a cymbal crash. The termination phase of this sound-object extends beyond the end of the main theme. This momentary ambience in the sonic landscape is broken by a sound-object derived from the filtered noise of a reversed cymbal. This sound-object has a swelled, graduated-continuant morphological model, and the perceived motion of its gestural contour is synchronised with the dilatory motion of the black disc (void) that grows to engulf the frame. This completes the final shot and final sonic event of the film.

8.3 Critical Reflection

In retrospect, this project encompassed two distinct modes of sound design practice: a collaboration-based 'service provision mode' and a research-driven 'practice development mode'. Both of these modes generated sound design practical knowledge.

8.3.1 Practice Modes

The project initially followed a service provision mode of collaboration between the author (sound designer) and filmmaker. In keeping with this study's practice-research strategy, independent films like *The Immortal* were sought as project opportunities for extended sound design practice. However, in such contexts the project course of sound design must adapt to the filmmaker's approach and those factors that impact post-production (e.g. scheduling). Practical knowledge gained on the projects for *Song of the Falklands* and *The Immortal* indicates that the respective goals of the sound designer and the filmmaker may diverge in response to circumstances that alter project schedules and objectives.

The filmmaker abandoned plans for a second phase of sound design for *The Immortal*. After submitting the film for examination, Jones-Morris felt that the project was complete and had served its primary purpose.[244] For the author it was necessary to continue with the project in order to fulfil his practice-research objectives. Without the filmmaker's input, sound design applications of the conceptual framework were not constrained by specific requirements. Therefore, the DVD version of *The Immortal* soundtrack reflects the author's artistic vision and creative interpretation of the film.

This insulation of the project from external criticism engendered the risk of an indulgent pursuit of research objectives that might structurally unbalance the film in favour of sound. Cognizant of this, the author engaged in ongoing critical reflection that focused on keeping the sound design narratively grounded. In this respect, the

[244]Jones-Morris produced *The Immortal* for his MA in Film at the University of Newport.

development of the Cartesian theatre concept was an important step in establishing a consistent thematic approach to sonic landscape design.

8.3.2 Sound Design applications of Sonic Landscape

The Immortal generated practical knowledge of how sonic landscape designs can be applied to film representations of subjective experience (e.g., memories, imaginings). In this regard, sonic landscape composition was creatively facilitated by the concept of the Cartesian theatre as a metaphor for a representational space within consciousness, a 'place' where the images and sounds associated with memories and imaginings are mentally projected. This interpretation aligns with Wishart's original theory, which states that the evocative qualities of the sonic landscape can convey a rich impression of 'place', whether realistic or imaginary (Wishart 1986).

The sound design also applied sonic landscape principles to create 'seamless' sequence transitions throughout the film. The compositional intention was to suggest a continuous flow of mental impressions that follow the course of Rufus's recollections. This was practically realised by applying the idea of sound-object 'inheritance' to the sonic landscape designs of adjacent film sequences. For example, the environmental similarity of locations allowed wind noise to be used as the fundamental sound-object of adjacent sonic landscapes. However, the same approach was also applied to the use of abstract atmospheric sounds-objects (e.g., vocal drones).

Critical reflection on the film's sound design raises the question of whether the concept of the Cartesian theatre sonic landscape truly enables the signification of Rufus's consciousness as the imaginary source (place) of sounds. In *The Immortal*, the omnipresence of Rufus's iconogenic I-voice suggests that the film's diegesis represents his consciousness as the source of mental impressions (e.g., memories, dreams). According to Field (2000, p.49), a "sonic synecdoche" exists when an extra-musical signification partially supported by aural cues prompts the audience to derive a meaning. It might therefore be argued that the film's symbolic sounds (e.g. vocal drones, chants) are sonic synecdoches that collectively signify consciousness as their sonic landscape source.

The sound design of *The Immortal* attempts to make a bold narrative statement. The author therefore strove for metaphorical articulateness and sensitivity towards the narrative significations carried by symbolic sounds (Wishart 1996). However, as Chion (2009a) observes, a successful deployment of symbolism as an aspect of sound's added value can be problematic in film. In *The Immortal*, the development of sonic landscape symbolic discourse is intended to stimulate audience engagement in a process of deriving narrative meanings connected to the film's themes of immortality and consciousness. As is the case with all films, those meanings ascribed by the audience to symbolic sounds can differ somewhat from those intended by the sound designer.

This need not be viewed as a problematic issue for soundtrack storytelling if there is a degree of 'conceptual resonance' between the audiences' narrative interpretations, and the sound designer's compositional intentions towards symbolic discourse. In general, one may therefore make a distinction about soundtrack symbolic discourse based on its *internal* (compositional) significance for the sound designer, and *external* (narrative) significance for the audience. In the case of *The Immortal,* the absence of the filmmaker from the second phase of sound design makes it difficult to evaluate the added value and success of soundtrack symbolic discourse. However, it is the author's hope that audience interpretations of the film will have a sufficient resonance with his own storytelling intentions.

In *The Immortal*, the iconogenic force of Rufus's I-voice gives form to his recollections. The narration drives the storytelling, and this influenced the author's decision to let the 'ear lead the eye' in the perception of audiovisual representations. This also reflects a creative reaction to the invariant and impoverished visual qualities of the silent-film styled imagery. Consequently, the film's sonic landscapes and sound-images are richly detailed to perceptually compensate the audience's imagination for what the eye is deprived of seeing.[245] This can be interpreted as an application of Chion's concept of added value (Chion 2009a), but also of Bresson's broad philosophy of film sound. In essence, the contrast between the uniform austerity of

[245]The *'Labyrinth'* sequence is a strong example of this approach at work.

image renderings and the dynamic vivid detailing of sonic landscapes, establishes a meaningful audiovisual relay (Weis & Belton 1985, p.149). This strategy allows sound to be the principal carrier of perceptual qualities that reference the indicative fields of material texture, gesture, motion and space.

During Phase I sound design, alternatives were considered to engineering a strong perceptual contrast between sounds and images. One 'supportive' strategy was based on a principle of similarity between minimalist sonic landscapes and the sparse qualities of the imagery. When this approach was discussed with the filmmaker, concern arose that the film might not sustain interest and immersion, particularly as the story is driven by its narration. The decision to apply the principle of contrast was also influenced by concepts in cognitive psychology that highlight how perceived contrasts between sensory stimuli can sustain an attentive focus. Furthermore, perceived similarity or homogeneity engenders cognitive habituation and the shifting of attention away from stimuli (Matlin & Foley 1997).

8.3.3 Sound Design Applications of Spectromorphology

In this project, spectromorphology was successfully applied to the sound design of animation sound-objects. This involved applying Smalley's morphological models and motion typology forms to the analysis of animation visual morphology. In each case, this analysis formed the basis of a spectromorphological design criterion for synchronous sound-objects that would enter into a meaningful synchresis with animation-object indicative fields, including gesture (motion), materiality, and texture.

In practice, sound design is still faced with the challenge of selecting the appropriate generative processes that will render the spectromorphological designs of sound-objects. Fortunately, digital studio tools such as those used by the author, afford innumerable possibilities for manipulating timbres and articulating spectromorphologies. For the most part, the animation sound-objects produced in this project are of a simple spectromorphological design, which reflects the qualities of the image. Moreover, practical knowledge confirmed that the synchronisation of gesture

and motion indicative fields is the key to source-bonding an animation visual object to a complementary sound-object.[246]

Spectromorphological concepts were also applied to the structural design of intersonic relationships within sonic landscapes. For many sequences this involved composing multi-layered atmospheric textures that formed the basis of the sonic landscape. When considered as a sound design dynamic, the perceived qualities of intersonic structural relationships between texture layers can be articulated to evoke an 'emotive' atmosphere that meaningfully supports the sequence narrative. For instance, in the sequences *'Delirium and Dreams'* and *'Seizures'*, the intersonic structural relationships of the sonic landscape are characterised by conflict, reaction, and competition (Smalley 1997). These perceived qualities have a narrative significance that supports the impression of Rufus's physical and mental breakdown.

In summary, the applications of spectromorphology and indicative fields to animation sound design and intersonic structural relationships in *The Immortal*, demonstrates how these concepts can be effectively integrated within the sonic landscape approach to the inter-modal compositional strategy.

[246]This concurs with a view expressed by Deutsch (2008).

Chapter 9

The Lock

This case study describes the sound design for *The Lock,* one of ten short films made by Inga Burrows for the video installation project "Well I Never...".[247] This project examines the subject of how local histories are sustained through the living memories of community residents (Burrows & Krebs 2007). Burrows has also developed an online version of the installation.[248]

9.1 Contextualisation

The Lock is the most experimental of the films in the installation series. Its fusion of contemporary dance and video compositing forms an abstract representation of Lenora Brooks's childhood memory of a drowning accident in Pontypridd.[249]

9.1.1 Project Management

The sound design project was launched with a project planning meeting and a screening of the film.[250] Burrows confessed that *The Lock* was the product of a 'mutually indulgent' artistic collaboration with a choreographer. As a consequence of

[247]The filmmaker is based at the Cardiff School of Creative & Cultural Industries, University of Glamorgan. The project "Well I Never..." (2007), was jointly funded by the Arts Council Wales and the Theatre Media & Drama Research Unit in the Cardiff School of Creative & Cultural Industries.
[248]The online version of the installation may be accessed at http://www.wellinever.org/.
[249]Leonora Brooks is one of a number of Pontypridd residents (County of Glamorgan, Wales) who contributed their oral memories to the project.
[250]This meeting took place on June 7th 2007.

this, the development of the film's abstract imagery had been prioritised throughout production and editing (Burrows 2007, *Project Requirements Meeting*). Therefore the soundtrack had not been considered in any detail, and Burrows hoped that a sound designer's interpretation and contribution could structurally rebalance the film (Ibid.). The filmmaker advanced few soundtrack requirements, but did suggest an 'impressionistic' approach be taken: "[L]et the sound be autonomous, less literal with the narrative, more atmospheric and abstract" (Ibid.). Overall, the vagueness of the brief for sound design highlighted clear uncertainties about the soundtrack. The filmmaker therefore put her faith in the creative vision of the sound designer. From the author's perspective, the outcomes of this meeting indicated that soundtrack development would follow a process akin to an 'action and reaction' approach (Sider 2003). While this creatively open context represented an ideal platform for sound design practice-research, the approach also engendered a risk that the filmmaker's 'reactions' to sound design could constitute an initial rejection of the soundtrack, at least in part. Therefore, another phase of soundtrack development would be required to address any emergent issues.

To manage this risk, the author requested that the post-production schedule be modified to incorporate a review of a 'draft' sound design, as well as a re-development phase that would allow for any change requests to be implemented. The filmmaker accepted this arrangement, which proved to be prescient, as the subsequent review highlighted issues with the sound design of the film's second section.[251] The outcome of this review and its significance for sound design is fully discussed in section 9.3.1.

Overall, effective project management ensured that there was sufficient time to implement the filmmaker's change requests and complete the soundtrack on schedule.[252] In this regard, the successful outcomes of the post-production project are a testament to the shared organizational values operating on both sides of the collaboration, and to the mutual understanding of a risk associated with the action and reaction approach.

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[251]This review was conducted on July 13th 2007.
[252]The soundtrack was handed over to the filmmaker on July 25th 2007.

9.1.2 Film Analysis & Research

Plate I: Factory work gestures represented by dance

Plate II: Leonora approaches the lock via the canal tow path

Plate III: Frenzied rescue activity—Leonora's POV

Plate IV: Workers prevent Leonora from looking

Plate V: Boy regurgitates water

Plate VI: Long 'abstract imaginative reflection' sequence (section two)

Figure 9.1.2: *The Lock*—Selected Image Plates

As a starting point for film analysis, the author examined Leonora Brooks's account of the accident to gain insight into the filmmaker's narrative interpretation of her

memories.[253] Also, analysis of the film images' abstract chain of significations was supplemented by field research at the accident location, and a reconstruction of Leonora's walk along the canal towpath (Plate II).

In the film, a number of intertitles are direct quotations from Leonora's account of events. These contextualise and structure the image sequences in keeping with her memories. In her testimony, Leonora describes how she was walking along the towpath past the Brown Lennox factory[254] when she noticed a number of anxious-looking workers gathered by the lock. The opening sequence represents the gestures of factory work (Plate I), as well as Leonora's approach to the lock (Plate II).

The analysis subsequently identified two distinct sections of the film. The first section is based on Leonora's testimony and constitutes a narrative reconstruction of her memories of the accident. This section also reflects Leonora's self-professed curiosity as a witness to the workers' attempts to rescue a drowning boy trapped in the lock mechanism. The images therefore refer to Leonora's POV of the workers' frenzied activity (Plate III) and her sense of being smothered by the hands and legs that prevented her from seeing (Plate IV). The first section ends with an image representing Leonora's memory of the dead boy lying beside the canal (Plate V). In contrast, the film's second section makes a transition from linear narrative to an abstract reflection on Leonora's fractured memories and feelings about the accident (Plate VI).

9.1.3 *The Lock*: Conceptual Rationale for Sound Design

In similarity with *The Immortal*, *The Lock* represents subjective experience as reflected in a character's memories and imaginings. For *The Immortal*, this representational subject inspired the application of the 'Cartesian theatre' concept to sonic landscape composition, and the same concept influenced the sound design of

[253]Burrows supplied an edited transcript of an interview conducted with Leonora Brooks that details her childhood memory of the drowning accident at Trawllyn Lock near the Brown Lennox Factory in Pontypridd.
[254]Brown Lennox manufactured industrial chains. The site was not in use during the project and was later demolished.

The Lock. However, unlike *The Immortal*, *The Lock* departs in its second section from a linear narrative based on the chronology of memories. The author subsequently developed two variations on the Cartesian theatre concept for this film. In the first section, the sonic landscape evokes an impression corresponding to the *vivid-emotional memories* associated with the narrative reconstruction of events.[255] The second section is non-narrative, and the sonic landscape evokes an impression that represents an *abstract-imaginative reflection* on memories.

This rationale for sonic landscape design was informed by social psychology research into the nature of memory in eyewitness testimony. For instance, the concept of *salience* refers to the properties of a stimulus that make it 'stand out' relative to other stimuli in a context (Hogg & Vaughn 2005). Furthermore, memory encodes the most salient features of a traumatic event because our selective attention is drawn to perceived qualities of *vividness.* The vividness of a stimulus is cumulative and based on interdependent factors including emotional interest, concreteness, and personal significance (Ibid., pp. 61–63).

The author construed the film's first section as reconstructing the salient features of Leonora's memories, which had preserved the most vivid qualities of her experience. In compositional terms, the quality of vividness was translated into the 'intensity' of sonic landscape impressions. The sound design therefore focused on rendering pronounced spectromorphologies and energetic audiovisual relationships to make a perceptually vivid statement that signifies the psychological intensity of Leonora's memories.

For the second section, the sound design explores Leonora's imaginative reflection on her vivid memories. In psychological terms, the process of post-trauma reflection enables an individual to gain 'emotional distance' from memories of a negative experience. This process may take many years, and shots of an older Leonora at the end of the film suggest that the film represents her later reflections. Furthermore, reflection on past experience relies on the imagination to conceptually 'fill in' details that were either forgotten or not originally encoded as memories (Blackmore 2003).

[255]This section runs to the intertitle: *"The men couldn't save the boy"*.

The second section therefore also represents Leonora's imaginative exploration of aspects of the rescue attempt that she was prevented from seeing.[256]

The second section contrasts with the frenetic energy of the first by structurally adhering to a slow, rhythmic, representational form. A consistent bi-directional visual morphology, linking uni-directional ascending and descending motions[257], is articulated by the dancers' movements (Plate VI). These motions represent 'emergence from' and 'submergence in' the lock waters, thereby signifying the workers' repeated rescue attempts. The set design and lighting effects suggest water reflections within the interior space of the lock.[258] In the second layer of the video composite, the free rotation of the boy represents the underwater space where he is trapped. The size differential between the boy and the workers creates an illusion of distance: a visual metaphor for the workers' inability to reach the boy in time to save him.

Many emergence motions are followed by a flow of water from the worker's mouth. The sound design develops this by selectively forming body-gesture associations between emergence, water expulsion, and breath exhalations. Conversely, submergence motions are selectively associated with water ingestion and breath inhalations. These associations are formed and varied throughout the second section. Overall, a pattern of representational associations between worker motions (emergence/submergence), water (expulsion/ingestion), and breathing (exhalation/inhalation) signifies the rescue attempt. Throughout the film, the spectromorphology of breathing is used as a symbolic discourse in sonic landscape designs to signify death by drowning.

The Lock sound design is based on the concept of a single diegetic sonic landscape for Leonora's Cartesian theatre. In this representational space, her memories and imaginings are rendered and projected. The unrealistic quality of the sonic landscape

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[256]In her testimony, Leonora recounts being prevented from seeing the workers in the water attempting to free the boy. Therefore, she only had partial memories of the rescue.
[257]This terminology is translated from spectromorphological categories (Smalley 1986). Specifically, the *ascent/descent* forms are noted in the *uni-directional* category of *motion typologies.*
[258]On location, it was noted that the Trawllyn lock is partially enclosed by a bridge. It was assumed that this interior space was where the boy was trapped.

combined with the abstract imagery sustains this impression. The principal difference between the two sections is the relative intensity of their sonic landscapes. In section one, energetic spectromorphologies and dynamic intersonic relationships underscore the power of Leonora's vivid-emotional memories. In section two, a comparatively stable sonic landscape evokes an impression of Leonora's emotionally distant, imaginative fixation on a pattern of reflections.

9.2 Commentary

The commentary presents separate descriptions of the film's two sections in order to distinguish the representational concepts that informed their respective sound designs. However, in practice the sound designs of these sections were not worked on independently.

9.2.1 Section 1: *Vivid-Emotional Memory*

[DVD Ch.1 0:00]

The film begins with an atmospheric 'whistle drone' sound-object derived from the granular re-synthesis of the concrete work whistle that signals the factory's lunchtime break (00:21). The sonic landscape impression is formed by layers of atmospheric sound-objects with interactive structural relationships. The majority of these sounds are vocal in origin but are spectromorphologically transformed using a combination of processes, including pitch-shifting, time-stretching, granular re-synthesis, and additive resynthesis.[259] In each case, sound design preserves the spectromorphological essence of the vocal source in order to activate perceptions of the utterances indicative field (Smalley 1992). The compositional intention behind this atmospheric mimesis was to abstractly signify the anguish of the drowning boy and the workers.

The symbolic discourse of the sonic landscape explores the theme of drowning by foregrounding perceptions of 'breath-gesture' indicative fields and complementary spectromorphologies (e.g., gesture- and texture-based motions). This extends beyond

[259]Metasynth's 'image synthesis' tool was used in the majority of cases to create these sound-objects.

sound-object design to the use of breath morphology as a structural metaphor for intersonic relationships. In this section, a series of transformed breath sound-objects were used over two dance sequences that represent factory production (Plate I). In these cases, the inhalation-exhalation morphologies of the breath sound-objects are 'stuttered' slightly to form a synchronous relationship with the iterative morphological models of mechanical sound effects. This sonic landscape impression engineers a meaningful synchresis with the repetitive gestures of workers operating unseen factory machines.[260]

Vocal sound-objects are used to evoke a sound-image of the unseen drowning boy. The calls of the boy are represented by two sound-objects: an "*ahh*" and an "*ohh*". These sounds were produced from field recordings made at a swimming pool.[261] The 'boy's call' sound-objects are first heard over the transition from images of factory work to Leonora's walk along the towpath (00:34 - 00:36). These sounds signify the boy's distress, which attracts the attention of the workers and Leonora. The mix articulation of the boy's call in the right side of the stereo image facilitates a clearer perception of its intrinsic spatial indicative field. This was done to imply that the boy's call emanates from the partially enclosed space of the lock.

Over the main titles sequence (00:39–00:45), transformed breath sound-objects are sequenced to foreground the gestural morphologies of inhalation and exhalation. The first inhalation is isolated, but a subsequent exhalation and second inhalation are combined with sound-objects derived from swimming pool ambience. Volume automation was applied to structurally align the morphological models of the pool ambience sound-objects with the perceived gestural contours of the exhalation and inhalation sound-objects.

[260]The stuttering effect was created using Metasynth's image synth tool by applying a patterned image filter to a transformed breath sound-object. This effectively removes parts of the rendered waveform. The result suggests a mechanised movement of air that one might associate with steam-powered machinery.

[261]It was noted that spatial coloration added by the swimming pool's highly reverberant acoustic space emphasised the energy of the vocalisations of children playing excitedly in the water. This combination of energy, spatial colouration, and the masking of linguistic details was key in the decision to use these sounds to represent the boy's anguished calls from the lock.

During post-production, Burrows decided to reinforce the rescue-attempt narrative with a short script for the factory workers. This script represents Leonora's memories of the workers' shock and desperation. The first speech element—"*Get in there and help me pull him out, man.... He's stuck, his leg is jammed behind the pipe*"—coincides with images of Leonora's POV as the workers rush towards the lock (Plate III). The first words were processed with 'reversed' delay and reverb effects to engineer a perceived spatial contraction within the sonic landscape.[262] This unrealistic pre-echo effect focuses attention on an 'incoming memory' of speech, and emphasises the first words.

Combined with the speech, a mix of footstep sound-objects reinforces an impression of the workers running en masse towards the lock (00:51). A hyper-realistic water splash sound-object is then used to signify the men jumping into the water (00:58). The boy's call sound-object is also reintroduced to reinforce his presence. Following this, a video composite represents Leonora's visual memories of the rescue attempt (Plate IV). One layer symbolises the gestures of the rescuers, who are swimming and shivering in the cold water. The second 'smothering hands' layer signifies the protective gestures of the men who prevented Leonora from seeing. At this point the sonic landscape introduces a layer of 'bubbling water' sound-objects to represent underwater turbulence perceived by the boy and the rescuers (01:00). The perceived 'closeness' of these sounds also supports the impression of smothering hands. The intensity of the water sounds is then gradually reduced, a sonic metaphor that signifies the progressive breakdown of energy in the rescue attempt.

Transformed breaths and pool ambience sound-objects punctuate this sonic landscape to reiterate the presence of the drowning boy. Some of these sounds are spatially articulated in alternating sides of the stereo image. This spatiomorphological mixing took into account the installation context for sound diffusion. The intention was to utilise the full stereo width to project the sonic landscape into the installation space and facilitate an immersive listening experience. Also, the engineering of distinct spatial dispositions within the sonic landscape offset the tendency for sound-objects

[262]The effect is simply produced by first reversing (playing backwards) the speech element, and then applying delay and reverberation. The transformed sound is then reversed again, which results in the perception of pre-echoes and reverberation before the onset of speech.

with high spectral densities and complex morphologies to mask one another. Overall, careful attention was paid to spatial dispositions to ensure that symbolic sound-objects like the boy's call could be clearly perceived.

An extended 'shush' gesture (01:10–01:18) represents the men's judgement that Leonora should not witness the events. Sound design supports this with a complementary time-stretched 'shush' sound-object. The hyper-realistic energy of the shush sound is rendered by subtle applications of filters, distortion, and pitch bend. This transformation maintains the continuity of indicative field references to breathing by emphasising the gestural morphology of exhalation. At the end of the shush, a near-silence coincides with a momentary absence of energy that is abruptly filled when the workers resume their rescue attempts. Their gestures are paired with four speech elements: "*The water is freezing*", "*Who is it?*", "*Poor bugger*", and "*Does anyone know his mother?*" The rescue sequence concludes with the intertitle "The men couldn't free the boy" and a reprise of the boy's call sound-object. This is followed by images representing Leonora's memory of the dead boy lying beside the canal (Plate V).

The boy is shown convulsing and regurgitating water, a mechanical bodily process that gives an illusion of life (Plate V). This representation of death by drowning is extended using a sonic metaphor that aligns breath inhalations with water ingestion, and exhalations with water expulsion. An 'inhalation-ingestion' sound-object was created from the cross-synthesis of two sounds: an inhalation, and water draining down a sink. The cross-synthesis was controlled to produce a spectral morph from the sound of water to an inhalation sound, passing through intervening phases that combine both spectromorphologies.[263] To improve the morph, a slight pitch bend was applied to the water sound. This sound represents the ingestion of water into the boy's lungs, and the sonic landscape articulation evokes an impression of inner body space as the source. Audiovisual synchresis was engineered by aligning the visual convulsions of the boy to the termination of the morphed sound-object (01:36).

[263]A phase vocoding/cross-synthesis patch in MAX/MSP was modified to produce the morph sound-objects. Careful sequencing of the two sound-objects was necessary to ensure that the onset and termination phases of the resultant morph sound-object matched the visual durations of each inhalation-ingestion and exhalation-expulsion phase. Within the patch, a simple cross-fade routine controlled the relative balance of the signal spectrums analysed by FFT objects.

The same cross-synthesis process was applied to the creation of the exhalation-expulsion morph sound-object. In this case, a breath exhalation was spectrally morphed to a water 'gurgle' to represent the expulsion of water from the lungs. Audiovisual synchresis was achieved by synchronising the water gurgle to the boy's gesture of expelling water from the mouth (01:39). This visceral representation of death by drowning ends the first section of the film.

9.2.2 Section II: *Abstract-Imaginative Reflection*

[DVD Ch.2 01:41]

The first section structures Leonora's fractured vivid-emotional memories to form a narrative of the accident. In contrast, section two's non-narrative form represents Leonora's reflections on her memories, and an imaginative reconstruction of that which she was not permitted to see. The structure of these reflections is thematic and possibly symbolises a psychological process of coming to terms with a traumatic childhood experience.

The section's imagery fixates on the boy and the workers. In the foreground, the dancer's repetitive movements signify the workers' submergence in, and emergence from, the lock's waters. The expulsion of water from the mouths of the two dancers is a further signification of the workers rescue attempt, and the boy's drowning. The perception of depth in the image composite gives an impression of the boy tumbling freely underwater a considerable distance away. This establishes a spatial metaphor that alludes to the workers' inability to reach the boy in time to save him.

In the project requirements meeting, the filmmaker expressed concern that the section's repetitive imagery might fail to sustain audience interest. She suggested that sound design might offset this by rendering an impression of development: "[...] the soundscape should gradually empty out and become progressively more ambient" (Burrows 2007, *Project Requirements Meeting*). While the author concurred with her points about development, rendering a progression towards greater ambience did not seem to be an effective strategy for sustaining interest. The author proposed an

alternate approach, which was to render impressions of development within audiovisual relationships. The filmmaker agreed to this, and sound design's inter-modal compositional strategy subsequently focused on engineering synchresis between the gesture-motion indicative fields carried by visual morphologies and sonic landscape spectromorphologies.

Throughout the section, dancer motions and gestures are structurally aligned with the spectromorphologies of 'vox pad' sound-objects. For example, an inhalation vox pad sound-object is aligned with an emergence motion (e.g., 01:49–01:55). Following the same logic, an exhalation vox pad was synchronised with a submergence (downward) dancer motion (e.g., 03:10–03:16). At points where water is shown being expelled from the dancers' mouths, the vox pad is often combined with an ingestion-inhalation morph sound-object (e.g., 02:01–02:04), followed by an exhalation-expulsion morph sound-object (e.g., 02:09–02:10). Applying Smalley's structural spectromorphologies to audiovisual relationships (Smalley 1986), one could describe these synchretic associations as being 'confluent' or 'reciprocal' in nature. However, the pattern evolves somewhat asynchronously, with vox pads and ingestion-inhalation/exhalation-expulsion sound-objects rendered independently of emergence and submergence motions. Consequently, at various points in the sequence, the respective motion cycles within the image and sonic landscape appear to form 'displaced' structural relationships, and may also form passing impressions of 'causal' structural relationships (Ibid.).

Over the course of the section, synchronous audiovisual relationships first establish an impression of synchresis (i.e., inhalation-emergence, exhalation-submergence), then asynchronous audiovisual relationships are formed by the subtle displacement of vox pad spectromorphologies and dancer motions. This allowed sound design to engineer other meaningful instances of synchresis. These include the structural alignment of an exhalation vox pad with a dancer's hand gesture 'pulling down' on his face (04:20–04:26), and the synchronisation of an exhalation vox pad with the slow turn of a dancer who looks over his shoulder (04:34–04:38).

Sound-objects derived from time-stretching the workers' speech provided a source of sonic landscape variation and structural development for the section. Reusing these sounds also reinforces the impression that Leonora is imaginatively reflecting on her memories. Speech was transformed with a focus on preserving intelligibility and pitch, while phrases were structurally articulated to align meaningfully with the images. At times this implies that a worker is the source of the speech (e.g., 01:57–02:10). Also, the unknown identity of the boy is signified following the alignment of the phrase "*Who is it*?" with an image of the boy floating in the water (03:16).

With respect to the sonic landscape concept for this section, the unrealistic qualities of the speech could be interpreted as signifying Leonora's post-event reflection on the emotions of the workers. These unrealistic qualities are produced by the time-stretching process, which extends spectromorphological patterns and magnifies phonetic stress. These stress patterns function as cues to the emotive qualities of the utterances indicative field (Smalley 1992). Sound design uses these utterance stress patterns as a signifying index to the complex emotions of the workers.

Also, a series of time-stretched reversed vocal sound-objects forms an atmospheric layer within the sonic landscape. These sound-objects are semantically meaningless, but as utterances they possess emotional stress patterns (e.g. 04:06–04:18). It should be acknowledged that perceptions of phonetic stress and enhanced emotive qualities in time-stretched speech are illusory and linked to the sonic artefacts of processing.[264] The compositional intention was not to create misleading interpretations, but to strengthen the impression that Leonora is reflecting on the anxieties and complex emotions of the workers.

Other atmospheric layers of the sonic landscape build on the whistle drone sound-object. This includes the ambient sounds of water dripping in a cave, which forms an environmental reference to the lock's partially enclosed space. Also, the 'haunted', unsettled atmosphere of the sonic landscape is supported using 'howling/whistling

[264]With time-stretching, this includes the audible stuttering effect that results from waveform interpolation.

wind' sound-objects derived from vocal resynthesis.[265] Additional colouration of the lock ambience was provided by small granular clusters of high-frequency signals generated using subtractive synthesis.[266] The spectromorphology of these sounds-objects was designed to mimetically reference water sounds.

The film's conclusion implies a change in Leonora's consciousness as she emerges from a state of contemplation into a 'present' reality. This transition is represented by images of Leonora's face as a girl and as a middle-aged woman. The shot focusing on Leonora's eyes refers to the narrative meaning articulated by the intertitles "*Children have this curiosity for looking...*" and "*...at something that could be dead*". A superimposed image of the boy lying beside the canal connects these images of Leonora, and implies that this is her most enduring memory. The sound design for this transition is based on an increase in the volume of a white noise sound-object. This signifies the purging of the Cartesian theatre of memories and imaginings associated with the accident. The white noise also functions as a spectromorphological reference to the roar of water at its most turbulent. The noise reaches its crescendo as the image layer of the boy fades and an older Leonora looks into the distance. The end credits are supported by atmospheric sound-objects, including the whistle drone and frequency clusters.

9.3 Critical Reflection

The final phase of soundtrack post-production followed the filmmaker's review of a 'draft' sound design. As noted in section 9.1.1, project planning identified this session as an opportunity to formalise any change requests. Previously, the project requirements meeting had generated only a vague brief for sound design. Consequently, the draft sound design largely reflected the author's own narrative interpretation, conceptual formulations, and aesthetic choices.

[265]Metasynth's image synth tool and also re-synthesis patches in Kyma X were used to create these sound-objects.
[266]A subtractive synthesis patch within Kyma X was used to create these sounds.

For the author, the risk associated with the filmmaker's creative faith in an 'action and reaction' approach to soundtrack development was accompanied by a unique opportunity for practice-research. It was realised that critical reflection on the sonic arts approach could benefit from the filmmaker's 'reactive' assessment of *The Lock* sound design. The review session therefore constituted a litmus test of the author's interpretative and storytelling skills using sonic landscape discourse. As events transpired, the review session provided several practical knowledge insights.

9.3.1 The Filmmaker's Evaluation of Sound Design

The author did not explain the conceptual rationale for the sound design prior to the filmmaker's review. While the primary reason for this was to elicit raw feedback, it was also circumstantially prudent, as the filmmaker was clearly anxious about the screening. The filmmaker's first responses were complimentary and acknowledged the work's narrative depth, as well as the author's sensitive engagement with the subject. However, the filmmaker also admitted to feeling overwhelmed by the impact of sound design contributions:

> It is such a shock to see it with sound after seeing it silent, you know; I'm so used to reading it as a silent thing. (Burrows 2007, *Sound Design Review Session*)

This reaction was in line with the author's expectations, and after repeated viewings supported by a commentary on the sound design, the filmmaker came to terms with the shift in interpretation. She also affirmed the soundtrack's added value in her own terms, noting: "It's full of interesting textures, and the environment of the sound is really good" (Ibid.).

The sound design for section one (vivid-emotional memory) was generally well received. In particular, the filmmaker appreciated the sonification of factory work gestures as a reference to local history:

> What I like about all that factory sound is what people say about Pontypridd before industrial decline, basically how noisy it was with industry. (Ibid.)

The filmmaker was also pleased with the contrast of structural relationships between factory work sound-objects and atmospheric sound-objects in the sequence showing Leonora's approach towards the lock (Plate II):

> I like the relationships of those sounds when she's walking. I like the ambient thing, and then the abrupt rhythm, I like that disjunction, I think it's good. (Ibid.)

Overall, the filmmaker was satisfied with the dramatic impact that sound design had brought to the first section. Also, there were no significant change requests. This suggests that sound design's concept of representing vivid-emotional memory was coherent with the filmmaker's vision. In this regard, the transcript of Leonora's testimony was a significant resource for sound design, as it provided insight into the filmmaker's narrative interpretation and structure for section one.

In comparison, the representational concept for section two sound design (abstract-imaginative reflection) was based entirely on the author's interpretation. Moreover, in the project requirements meeting, the filmmaker had seemed genuinely uncertain about what this section actually represented. Therefore, the sound design provided the filmmaker with an interpretation to 'react' against, which prompted her to focus on her own vision. The filmmaker principally remarked on the aesthetics of the sound design, which led her towards certain associations between style and genre:

> I don't know what it is because it's very complicated, but it feels a bit sci-fi, and I'm thinking *Dr. Who*. The treatment of the sounds, sounds 'science fiction'. (Ibid.)

While the film's sound 'treatments' (spectromorphologies) are not genre-specific, they activated the filmmaker's listening association with science fiction. The author had not previously considered the possibility that genre-typed associations might become a

factor in interpretations of this work. On further consideration, one sees that the filmmaker's response implies the action of a 'specialist listening' attitude, one that "[...] shuts itself off from certain meanings, certain potentialities, or else it tries to bring everything into its own domain" (Chion 2009b, p.25). In effect, the filmmaker's specialist knowledge informed her interpretation, and this accounts for the science fiction association.

Unfortunately, the filmmaker found it difficult to look past this association and appreciate the compositional rationale behind using certain spectromorphologies and indicative fields to establish a symbolic discourse. For instance, the filmmaker did not recognise how sonic landscape designs had deepened the signification of drowning by using a structural metaphor based on the alignment of breath morphology (inhalation/exhalation) and worker motions (emergence/submergence). These significations were duly explained, but for the filmmaker they were obscured by her primary listening association. As a consequence of this mixed review, the filmmaker proposed implementing her initial suggestion for an ambient soundtrack to accompany section two. The filmmaker also requested the removal of the time-stretched voices, which she thought might be 'too disturbing' for the audience.

These change requests were subsequently addressed, and the filmmaker also re-edited the second section to make it shorter.[267] On reflection, it is apparent that Burrows's hesitations over the section two sound design were intensified by other factors. In comparison with other films in the installation series, *The Lock* stood out as an abstract experimental work. The filmmaker worried that this quality, combined with the film's dark subject matter, might alienate sections of the intended audience.[268] Her anxiety on this point suggests that Burrows's change requests were partly motivated by a need to tone down the film's impact. Burrows's concerns were reiterated when the author visited the installation. Following some negative reactions from residents, Burrows intimated that it might have been prudent to omit the film and screen it separately for an 'arts' audience.

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[267]Shortening the second section was Burrows's attempt to minimise the risk of the audience becoming bored with repetitive imagery. With the addition of an ambient soundtrack for the section, this seemed like a logical approach.

[268]The audience included a number of elderly Pontypridd residents who had contributed their memories to the project.

9.3.2 Applications of the Conceptual Framework

The DVD and supporting commentary presents the full-length version of *The Lock* and its original sound design.[269] Critical reflection on the project outcomes suggests the focused narrative statement made by section one reflects a convergence of the creative visions respectively held by the filmmaker and sound designer. In contrast, section two brought about differing interpretations that led to a divergence of creative visions. Both outcomes are possible in an 'action and reaction' approach to soundtrack development.

With hindsight, the non-narrative structure and abstract representational form of section two was more open to diverging creative visions. Given the vagueness of Burrows's initial brief for sound design, the author had no alternative but to follow his own interpretation and compositional intentions in both sections. In this regard, the creative vision for sound design was inspired by a sonic landscape concept that sought to distinguish between the representation of vivid-emotional memories and that of abstract-imaginative reflections. This concept is coherent with the film's theme of memory, and in practice it facilitated compositional applications of sonic landscape.

While the creative liberty afforded to the author in this project was exploited as a practice-research opportunity, a concerted effort was made to work sensitively within the boundaries set by the film's subject and form. The sound design sought to extend the film's visual chain of significations by establishing a sonic landscape metaphorical discourse that explored the symbolic relationships between breathing and drowning. Meaningful audiovisual relationships were also engineered by analysing visual gestures and then developing complementary intersonic structural relationships and sound-object spectromorphologies. *The Lock* sound design therefore demonstrates effective applications of the sonic arts conceptual framework.

In summary, the project was a significant source of practical knowledge that advanced several lessons for professional development. For instance, the open creative

[269] This sound design is based on the 'draft' version presented to the filmmaker with some minor mixing adjustments.

conditions of the project engendered a risk that certain sound design contributions would not be appreciated and accepted by the filmmaker. This risk was managed in so far as the schedule allowed time for change requests to be addressed. On further reflection, Burrows's reaction to section two offers a useful insight into the 'action and reaction' approach to soundtrack development. In this case, the filmmaker did not initially advance a clear rationale for the soundtrack. Consequently, the creative vision of the sound designer presented the filmmaker with an interpretation to 'react' against, which facilitated her own ideas. While this is an aspect of the 'action and reaction' approach, there is a possibility, as was the case with *The Lock,* that sound design contributions may overwhelm the filmmaker. Moreover, the sound designer must have a pragmatic attitude to the outcomes of 'action and reaction' strategies, which may produce both convergent and divergent interpretations of the film.

Chapter 10

Conclusions

This study pursues two interdependent research aims that constitute the development of a sonic arts approach to sound design. The first research aim concerns the definition of the approach and its supporting (interdisciplinary) conceptual framework. The second aim focuses on acquiring practical knowledge of the approach through applications of the conceptual framework. Over the course of the study, practical knowledge informs the development of the sonic arts approach and its conceptual framework.

Tracing the post-modern historiography of sound design reveals a sonic arts influence on its development. One definitive source of influence stems from Walter Murch's applications of musique concrète to sound montage. The research builds on this sonic arts foundation, reframing sound design practice in terms of an inter-modal compositional strategy that applies theories of electroacoustic music. This development also acknowledges that concepts advanced by soundtrack studies can meaningfully enrich sound design approaches to storytelling.

The three case studies report on various applications of sonic landscape, spectromorphology and indicative fields within the inter-modal compositional strategy. Discussion in this chapter will critically reflect on the case studies and practical knowledge of conceptual framework applications. The evaluation of the sonic arts approach also examines practical knowledge of extended sound design practice in different project contexts. The chapter closes with general conclusions on

the outcomes of practice-research before outlining plans for future research and professional development.

10.1 Evaluation of Conceptual Framework Applications

The case studies illustrate a range of possible applications of the interdisciplinary conceptual framework. Collectively, the case studies present evidence that applications of sonic landscape, spectromorphology, and indicative fields theories can creatively enable the analytical and generative aspects of the inter-modal compositional strategy. This assessment acknowledges that the scope of case-study research is restricted to just three practice contexts. Section 1.2.2 notes how the formulation of case studies is directed by methodological criteria stipulated for multiple case-study research. One criterion specifies that multiple cases in a design must bear contextual similarity and generate sufficient comparable evidence to support the aims of research (Yin 2003).

Adherence to this criterion helped narrow the range of possible case studies to three projects that enabled sound design to take a multifaceted role and assume creative responsibility for soundtrack post-production. From the outset it was judged that such projects represented an ideal context for a practice-research evaluation of the interdisciplinary conceptual framework. Moreover, each case study describes a project driven by the non-commercial ideals of independent film. While the case studies point to a specific practice form and project context, the findings of this study in entirety represent a knowledge contribution with wider relevance to the field of sound design and soundtrack studies.

10.1.1 Sonic Landscape: Conclusions on Sound Design Practical Knowledge

Over the course of the study, critical reflections on practice applications of sonic landscape were not limited to the three case studies, but also incorporated the author's work on other projects completed during the practice phase of research. However, the three case studies alone present clear evidence that the inter-modal compositional strategy is based on an audiovisual application of Wishart's sonic landscape principles. In general, the sonic landscape approach to inter-modal composition facilitates the creative development of sound designs in the following ways.

In all three case studies, the sound design commentaries affirm how the inter-modal compositional strategy aims to structurally combine film images with complementary sonic landscape impressions. Reflecting the requirements of a sequence, one or more sonic landscapes are evoked from the perceived relationships between sound-images located in diegetic and nondiegetic representational spaces. In practice, the objectives of sonic landscape design map to a production process that integrates the creative agency of the audiovisual and intersonic compositional modes.

When articulated as a top-down process, sound design requirements considered in the audiovisual compositional mode can be defined in terms of sonic landscape designs and indicative fields. In the intersonic compositional mode, the sonic landscape design is further specified through the application of spectromorphological categories and forms to the analysis of indicative fields. This process yields sound-design criteria for sound-objects and soundtrack structural relationships, which can be effectively mapped to technical parameters controlling generative and transformative processes.

To confirm this process logic, a bottom-up perspective may also be considered. At the level of the sound-object, the intersonic compositional mode focuses on engineering spectromorphologies that structure perceptions of indicative fields. These phenomenal qualities of sound-objects evoke corresponding sound-images and establish their perceived relationships in space. In turn, this spatialised distribution of sound-images evokes a sonic landscape impression, one that constitutes an aspect of perceived audiovisual relationships within the film form.

In practice, the aforementioned process of sonic landscape design is rarely fully top-down or bottom-up, and is more often an organic hybrid of the two that commences with image analysis and sound-object creation in parallel. This inherent flexibility of compositional approach enables the sound designer to work effectively with an alternative conception of the soundtrack and its relationship to film images. Specifically, the approach views the soundtrack as a spatialised structure of sound-images, comprising one or more sonic landscapes that evoke impressions of 'place', environments, and sound sources. Moreover, the inter-modal strategy for sonic landscape composition links meaningfully with sound design considerations of soundtrack 'storytelling' functions, including the complex relationship between sound-object perceived qualities and significations (i.e., causal associations, source identities, symbolic meanings). From the case studies, various practice applications of sonic landscape illustrate how its compositional approach and conceptual basis aligned well with sound design requirements to structure aural perceptions (impressions) of diegesis.

In *Song of the Falklands*, realistic sonic landscapes support visual representations of the story world and extend its aural impressions into offscreen space using acousmatic sound-images. In the film, sonic landscape designs also occasionally structure the acousmatic sound-images of re-figured location recordings in ways that conflict with diegetic realism. This is evident in the sonic landscape design of the sequence *'Magnificent Men'*, where unrealistic re-figurations of sound evoke a surrealistic diegetic impression that supports a metaphorical discourse with narrative significations.[270]

Practice also uncovered applications of imaginary sonic landscape designs that blur the perceived border between diegetic and nondiegetic space. In the films *The Immortal* and *The Lock*, imaginary sonic landscapes supported audiovisual representations of subjective realities associated with memories, flights of

[270]This refers to the unrealistic re-figurations of a brass band musical arrangement and the Lord's Prayer. The former effect undermines the seriousness of the military showpiece, whereas the mixing of excerpts from the Lord's Prayer with the national anthem supports the montage signification of narrative themes connected to the Falklands War.

imagination, and dreams. Moreover, these projects highlight that sonic landscape design, as an aspect of the conceptual development of a sound design; can provide an inspirational focus and creative momentum that generates compositional ideas. In both cases narrative analysis readily formed meaningful concepts for imaginary sonic landscape designs, advancing a representational theme based on the idea of the 'Cartesian theatre' (Blackmore 2003). These sound designs are driven by the concept of the Cartesian theatre (consciousness) as the representational space of sounds and images associated with memories, dreams, and imaginings.

Sonic landscape composition also supports sound design strategies that focus on developing a symbolic-metaphorical discourse to meaningfully extend film narrative. In *Song of the Falklands*, community radio is identified as a metaphor for Islander collective consciousness. In several sequences the sound design develops a symbolic discourse using radio sonic landscapes that counterpoint the image. In the 'History' section, an imaginary sonic landscape design evokes the impression of a radio device as a source of messages that describe a history of colonial disputes. Also, the sequences *'Prelude to Invasion'* and *'The Invasion Show'* illustrate how re-figured radio sonic landscapes structured within a dialectical montage contribute a chain of significations to the film's narrative subtext on the Falklands War. These examples also reflect the application of Murch's concept of metaphoric distance in audiovisual relationships (Murch 1995). This further suggests that sonic landscape can be applied in sound design to facilitate the audience's imaginative engagement in resolving narrative meanings.

In practice, sound design creativity was facilitated by experimenting with sonic landscape permutations for sequences. This opened up different representational possibilities and narrative interpretations for subsequent compositional exploration. One approach involved manipulating the perceived nature of the space and the spatial disposition of sound-images (realistic vs. unrealistic). Another approach focused on altering the balance of realistic and unrealistic sound-images in the sonic landscape. Both approaches were aspects of the design process for layered atmospheric sound textures in *The Immortal.*

Overall, practice experimentation revealed that subtle variations in sonic landscape design could have a significant bearing on the meaningful interpretation of audiovisual representation. Evidence to support this assertion can be found in the 'History' section of *Song of the Falklands*. For example, in the sequences '*Sea lions*', '*Bird Parliament*', and *'Rights & Property'*, the compositional intention was to engineer a surrealistic alignment of the radio docudrama narrative with shots of coastal wildlife. The approach involved manipulating spatial indicative fields to render the illusion of nondiegetic voices 'projecting' into diegetic space. The surrealism effect relies on a momentary blurring of distinct perceptions of the diegetic '*Coastal Surroundings*' and nondiegetic '*History Radio*' sonic landscapes. Despite these compositional intentions, it is arguable whether the effect is possibly too subtle to evoke a fleeting impression of surrealistic sonic landscape that combines realistic sound-images (coastal ambience) and unrealistic sound-images (docudrama voices). Irrespective of this possibility, in these sequences the radio docudrama sonic landscape still fulfils its primary function within the montage, by forming a meaningful dialectic with the imagery to emphasise the narrative significance of the historical message.

Critical reflection on the application of sonic landscape suggests that its full creative potential in sound design is realised when the diegesis represents subjective experiences or unrealistic phenomena. In *The Immortal*, the sound design attempts to render impressions of a single imaginary diegetic sonic landscape for the Cartesian theatre with Rufus's I-voice as its centre. However, retrospective analysis suggests that single sonic landscape impressions are only sustained when Rufus (the narrator) is not speaking. In spite of the compositional intentions, the perceived intimate 'presence' of Rufus's I-voice and its reflective tone, tends to facilitate its interpretation as a conventional narration that is nondiegetic and therefore metaphorically distant from diegesis. Indeed, the separation of the narrator's voice into a nondiegetic sonic landscape that is also selectively used for music, does not detract from the atmospheric and symbolic qualities of the diegetic sonic landscape that support the representation of memories, dreams, and imaginings. On further consideration, sequences such as '*Immortal City*', demonstrate how the manipulation of the spatial

indicative field of music to reflect the diegetic environment can evoke single sonic landscape impressions.

The impression of single imaginary sonic landscapes is more consistently sustained in *The Lock*. This film features neither narration nor underscore, making it easier to evoke a single sonic landscape that supports the representation of two aspects of recollection.[271] Similar to *The Immortal*, *The Lock* sound design focuses on rendering imaginary sonic landscapes that support representations of subjective realities projected within the Cartesian theatre of consciousness. This shared sonic landscape concept underpins the strong narrative contributions and bold artistic statements made by the sound designs of both films. Key to this was the creative license given to the sound designer to engage his storytelling voice through the sonic landscape approach.

In stylistic terms, the soundtracks of *The Immortal* and *The Lock* occasionally approach the aesthetics of electroacoustic music. In these cases, the sonic landscape composition articulates meaningful intersonic relationships between soundtrack elements that comprise diegetic sounds, nondiegetic music and narration, as well as 'emotive' atmospheric sound textures that appear to transcend the border between diegetic and nondiegetic representational space. If one applies Emmerson's analytical matrix of electroacoustic music forms (Emmerson 1986), these sonic landscape designs fall into a hybrid category because they combine 'mimetic' and 'aural' discourses.[272] In principle, this categorisation could apply to most film soundtracks on the assumption that intersonic relationships between soundtrack elements are compositionally meaningful. The sonic landscape approach to sound design embraces this view by attempting to compose meaningful intersonic relationships between the aural discourses of film music and the mimetic discourses of film sound effects. Furthermore, *The Immortal* and *The Lock* sound designs show how a compositional approach to soundtrack intersonic relationships can meaningfully extend film narrative with a symbolic discourse. In both films, this symbolic discourse is

[271] These representational aspects based on vivid emotional memories and abstract imaginative reflections divide the film into two parts.
[272] In Emmerson's terms, mimetic discourse can be either a literal or non-literal signification of a concrete natural phenomenon. For example, in Saint-Saëns's *Carnival of the Animals*, a clarinet mimetically references the call of a cuckoo. In contrast, aural discourse in music is abstract and carries no extrinsic significations.

occasionally carried by evoked sonic landscape impressions that transcend the border between diegetic and nondiegetic representational space.

In summary, the sonic landscape approach to sound design advances the idea that soundtrack intersonic relationships bear significantly on the interpretation of audiovisual relationships and the meaning of film representations (Burch 1985; Théberge 2008). While this view of the soundtrack is not fully shared by Chion (Chion 2009a), these structural principles of sonic landscape composition are coherent with the creative rationale of sound design expressed by Murch (1995) and Sonnenschein (2001). Finally, in this study practice applications of sonic landscape have reflected the emphasis that Murch places on articulating sounds in space, as well as the need for the sound design to imaginatively engage the audience by contributing a metaphorical-symbolic discourse to film narrative (Murch 1995; LoBrutto 1994; Sonnenschein 2001; Costantini 2010).

10.1.2 Spectromorphology: Conclusions on Sound Design Practical Knowledge

In practice, the approach to sonic landscape design forms the basis of the inter-modal compositional strategy. As previously noted, sonic landscape design in the audiovisual compositional mode is interdependent with the intersonic compositional mode, which considers the perceptions of indicative fields and spectromorphologies in detail. The process involves mapping sonic landscape requirements to indicative fields and spectromorphological forms to derive a sound design criterion for sound-objects and soundtrack structural relationships.

In *Song of the Falklands*, the analytical affordances of spectromorphology are applied to AM radio sound. This generated sound design criteria for radio sonic landscapes in the 'History' section. In this case reduced listening aided the spectromorphological analysis, which identified the perceived qualities of radio sound.[273] This analysis is a key aspect in the development of a sound design 'radioizing' process for docudrama voices and sound effects.[274] The sound design also applies indicative fields and

[273]See also appendix 1.2.
[274]See also appendix 1.3.

spectromorphological categories to the image analysis of visual motions and gestures for the sequence *'Sheep to Sweater'*. In this case, the image analysis derived a spectromorpholological design criteria for synchronous sound-objects that functions as a compositional syntax for a 'work song' of industrial (wool) production.

This approach to image analysis is also applied to *The Immortal*. In this project, animation sound design involved mapping perceived visual gestures, textures, and motions to their corresponding sound indicative fields and spectromorphological forms. It was noted that in this context, certain spectromorphological categories are highly applicable (e.g., motion typology), as Smalley's descriptive language is evocative of visual associations. For animation sound design, a strategy that begins with visual indicative fields analysis followed by spectromorphological design is both practical and creatively enabling, particularly when it is combined with a use of studio tools that permit spectromorphological forms to be effectively mapped to sound engineering parameters.[275] The same logic also applies to acousmatic sound-object design, but in this case indicative fields are not given by the image, but are evoked aspects of the sound-image that are rendered by spectromorphologies.

The Immortal and *The Lock* projects also generated practical knowledge of applications of indicative fields and spectromorphology to the transformations of concrete sound-objects. In many instances, the transformation aimed to retain certain perceived qualities of the concrete sound-object. For example, in *The Lock*, the sound design of abstract atmospheric sound-objects involves transforming breath sounds to offset clear recognition of their sound-images. The gestural indicative field and motion typology forms are applied to ensure that the transformed sound-objects retain perceived inhalation and exhalation morphologies. The compositional intention behind these spectromorphological transformations is to create ambiguous sound-images that activate second-order significations of breathing.[276] The sonic landscape design utilises breath morphologies perceived in atmospheric sound-objects to form a

[275]See Section 10.3 for a discussion of the use of studio tools in relation to applications of spectromorphology to sound design.
[276]In contrast to first-order significations of 'breaths' as the cause of the sounds. The transformation aims to offset causal recognition of human breaths in order to focus interpretation on a second-order signification of breathing as a structural metaphor.

structural metaphor within a 'mimetic-symbolic' discourse that explores the narrative subject of drowning.

Indicative fields and spectromorphology were similarly applied to sound-object transformations for the sound design of *The Immortal*. For example, the transformation of Buddhist chants dehumanised the source, thereby offsetting linguistic and cultural recognition while preserving qualities of the utterances indicative field. This spectromorphological transformation permits the rhythmical entraining qualities of the chants to signify an altered state of consciousness associated with immortality. Qualities of the utterances indicative field are also intentionally preserved when granular re-synthesis techniques are applied to render atmospheric background textures from chant phrases.

The three case studies report on acquired practical knowledge of spectromorphological categories when they are applied to the composition of intersonic relationships between soundtrack elements. These applications include the design of dynamic structural relationships between layers of atmospheric sound-objects to engineer perceptions of 'interior' textural motion. In reference to the sound design of *The Immortal*, it was discovered that articulating variations in the 'behavioural' characteristics of intersonic relationships yielded not only impressions of textural motion, but also meaningful effects on the atmospheric mood evoked by the sonic landscape.

This is demonstrated in dream sequences from *The Immortal*, and also the second section of *The Lock*.[277] In these sequences, the spectromorphologies of intersonic structural relationships are frequently characterised by interaction, confluence, reciprocity, and synchrony. Consequently, the perceived nature of intersonic relationships allows a balanced, stable, and harmonious atmospheric impression to be evoked by the sonic landscape. In contrast, in the *'Seizures'* sequence in *The Immortal* and the *'War Climax–Communications War'* sequence in *Song of the Falklands*, intersonic structural relationships are characterised by reaction, displacement, competition, and asynchrony, giving the evoked sonic landscape impressions an

[277]In the case-study this section is referred to as 'abstract-imaginative reflection'.

unstable, dissonant and inharmonious atmospheric quality. In each of these cases, the sound design engineered the spectromorphological characteristics of intersonic relationships to evoke sonic landscape atmospheric qualities that support an appropriate narrative interpretation for the sequence.

In summary, the case studies present practical knowledge of indicative fields and spectromorphology as applied analytical tools and design criterion within the inter-modal compositional strategy. These applications are by no means exhaustive, but are nonetheless effective demonstrations of the creative value and potential that these concepts represent for sound design. A concerted effort was also made in the writing of the case study commentaries to demonstrate how spectromorphology and indicative fields theories can be applied as a descriptive language of sound perception in relation to soundtrack analysis.[278] While this language is used in correspondence with sound design applications of spectromorphology and indicative fields, the commentaries bear comparison with discourses on soundtrack analysis found within film studies. Hypothetically, spectromorphology is ideally suited for the purposes of soundtrack analysis, as its perceptual categories were originally developed to support the analysis of electroacoustic music (Smalley 1986; 1997).

10.1.3 The Sonic Arts Approach to Sound Design: General Conclusions

Machover (1986) notes that concepts which inform compositional practice must be selectively adapted to reflect the objectives of a particular artistic vision. This logic underpins the development of the sonic arts approach to sound design. Specifically, this approach selectively adapts concepts from electroacoustic music and soundtrack studies to reflect the objectives of a soundtrack compositional strategy that emulates Murch's principles of a multifaceted practice (Murch 1995; 1996).

This research uncovers evidence of a sonic arts influence and compositional approach to the soundtrack, which includes Murch's application of musique concrète techniques

[278]Section 4.3.1 discusses this application in reference to Altman (1992), who argues that soundtrack studies requires a detailed language of film sound perceptions. It is also noted that Gates and Rudy (2005) have applied spectromorphology to the soundtrack analysis of *Black Hawk Down*.

and aesthetics in sound montage. This significant connection between 1950s electronic music and sound design's practice precursor, establishes a foundation for the integration of post-Schaefferian theories of electroacoustic music within the interdisciplinary conceptual framework. In this regard, Chion's application of Schaefferian concepts to film sound studies (e.g., acousmatic sound, listening modes)[279] provides a key theoretical link between the soundtrack and electroacoustic music.

In practice, soundtrack-studies concepts oriented compositional applications of sonic landscape, spectromorphology, and indicative fields, thereby ensuring their meaningful relationship to the storytelling objectives of sound design. In relation to other practice perspectives on sound design, in particular Murch (1995; 1996) and Sonnenschein (2001), sonic landscape is an effective approach to deploying audiovisual poetic modes and developing metaphorical-symbolic discourses. These applications are also informed by selected concepts associated with soundtrack analysis that point to how sounds in their relationships to the image carry a multidimensional added value for film experiences (see Chion 1994; 2009a). Overall, the applicability and inherent value of soundtrack-studies concepts to sound design compositional strategies is generally borne out by the case studies. One notable example is the application of montage dialectics to audiovisual relationships in *Song of the Falklands*.

Throughout the practice-led phase of research, the interdisciplinary conceptual framework evolved in correspondence to an expanding practical knowledge of its applications. The three case studies collectively demonstrate how various applications of the conceptual framework facilitate the creative objectives of sound design practice. In turn, acquired practical knowledge progressively refines the practitioner's applications of sonic landscape, spectromorphology and soundtrack studies theories to the inter-modal compositional strategy. The case study evidence also highlights the inherent flexibility of the sonic arts approach to address the sound design requirements of contrasting films. Moreover, in each case the sonic arts approach yields a strong narrative contribution to the film.

[279]See Chion (1994; 2009a).

The author recognises there is a connection between the three films in terms of experimental qualities. Specifically, *Song of the Falklands* takes the structural form of intellectual montage, whereas experimental representational aesthetics are evident in *The Immortal* and *The Lock*. On reflection, these qualities combined with the filmmakers' creatively open attitudes to sound design suited the sonic arts approach. However, this does not imply that the sonic arts approach is only applicable to films that possess experimental qualities, or to project conditions where the sound designer is given considerable creative license to develop a conceptual vision for the soundtrack. In point of fact, experiences across the practice phase suggest that the inter-modal compositional strategy, as well as its conceptual framework applications, can be successfully adapted to reflect the requirements and project conditions of different films.

Overall, the case study evidence affirms the potential of the sonic arts approach to sound design to be generically applied across film genres and project conditions. While more project work is required to fully explore and discover sound design applications of sonic landscape and spectromorphology, conclusions may be drawn on the basis of practical knowledge acquired across the practice phase of this study.

Critical reflection on the practice of the sonic arts approach indicates that the storytelling objectives of the inter-modal compositional strategy are creatively enabled by sonic landscape design. Furthermore, the interdependence of the audiovisual and intersonic compositional modes is actively supported by the conceptual cohesion and practical compatibility of sonic landscape, spectromorphology and indicative fields theories. Notably, the sonic arts approach to sound design is not prescriptively applied in the project contexts examined, and as the author's experiences accumulated, key aspects of the approach became increasingly operationalised as tacit practical knowledge.

To elaborate on this, the author's practice experience of the sonic arts approach suggests how, over time, the process of sound design moved more fluidly between the audiovisual and intersonic compositional modes, and their respective considerations of

sonic landscape, indicative fields, and spectromorphology. This pattern follows sound design compositional intentions with respect to storytelling, and is supported by modal listening approaches. The tacit nature of this practical knowledge implies that the sound designer is not always conscious of shifts between compositional modes. The automatisms of the process also extend to applications of sonic landscape and spectromorphology. On analysis, this development of tacit practical knowledge indicates the efficacies of the sonic arts approach for the author.

The outcomes of this study have enhanced the author's professional development as a sound designer. In this regard, the practice-research established theoretical knowledge of the sonic arts approach, and complementary practical knowledge with explicit and tacit dimensions. This knowledge represents a solid foundation for sound design practice that the author aims to develop into a mature expertise over future projects.

10.2 The Practice of the Sonic Arts Approach to Sound Design

During the study's practice phase, the author was often questioned by project colleagues about the functions and creative responsibilities of sound design. This highlighted that general knowledge of sound design practices varied considerably among practitioners from different specialist disciplines. A significant proportion of these practitioners imparted points of view that reflect the predominant industry association with sound effects creation (Beck 2008), whereas others acknowledged that they were unclear about the form and scope of sound design's post-production responsibilities.

On reflection, these views had a bearing on the difficulties the author encountered in attempting to secure practice opportunities for an extended sound design role in certain project contexts. This is borne out by the author's failed attempt to secure sound design creative responsibility for soundtrack post-production on two short films for ITV Wales, *Owl Creek Bridge* and *The Bone Orchard.*[280] These projects had concurrent schedules, and in pre-production meetings with the producers, the author

[280]Both films were co-produced with It's My Shout in 2007 (http://www.itsmyshout.co.uk).

promoted the idea that sound design could alleviate organisational pressures on two inexperienced directors by assuming creative responsibility for the soundtrack. The suggestion was met with approval, but as both projects entered post-production, the producers expressed concerns that this approach constituted a risk because it deviated from in-house soundtrack conventions.[281]

The producers subsequently changed the plan, and the author's sound design role was restricted to sound effects creation. This outcome was detrimental to the soundtrack development of both films. In each case, creative responsibility for the soundtrack fell to the directors who did not seek sound design consultation on the integration of soundtrack elements.[282] The dubbing sessions for both films revealed the critical flaws in this strategy. When the separately created soundtrack elements were combined, there was a considerable lack of cohesion between the musical underscore and the sound effects produced by sound design. Recordings of dialogue made during these sessions indicated the frustrations of the dubbing mixer with the time consuming process of correcting these issues.[283]

Both directors appear to have acted in accordance with the producers' instructions not to consult with the sound designer on the production and integration of soundtrack elements. The rationale for their decision remains unclear, but one may speculate. Firstly, insufficient knowledge of sound design may have cultivated certain misinterpretations and false assumptions about how the role would be carried out. In spite of the author's explanation of sound design and its consultative functions, the outcome suggests that the producers were concerned about the power of the role to influence inexperienced directors. Secondly, it is also possible that the 'politics' of post-production culture in ITV Wales fostered an unwillingness to depart from

[281] When working as a composer and location sound recordist on previous It's My Shout / ITV Wales co-productions in 2006, the author noted that the general approach to soundtrack post-production at ITV Wales focused on dubbing sessions involving the director and an in-house sound editor/mixer. In 2007, sound design was introduced as a discipline on the two films mentioned for the first time.

[282] The dubbing mixer was responsible for editing and pre-mixing stems from location recordings. A composer separately provided music, while the author produced additional sound effects. Outside of dubbing sessions, the mixer was not contracted to offer the director's advice on soundtrack post-production.

[283] The author was allowed to observe and record these sessions for research purposes, but was not permitted to participate in them as a sound designer. The dubbing mixer's frustration focused on the inexperience of the directors, who had failed to see the need for sound designer and music composer to consult during post-production.

conventional practices. Had sound design been accorded greater creative responsibility, the majority of problems that arose during the dubbing sessions could have been avoided.

On the basis of this limited practice evidence, one cannot draw general conclusions regarding the status of sound design in UK television production companies. However, these project experiences suggest that sound design is recognised primarily as a sound effects creation practice in this context. Unfortunately it also appears that other integrated aspects of sound design (e.g., consultancy and soundtrack mixing) are not standard practices. This constitutes a missed creative opportunity for UK-based sound designers and the television industry.

In this study, the mixed fortunes of the Murchian approach to sound design on semi-commercial projects for television is contrasted with a successful application to low-budget independent film. In this context, the collaborating filmmakers in the project-studies viewed the multifaceted roles and creative responsibilities of sound design positively. This is understandable, given that many independent filmmakers do not possess the financial resources or the specialist practice skills required for soundtrack post-production. For filmmakers working with limited budgets and crew, a single sound designer's provision of consultancy, sound effects creation and soundtrack mixing represents an attractive proposition. On the surface this scenario appears beneficial to both sound designers and independent filmmakers. For the early-career sound designer, small independent films may present genuine opportunities to acquire practice experience of the Murchian approach. A balanced view suggests that successful project outcomes in such contexts are critically dependent on the quality of creative collaborations between sound designers and filmmakers (Sider 2003). The case studies highlight the significance of this professional relationship.

With *Song of the Falklands*, the absence of detailed requirements for sound design was counterbalanced by the filmmaker's involvement in practice-research. Sound design was therefore able to proceed with an informed interpretation of requirements based on an analysis of the filmmaker's conceptual framework. Towards the end of the project (Phase III), creative conflicts emerged as the filmmaker sought to deconstruct

aspects of the sound design in order to emphasise applications of his conceptual framework. The filmmaker's agenda subsequently failed on execution, and a final phase of development saw ideological differences set aside in order reach practical compromises, the outcomes of which confirm, that the film's completed soundtrack represents a synthesis of creative visions.

While the sound design for *Song of the Falklands* was eventually completed, consistent progress was hindered by the filmmaker's ineffective approach to project management and scheduling. Similar issues also impacted soundtrack post-production on *The Immortal.* Overall, practical knowledge acquired on projects characterised by one-to-one collaborations with filmmakers suggests that sound designers must be prepared to adapt to unforeseen changes in project conditions and schedules. Moreover, in these contexts the sound designer's attempts to instil organisational best practice must be part of a flexible strategy tailored to suit the filmmaker's approach.

The post-production schedule for *The Lock* was well managed, but in similarity with other case-study projects, sound design commenced without a clear set of requirements. This 'open requirements' scenario may be creatively liberating, but it also engenders certain risks that the sound designer may misinterpret the storytelling intentions of the filmmaker, with the possible consequences of prolonging post-production. While the sound designer may inform their interpretation through deep critical engagement with the film's narrative themes, practical knowledge acquired on *Song of the Falklands* and *The Lock* suggests that a strategic use of sound design reviews is also advantageous in offsetting risk. In these cases, the filmmaker reviewed the soundtrack at key points in its development. This established conditions that favoured an organic 'action and reaction' approach to sound design collaboration (Sider 2003). Specifically, on both projects, the filmmaker relied on the interpretative capabilities and 'action' of the sound designer to produce a soundtrack interpretation that could be 'reacted' against. The filmmaker's reactions subsequently informed the sound designer of potential narrative misinterpretations and also directed further soundtrack development. On *Song of the Falklands* this process of action and reaction went through several iterations and reflects the sound design's phased development.

10.3 Research Conclusions and Future Prospects

The two research aims that constitute this study focus on the development of a sonic arts approach to sound design. Over the course of the research, the integration of these aims enables both theory and practical knowledge to inform the development of the sonic arts approach and its interdisciplinary conceptual framework.

The first research aim focuses on defining the conceptual framework and its practice applications. This aim is principally accomplished through structured arguments and supporting literature reviews presented in Chapters' Two to Five. To reiterate, the author first establishes the foundations of the sonic arts approach and advances his inter-modal compositional strategy (Chapter Two). This is followed by an explanation of different aspects of the conceptual framework, incorporating theories associated with soundtrack studies (Chapter Three) and electroacoustic music (Chapters Four and Five).

The definition of the conceptual framework also reflects the integration of a second research aim, which focuses on generating practical knowledge of the sonic arts approach. The three practice cases studies collectively aid in accomplishing this aim, by documenting practical knowledge that demonstrates how the theories of sonic landscape, indicative fields and spectromorphology can be meaningfully applied to the inter-modal compositional strategy.

While the scope of practice-research is focused on three case-study projects, sufficient evidence is presented to support the conclusion that applications of the conceptual framework can creatively enable different aspects of the inter-modal compositional strategy. Facilitatory applications for sound design include the analysis of soundtrack requirements, which incorporates the development of representational concepts and narrative themes. Other effective applications are related to generative compositional processes, including sound-object creation and the mix 'orchestration' of soundtrack elements.

The development of the sonic arts approach to sound reflects the author's research interests, professional aims and artistic values. Accordingly, the intention is not to promote a prescriptive model for sound design that others can directly emulate in practice. Instead, it is hoped that sound designers will find this study informative, in particular those practitioner-researchers with an interest in developing the field's interdisciplinary links with electroacoustic music and soundtrack studies.

If one contextualises 'sonic arts' approaches to the soundtrack within the industry, then Gus Van Sant's *Last Days* (2005), David Lynch's *Inland Empire* (2006) and Peter Strickland's *Katalin Varga* (2009), are all notable examples of experimental aesthetics permeating the sonic landscape of art house film. More recently, Strickland's *Berberian Sound Studio* (2012) echoes *The Conversation* in its portrayal of sonic artistry, by dramatising approaches to film sound post-production that evoke the compositional spirit of elektronische musik and musique concrète. The film's soundtrack incorporates experimental sound montages recorded by the indie-electronica group 'Broadcast', a fact which points significantly to the untapped sound design potential of contemporary electronic music and its plethora of sub-genre forms.

As a background to the development of film sound design practice, there is an ongoing democratization of its related technologies, production models and modes of dissemination. Unquestionably, the increasing affordability of digital technology has placed 'prosumer' quality equipment within the reach of most aspiring audiovisual media producers. Coupled with the ubiquity of social media and mobile Internet access, these changes have effectively levelled the market playing field, allowing independent producers unprecedented opportunities to reach a global audience. Sound designers can similarly reap the benefits of the social media phenomenon, not only in terms of procuring project work and raising professional profiles, but also in relation to disseminating and accessing practice-research. Considering these factors, the online development of information niches about sound design could be an important step towards cultivating practitioner interest in research.[284] What also remains clear is that

[284]To this end, the author is in the process of making his case study work and research available online via a website that to sound design (http://www.boxgarden.biz - under development at time of publication).

sound designers must be ready to adapt to changes in the practice context that are likely to follow in the wake of greater social media expansion.

Sound design practice-research is currently at an early stage of development in UK institutions. Consequently, this study aims to contribute knowledge to soundtrack studies that reflects those priorities the author deems essential to the immediate progression of sound design practice-research. This includes the investigation of sound design conceptual frameworks and interdisciplinary relationships with other areas, as well as methodological approaches appropriate for practice driven research. The study addresses these priorities through its knowledge contributions, specifically by applying PAR and case-study research methods to the formulation of a developmental enquiry into a sonic arts approach to sound design.

10.3.1 Plans for Future Research and Practice Development

A clear priority for the author is to disseminate this research via journal publications and conference presentations. This includes plans to a co-author an article with Clive Myer that describes the dialectical process of soundtrack post-production on *Song of the Falklands.*

During the study the author contributed sound effects for two short dramas, *Owl Creek Bridge* and *The Bone Orchard.* In both cases, a partial application of the sonic arts approach complemented the requirements of the horror genre. The author therefore intends to develop the approach by investigating its applications across a wide variety of film genres. Specifically, it is clear that the full practice approach remains largely untested in mainstream film, but the author remains confident that sonic landscape, spectromorphology and the inter-modal compositional strategy are all applicable in this context. The author will investigate this directly on upcoming mainstream projects, including a feature-length drama and a non-fiction film.[285]

[285] The author has recently joined Clive Myer's film production company (Eclectic Films) as a sound designer. Further details about a feature length drama, entitled '*The Orchard*', and a non-fiction film '*Don't worry – Be happy*', can be found on the company's website (http://www.eclecticfilms.com/thefilms.html).

For the development of the sonic arts approach to be both well-rounded and relevant to industry practitioners, there is a need to refine its applications to reflect those project contexts where multi-disciplinary teams work on soundtrack post-production (e.g., commercial film and television). In this context, securing opportunities to progress practice-research will require perseverance, particularly in overcoming industry resistance towards extended forms of sound design practice. In the meantime, the author will continue to work on low-budget independent films, which currently represent a more viable project context for the sonic arts approach in its extended practice form.

One application for the sonic arts approach that this study does not explore concerns the sound design of multi-channel soundtracks (i.e., 5.1 and 7.1 surround sound formats). The author is committed to pursuing this development, as there is a clear potential to extend applications of sonic landscape, spectromorphology, and spatiomorphology in this post-production context. The author is also particularly interested in the possibilities of adapting the sonic arts approach to the development of binaural sound mixes for audiovisual media accessed using smart phones and tablet computers.[286]

Another possible direction for research stems from practical knowledge acquired in this study that indicates that sound design applications of spectromorphology are facilitated by the selection of appropriate studio tools. It was noted that software interfaces that provide dynamic graphical representations of digital audio could visually aid the sound designer in mapping spectromorphologies to parameters controlling sound synthesis and transformatory processes.

For example, morphological models for the onset, continuation, and termination phases of a sound-object can be mapped to parameters controlling the attack, sustain, and release components of an amplitude envelope. Also, perceptions of interior textural motion may be produced by mapping motion typology forms to envelope

[286]The rationale for this is based on the idea that audiovisual media, including films are being increasingly accessed using portable devices by users wearing headphones. The author is interested in delivering audiovisual media with binaural soundtrack mixes that can give the use a more immersive three dimensional sound experience.

functions that drive filter modulations. In this study, Metasynth[287] was used extensively for sound-object design because it features a unique set of graphical interfaces for manipulating an image rendering of a sound. The author also utilised the features of Pro Tools[288], and Logic Pro[289], to map spectromorphologies to automation lines and curves to control effects parameters (e.g., filter modulations) and mix balances. This technique was applied to the sound design of the radio sonic landscape for the 'History' section of *Song of the Falklands* (see appendix 1.3).

On further consideration, there is a great deal of research that could be initiated to advance these aspects of the sonic arts approach to sound design, including the development of specialist spectromorphological design tools using programming environments such as MAX/MSP[290] and Kyma X[291]. Furthermore, the design of such software interfaces should logically be partnered by research into the use of different hardware controllers, particularly those devices that offer mappings of gestural motion through two-dimensional and three-dimensional space.[292]

[287]Metasynth Ver.5, U&I Software, http://www.uisoftware.com.
[288]Pro Tools Ver.7, Avid Audio (Digidesign), http://www.avid.com/US/products/pro-tools-software.
[289]Logic Pro Ver.8, Apple Software, http://www.apple.com/logicpro/
[290]MAX/MSP Ver.5, Cycling74', http://www.cycling74.com.
[291]Kyma X, Ver. 0.47, Symbolic Sound, http://www.symbolicsound.com.
[292]The author has experience of developing haptic controllers, as well as using existing technologies such as Nintendo's Wiimote (Wii Remote) to map hand gestures to parameters in Kyma X and MAX/MSP that control sound synthesis and effects processes.

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Appendices

Appendix 1: *Song of the Falklands*

This appendix contains supplementary material for the case study report. It includes a summary of the four phases of the post-production project and details the design of radio sonic landscapes.

1.1 The four phases of the sound design project

The soundtrack post-production project for *Song of the Falklands* can be broken down into four phases with distinct objectives. The protracted timeline of the project arose as a consequence of changes in the filmmaker's schedule.

Phase I: Re-Recording & Restoration of location sound (02/01/07 – 27/02/07)

At Myer's request, the objective for Phase I was the preparation of a basic soundtrack comprised of restored location sound and a test rendering of the 'History' section docudrama.[293] In parallel, the author began developing the rationale for sound design through film analysis and research into the filmmaker's conceptual framework. In this regard, emphasis was placed on appreciating Myer's applications of montage theory, as well as his intentions for *Song of the Falklands* to advance a critique of mass observation movement films, including *Song of Ceylon* and *Listen to Britain.*

[293] At this point, Myer had not found performers for the foreign language voices, so the script was performed in English by the author.

Phase I highlighted a series of technical problems with the film, which had been edited on an older AVID system. This system did not support OMF[294] sound export, and Myer was only able to provide the author with a low-quality, unbalanced soundtrack mix on Mini DV tape. Unfortunately, Myer was unable rectify the AVID export issues, and this prompted the author to re-record and restore the two-channel location sound from the original Beta tapes. Myer provided the necessary equipment and a list of tape time code references used in the creation of the edit.

During the re-recording process, a number of problems were identified with the location sound. In general, the signal carried considerable hiss and noise generated by the camera. Furthermore, a failure to monitor input levels for the boom mic had resulted in distorted recordings. The most significant issues were with outdoor recordings, many of which were severely affected by wind noise. Fortunately, in approximately 50% of cases, the wind noise was 'directional' and affected only one channel of the recording. This allowed some dialogue to be presented monaurally, including a sequence of public speeches in the 'Death, Desolation Emptiness' section.

In Phase I, Myer made no request to attenuate the wind noise, or replace poor quality outdoor location recordings with library sound effects. When the option was discussed, Myer expressed concerns that such processes would lead to the construction of an aural illusion of diegetic realism. Myer pointed out this was in conflict with the rationale for *Song of the Falklands*, and its critical opposition to nonfiction films such as *Song of Ceylon*, which had relied heavily on sound to construct illusions of diegetic realism. Myer's position was therefore contrary to those industry conventions in soundtrack post-production which aim at removing sources of noise from location recordings (Holman 2002). Myer also believed that preserving the typically unwanted sonic artefacts of a production process draws one's attention to the mechanisms of representation in nonfiction film. This was another aspect of his research and rationale for *Song of the Falklands*.

[294]The OMF (Open Media Framework) file format is used to exchange data between AVID video editing systems and audio software platforms such as Digidesign's Pro Tools.

The process of re-recording, restoring, and re-syncing the location sound was time-consuming, but not without its rewards. Unused video footage became a resource for sounds that were later re-figured in the sound design. For example, in the sequence *'Magnificent Men'*, brass band recordings and excerpts from the Lords Prayer were re-figured from footage shot at the Falklands 'Battle Day' commemoration. Myer also provided the author with a tape archive of radio recordings. The archive consisted of recordings made by an Islander of BBC World Service and FIBS broadcasts. These recordings were subsequently re-figured in the sound design, and provided the key source material for film's radio montage sequences, including *'Prelude to Invasion'*, *'The Invasion Show'* and *'War Climax'*. While the significance of radio as a metaphor for collective consciousness did not fully emerge until Phase II, the acquisition of the tape archive in Phase I was an influential factor on that development.

Phase II: Sound Design 'Draft' (04/04/07 – 09/05/07)

Following a break when the author was engaged in work on *The Immortal*, Phase II work continued with conceptual development and the production of a 'draft' sound design. During this phase, Myer took organisational responsibility for recording the foreign language parts of the docudrama. However, problems with booking actors and studio sessions meant that Myer was forced to record the parts in an ad-hoc manner using portable equipment. This included two parts in Italian and Dutch, which were recorded onto a telephone answering machine.[295] Fortunately, disparities in the quality of Myer's recordings did not create an issue for sound design, as all the voices were to be put through a 'radioizing' process. In the case of the Italian and Dutch voices, the telephone recording quality actually worked in favour of radioizing, by supporting an impression of 'on-the-air' sound (Chion 1994).

The Phase II soundtrack presented the majority of the sound design ideas discussed in the commentary (section 7.2). Following its completion, a review session with the filmmaker was organised for June 15th. This provided an opportunity to gauge opinions about the sound design, with a view to identifying change requests and new requirements. The discourse of this meeting focused on Myer's critical assessment of

[295]In both cases, the readers were located abroad. Myer had considerable problems in sourcing foreign language readers locally.

the author's interpretation of the film and its research themes. This session also revealed that Myer was unclear about the modus operandi of sound design when he complained: "What's unusual for me is for the director not to be there, during the mix" (Myer 2007, *Phase II Review Meeting*). It was subsequently explained that the Phase II sound design was a 'work in progress', and that a collaborative approach would be taken in the Phase III dubbing sessions to finalise the soundtrack.

Phase III: Full Sound Design (21/06/07 – 20/12/07)

The filmmaker's idiosyncratic approach to project management invariably introduced the element of surprise in relation to post-production deadlines. When Myer was pressed to define the schedule for the Phase III dubbing sessions, he was unable to give specific dates, asserting only that his PhD submission would be sometime between December 2007 and January 2008. During Phase III, the author was engaged with other projects, and so worked intermittently on finalising the mix stems in preparation for the dubbing sessions. The author maintained communications with Myer by emailing regular progress reports. Concerned by the openness of the schedule, the author took the initiative on November 27th to inform Myer that it would be possible to organise two dubbing sessions for December 12th and 14th. Myer responded the same day with unexpected news:

> I've just arrived in London for meetings till Friday, one being PhD at the RCA, so will know more about deadline final but I expect it'll be in about a weeks time (don't suppose you can bring the dates forward a week?) If not, I'll have to send the old version off ....and they can play the new version at my viva. (Myer, *Email Communiqué*, 27/11/2007)

Myer's email encapsulates his pattern of project management, which generally failed to provide timely information about the schedule or changes in plan. At such short notice, the author was unable to advance the schedule as requested, and Myer was forced to submit the film with the phase II soundtrack.

Myer later attended the second of the scheduled dubbing sessions. During discussions, he stated that the radio sound aesthetic produced for the 'History' section was too

subtle, noting: "I'm worried it's become a little bit like a voice over" (Myer 2007, *Phase III Dubbing Session*). While sound design had opted to produce a 'realistic' sonic landscape of radio sound, Myer's emergent strategy was to usurp this aesthetic in preference for a hyper-realistic, exaggerated articulation of tonal modulation effects on the docudrama voices. This departure from the sound design strategy agreed in Phase II, reflected Myer's growing concern that *Song of the Falklands* did not sufficiently demonstrate the experimentalism he advanced in his thesis. Throughout the session, Myer seemed preoccupied by the idea of taking radical steps to undermine the compositional integrity of the sound design, in order to foreground diegetic fractures that supported his anti-realist redefinition of nonfiction film diegesis.

The author complied with Myer's requests, but the audible products of this strategy were highly synthetic and lacked a coherent rationale. In summary, 'overcooking' the modulation effects obliterated the delicate illusion of a radio sonic landscape, effectively decoupling the use of effects from source bonded associations (radio devices) and their meaningful significations (radio as a metaphor for collective consciousness).

Phase IV: Sound Design 'Remix' (16/04/08 – 25/07/08)

Phase IV constituted a partial re-development of the sound design, prompted by the critical comments that Myer received from his PhD examiners. Their critique was directed towards two aspects of the soundtrack. The first point made was that the extreme modulation effects used in section one (1. History) were monotonous and obscured the intelligibility of the voices. The second point was an instruction that all audible instances of wind noise in the location recordings should be attenuated, or completely removed if possible. Although forced to comply with these requests, Myer was disappointed about what he felt was a misinterpretation of his rationale, and a reticence by the examiners to step outside the dogmas of cinematic conventions. In an email, Myer made the following comments:

> Nobody is criticising the aesthetics in general, they are just seeing the pieces too conventionally. We are way ahead of the game (who said the avant-garde was dead!). (Myer, *Email Communiqué*, 21/04/08)

In fact this outcome came as no surprise to the author who had anticipated the likelihood of criticism in relation to the history section. Consequently, the opportunity to remix the history section radio sonic landscape as originally intended was welcomed by the author. Revisiting the 'radioizing' process proved beneficial, and a more convincing radio sound aesthetic was produced by varying the balance between six mixable stems. This approach also gave the filmmaker the ability to direct a fine control over the radio sound aesthetic.

Addressing the issues of wind noise in location sound proved to be a labour intensive exercise. In certain cases, the severity of the noise warranted high degrees of noise reduction that introduced audible aliasing effects rendered by the processing. Therefore, with the permission of the filmmaker, sound design produced a mix compromise between restored location sounds and library sound effects. Most of the library effects used replaced environmental sounds. While this approach was anathema to Myer's principles, he was resigned to accept this solution. This reconstruction of environmental ambience also necessitated the use of a controlled wind sound, to reinforce the diegetic illusion of windy conditions that the majority of outdoor sequences show visually.

1.2 Spectromorphological Analysis of Radio Sound

The first stage of radio sonic landscape design involved the spectromorphological analysis of radio broadcasts. An Eton R5 world band radio receiver was used during the analysis sessions, as this device was capable of tuning into a wide range of AM frequency bands (SW, MW, LW). Tuning experiments were conducted to produce a range of effects that characterise AM radio sound, including signal interference, tuning drift, and modulation effects (i.e., pitch, amplitude, filter). Reduced listening aided the identification and categorisation of the spectromorphological qualities associated with these radio effects. Table appendix 1.2 summarises the

spectromorphological analysis, which was subsequently used as criteria for the design of radio sound-objects and sonic landscapes.[296]

Spectromorphology (Categories)	Description
Spectral Typology	*Transmissions*: Voices and Music subject to distortion, band pass filtering, amplitude and ring modulation effects. *Noise:* Noise varying from wide band (white) to nodal groups (narrow band passed noise) *Interference Tones:* Various pitch-modulated waveforms (sinusoid, sawtooth, triangle). Can be modified by tuning controls.
Morphological Models	Perceived amplitude, pitch and filter based modulations follow a swelled graduated continuant form - sinusoidal in character.
Attack Effluvium	A wide range of temporal effects in the articulation of noise and interference tones, including separated impulses, iterative pulses, granular and effluvial combinations.
Motion Typology & Style	*Modulation Motions:* The perceived motion of amplitude, pitch and filter modulations varies dynamically between oscillatory, periodic and aperiodic forms.
Gesture	Tuning gestures are suggested by a characteristic signal 'squelch' derived by rapidly sweeping through a range of frequencies.
Structural Relationships	Structural relationships perceived between distinct signals appear conflicting or interactive with a tendency towards confluence. The structural relationships of modulation motions are also dynamic and vary between perceptions of synchrony and asynchrony.

Table Appendix 1.2: A Summary of AM Radio Sound Spectromorphological Analysis

[296]The spectromorphology categories used in the table and the various terms used to describe perceived forms were derived from Smalley (1986; 1997)

1.3 Radio Sonic Landscape Design and the 'Radioizing' Process

Wishart's landscape theory proposes than an aural impression of a place can be imaginatively evoked as the spatial location and source of sound-objects (Wishart 1986; 1996). In a practice-led extension of this theory, the audiovisual application of sonic landscape was recoded using a simple formula to provide a compositional tool for representing complex structural designs. Using a quasi-algebraic notation, the relationship between space and sound-objects in the perception of a sonic landscape may be expressed as a function.

$$\text{Sonic Landscape} :\Rightarrow f(\text{Sound-objects, Space})$$

To clarify the interpretation of this formula, the perceived sonic landscape is 'logically equivalent' (=>) to a function (f) expressing the product of two arguments; these being 'sound-objects' and 'space'. This formulaic representation of the relationship between sound-objects and space as the arguments of a function reflects their mutual interdependence in the formation of a perception of sonic landscape.

If one takes a phenomenological approach to the listener's appreciation of sonic landscape, then it would appear that the perceived acoustic qualities of a space arises post-priori from an awareness of the relative spatial dispositions of all sounding objects. The cues that make distinctions in spatial location possible are derived from the perceived differences in the spectromorphologies of sound-objects exhibiting various spatiomorphologies. Smalley (1986) refers to these aspects of the spatial indicative field in terms of *setting;* which is comprised of *dimensions* (open or confined), and a perceived quality of 'realness' (real – fictitious continuum).

These ideas are coherent with acoustic theories that describe how the interactions of propagating sound waves with material structures in an enclosed space (e.g., reflections, frequency absorption, wave superimposition), modifies the spectrums of perceived sound-objects with a logical consistency. In summary, for a single sonic landscape impression to be evoked, all sound-objects must be perceptually bound to the same space. Moreover, for spatial coherence to emerge, there must be a

consistency to spectromorphological variations when sound-objects are spatially articulated to form a disposition within the space, or when they exhibit spatiomorphological motions.

The concept of *impulse response* (*IR*) has been widely applied in sound engineering to represent the modifying properties of a reverberant space or electrical system as a signal. Through the process of convolution (signal multiplication in the frequency domain) a source signal is modified by the impulse response signal, resulting in a new signal that carries the signature characteristics of the space or electrical system represented by the *IR* (Roads 1996). Therefore, by substituting the argument 'space' for that of *IR* in the sonic landscape formula, one can widen the scope of the concept to incorporate 'device based' sonic landscapes.

Sonic Landscape (Device):=> f(Sound Objects, *IR*)

The formula above represents a part of the process by which sound-objects were 'radioized' in the creation of the *'history radio'* sonic landscape for section one of the film. Specifically, sound-objects associated with the docudrama (i.e., voices, sound effects) were broadcast to two radios using an FM transmitter. The convolution of these source signals with the electrical circuitry (impulse response) of the radios consistently modified their spectrums. This process facilitates *source bonding*, or the perceived association of a sound-object with a recognisable source (Smalley 1986), in this case a radio device. In principle, the spectromorphological modification of signals by the impulse response of a radio receiver is no different in signal processing terms to how a physical environment 'imprints' its acoustic qualities on the spectromorphologies of sound-objects that are diffused into its space.

Figure Appendix 1.3A formulaically represents the structure of the history radio sonic landscape (HR.SL) at the first level. This sonic landscape was produced from the additive mix of six sonic landscapes represented at the second structural level. The structural design also introduces the concept of 'nested' sonic landscapes between the third and second level. This represents how one sonic landscape may be substituted into the formulaic expression of another sonic landscape as a 'macro' sound-object.

Although somewhat convoluted, this formulaic shorthand for coding sonic landscape designs arose in response to a compositional need to represent the inner complexity of the history radio sound design.

Figure Appendix 1.3A: Formulaic Representation of 'History Radio' Sonic Landscape Design

Key:

SL := Sonic Landscape
SO := Sound Objects
S := Space
IR := Impulse Response

1st Level

(HR.SL) *History Radio* SL :=>
f [(RD1BR.SL+ RD1BRFX.SL+RD1TR.SL+RD2BR.SL+RD2BRFX.SL+RD2TR.SL), (MX.S + AC.S)]

2nd Level

(RD1BR.SL) *Radio 1 Broadcast* SL :=> *f*(BR.SL, RAD1.*IR*)
(RD1BRFX.SL) *Radio 1 Broadcast FX* SL :=> *f*(BRFX.SL, RAD1.*IR*)
(RD1TR.SL) *Radio 1 Transmission* SL :=> *f*(TR.SL, RAD1.*IR*)

(RD2BR.SL) *Radio 2 Broadcast* SL :=> *f*(BR.SL, RAD2.*IR*)
(RD2BRFX.SL) *Radio 2 Broadcast FX* SL :=> *f*(BRFX.SL, RAD2.*IR*)
(RD2TR.SL) *Radio 2 Transmission* SL :=> *f*(TR.SL, RAD2.*IR*)

3rd Level

(BR.SL) *Broadcast* SL :=> *f*(BR.SO, BR.S)
(BRFX.SL) *Broadcast FX* SL :=> *f*(BRFX.SO, BRFX.S)
(TR.SL) *Transmission* SL :=> *f*(TR.SO, TR.S)

Working from the bottom up, the three sonic landscapes defined at the third level substitute into the second level expressions as macro sound-objects. The six second-level sonic landscapes are summed (mixed) as macro sound-objects at the first level, an expression that represents the mixing of the history radio sonic landscape (HR.SL) using six stems in the Phase IV dubbing session. The following explanation is intended to clarify understanding of the nested structural design of the radioized sonic landscape.

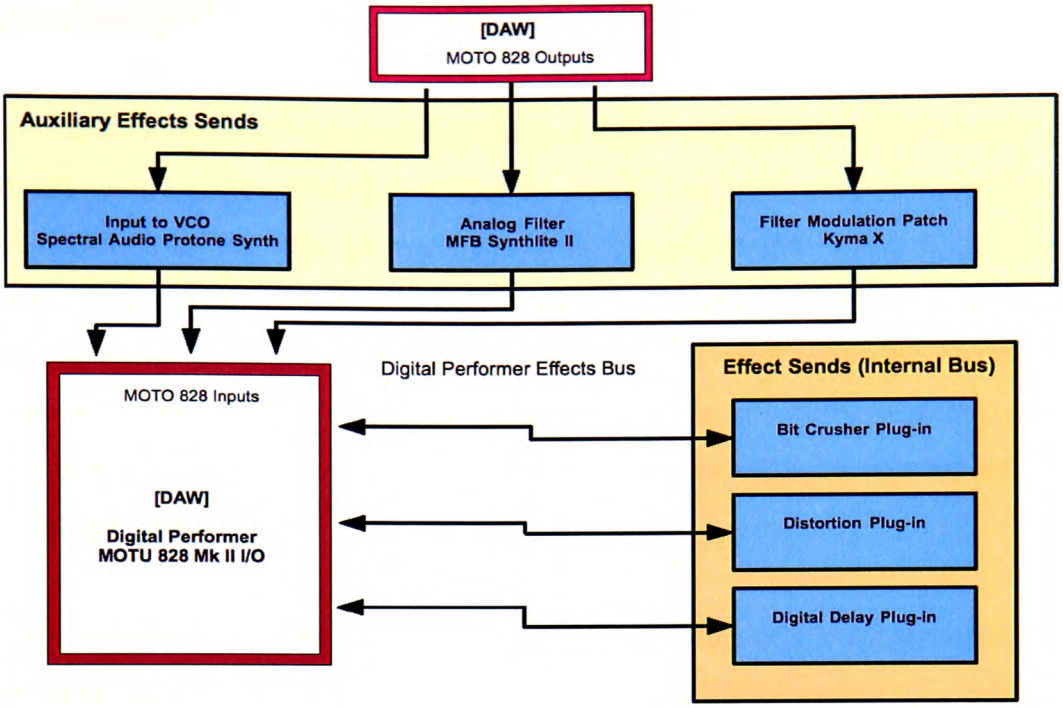

Figure Appendix 1.3B: Effects Processing Scheme for Radioizing

The '*broadcast*' sonic landscape (BR.SL) was premixed to create a clean rendering of the docudrama voices and sound effects (BR.SO). The vocal recordings were processed with EQ and compression to imbue them with a basic 'radio announcer' sound quality.[297] A plate reverb effect was also added, to render the subtle, intimate spatial characteristics of a formalised broadcast space (BR.S). The sound design intention was to arrive at a pre-transmission sonority suggestive of radio production.[298] The sonic landscape '*broadcast FX*' (BRFX.SL), was created by processing the clean '*broadcast*' sonic landscape (BR.SL) with an effects chain designed to artificially render a mimesis of the audible artefacts of radio transmission and reception (figure appendix 1.3B). The design of this processing scheme evolved

[297]The low-mid frequency tonal emphasis characteristic of the voice in radio production, is a combination of microphone design, proximity effects and compression. The limitations of AM and FM to faithfully represent the dynamic range of produced music is well-known, and has created the phenomenon of the "radio mix". In this case, low-mid emphasis was added using EQ, and the vocal mix was strongly compressed.

[298]Examples of broadcast sound quality feature in two sequences showing announcements by FIBS.

by experimentation in the studio, and was informed by the spectromorphological analysis of radio.[299]

This pre-processing took into account the fact that a studio-based FM transmission of broadcast sonic landscapes to two radios for re-recording, would not reproduce signal transformations in line with the spectromorphological characteristics of AM radio reception. In the film, examples of radio sound spectromorphology can be clearly heard in sequences showing two-way shortwave (SW) radio communication. The combination of these film references with the spectromorphological analysis of AM radio, laid the necessary research foundations for the reproductive mimesis of radio effects in the studio.

The '*transmission*' sonic landscape (TR.SL) is comprised of a background mix of signal based sound-objects (TR.SO) recorded directly from the Eton R5 radio (TR.S). This sonic landscape represents the sonic artefacts of AM radio transmission and reception, and has a significant role in helping to create the illusion of a radio device source. Specifically, the history radio sound design concept treats each scripted segment of the docudrama as an independent historical transmission transmitted and received on a particular frequency. To extend the mimesis of AM radio sound, short bursts of signal 'squelch' and noise are foregrounded between each script segment to create the impression of a gestural 'tuning in' to different historical messages. In this regard, the frequency range of signals is a metaphor for separation by historical time.

Other sound-objects within the transmission sonic landscape include wide-band noise and interference signal tones. In the production of the history radio sonic landscape, these sounds are mixed dynamically to form a signal background to the docudrama broadcasts. Furthermore, these sound-objects mimetically reference the intrusive slow beating and undulating modulations of signal drift around a target frequency.

The radioizing production techniques adopted the broad schemas of the 'worldizing' re-recording approach employed by Walter Murch on films such as *THX 1138* and *American Graffiti* (see Murch 1998). The radioizing procedure involved the studio

[299]See Table Appendix 1.2.

based FM transmission of the two premixed broadcast sonic landscapes (BR.SL, BRFX.SL) and the transmission sonic landscape (TR.SL) to two radio devices (RD1, RD2). The transmitted FM signals received by the two radios were subsequently re-recorded using close-miking techniques to minimise spatial colouration. By modern standards, both the radios used would be considered vintage equipment. This aspect of the history radio production was considered worthwhile because the distinctive warmth and tonal characteristics of valve (RD1) and early solid-state transistor based technologies (RD2), are recognisable qualities of radio sound itself, and thus contribute to the overall aesthetic.

These sound qualities associated with valve and solid-state radios are reproducible by re-recording the FM signal after it has been received and amplified. In effect, the received signals (BR.SL, BRFX.SL, TR.SL) are convolved with the impulse response of the two radios (RAD1.*IR*, RAD2.*IR*), which spectrally modifies the sound and imbues it with the qualities of the radio device. The separate transmission, reception and re-recording of the three premixed signals (BR.SL, BRFX.SL, TR.SL) to the two radios produced the six radioized sonic landscapes notated at the second level of figure 1.3A. The first level of the formula represents the dynamic mixing of the six radioized sonic landscapes in the formalised 'mix space' of the Protools session (MX.S). The balance between the six stems was automated during the Phase IV dubbing session to create dynamic variations in the radio sound aesthetic.

During the dubbing session, the filmmaker directed sound design to engineer these variations in the radio sound aesthetic. The filmmaker also requested some additional processing of the history radio sonic landscape using reverb (AC.S). The effect was subtly applied, and only to certain sections of the docudrama. Myer considered that a perceivable echo around the radio transmissions further 'historicised' their messages.