Wired for sound: on the digitalisation of music and music culture

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Abstract

By focusing upon the specific material details of the recording studio, the MP3 player, and music downloading, this thesis examines the historical, social and cultural implications of the *digitalisation of music and music culture.* Developing Friedrich Kittler's *information materialist* project, the thesis draws upon a range of sources, including social and cultural theories of digitalisation, historical and technical literature, structured and semi-structured interviews, advertising images, newspaper and magazine articles, user and buyer guides, industry reports, and photographs, to construct a materially grounded sociology of digital music technologies.

The central argument of the thesis is that digitalisation should not be thought of as a complete or discrete movement from an analogue to a digital era. Digitalisation is not a homogenous displacement of the new in place of the old, of the digital superseding the analogue, or of the movement from physical to virtual spaces and artefacts. Rather digitalisation represents a complex and heterogeneous interweaving of the old and new, the analogue and digital, and the virtual and physical, in the routines and mundane practices of everyday life. The thesis concludes that digitalisation, as an ongoing social process, affords a series of defining reconfigurations and recontextualisations. Three of the most prominent of these defining features of the digitalisation of music and music culture are *miniaturisation*, the compression and increased mobility of cultural forms, *non-linearity*, the development of systems for cultural production and reproduction that afford the removal of the boundaries of linearity, and *cultural archiving*, the storage and retrieval of digitalised libraries of cultural artefacts accessed through various interfaces or portals.

Keywords

Music, music technology, digitalisation, information, materialism, affordance, interface, thick description, everyday life, social theory, cultural informatics.

For Erika

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Author's declaration

I hereby certify that this thesis is my own work and has not been published elsewhere.

Signed:

Dated: 24/8/2006.

'Power from the needle to the plastic, AM FM I feel so ecstatic now, this music I've found, 'cause I'm wired for sound'
(Cliff Richard, from the song 'Wired for Sound' (n.d.))

'**analogue** (US also **analog**)...relating to or using information represented by a continuously variable physical quantity (such as spatial position, voltage, etc.) rather than digitally.'
(*Concise Oxford English Dictionary*, tenth edition revised, 2002)

'**digital** adj (1960) Designating (a) recording or broadcasting in which the original waveform is digitally coded and the information in it represented by the presence or absence of pulses of equal strength, making it less subject to degradation than a conventional analogue signal. The method was originally used for making high-quality audio recordings, but as the end of the century it was being phased in as a broadcasting medium.'
(Ayto, 1999: 402)

Chapter 1: Introduction: structure and objectives

Chapter contents

1. Introduction: central themes

'*we* are *enveloped* by sound, it forms a seamless web around us. We can't shut out sound automatically. We simply are not equipped with earlids.'
(McLuhan & Fiore, 1989: 111)

Recent years have seen the emergence of a vast range of digital music technologies (MP3, the MP3 player, home recording studio software, etc) and digital cultural phenomenon (music file-sharing, the music downloading phenomenon, podcasting, etc). Indeed, it would appear from even a cursory glance through magazines, newspapers, e-zines, blogs, or television and radio programmes, that digital technologies, as part of a shift toward a 'global information culture' (Lash, 2002) and the mass-appropriation of information and communication technologies (ICTs), are now an integral part of the ways in which music is produced, reproduced, and appropriated. The question, then, is what substantive transformations occur in relation to the functionalities of digitalisation? How are digital technologies appropriated in everyday practices and routines and with what consequences? How can these digitalised processes and practices be described or conceptualised? In short the central question of this thesis is what are the defining features of the digitalisation of music and music culture?

Digitalisation – a term that is often used to imply a transition or transformation between a pre-digital and a digital age – is defined here simply as the *appropriation of digital technologies in everyday (musical) practices.* This thesis, therefore, may be thought of as a sociological study of digital music technologies in everyday life that operates at the intersection of social and cultural theory and the sociology of music culture. To this end the thesis aims to identify the key defining features of the digitalisation of music and music culture by drawing upon and triangulating a range of sources, these include writings in social and cultural theory, structured and semi-structured interviews, advertising and marketing text and images, newspaper and magazine articles, buyers guides, and photographs.

In broader terms this thesis may be thought of as a study in *cultural informatics.* Cultural informatics has been defined as 'the sociological analysis of ICTs to the extent that they impinge upon cultural issues, objects and topics'[1]. The particular investigations into cultural informatics represented by this thesis are narrowed down, for the purposes of detail and focus, to the specifics of digital music technologies, or what I label here as the *digitalisation of music and music culture*. Therefore, its concern is with how digital technologies impinge upon music, musical artefacts, and music culture.

2. Guiding problems and parameters: mobile terminologies and the sociology of the not-yet-there

From the outset, to understand this research as a contribution toward an emergent field of research, it is worth drawing attention to two significant issues, problems or limitations that have influenced its content and direction.

The first problem concerns the mobility or instability of the term digitalisation itself. Digitalisation is far from a fixed concept with clear and discernable boundaries. Furthermore, as some of the references used in this thesis indicate, there are a diverse range of terms for this process, these include: digitalization, digitisation, digitization, or extending this further, informatics or informatization. The choice of terminology, however, is not entirely arbitrary. In an interview that I recently conducted with the social theorist Nick Gane for the journal *Sociological Research Online*, Gane made the following comment on the distinction between digitalisation and digitisation:

> 'No, I didn't draw out the differences between these terms in the book. The main reason for this is that they are not terms I tend to use, but are terms that, increasingly, I am encountering in the work of others...I presume that, in asking this question, you find the distinction between digitalisation and digitisation in some way problematic. I would agree, as I'm not sure there is (or needs to be) a sharp distinction between these two terms or processes. But, if we wanted to draw some kind of dividing line between them (for the purposes of argument), digitalisation could perhaps refer (at a very general level) to processes of technological transformation that are affecting us all in

[1] The *Social Informatics Research Unit* (SIRU) at the University of York, http://www.york.ac.uk/res/siru/cultural.htm, accessed 21st of April 2006.

some way (so that there is now no longer any real 'outside' to the digital, not least because digital technologies are literally everywhere today: on my desk, in my living room, on my wrist, and perhaps one day inside my body), whereas digitisation could maybe refer more directly to the physical processes associated with digitality (i.e. the symbolic and material processes of representing objects or relations in binary terms). Of course, these two processes are connected, as the one cannot take place without the other, and I would not want to lose sight of this because codes and coding are very much part of contemporary social relations and culture, while being tied at the same time to a whole range of material technologies that carry their own transformative powers.'

(Gane in Beer & Gane, 2004: 2.12)

Following this usage, digitisation can be provisionally defined as the technical process of transferring information into digital code, whereas digitalisation may be thought of in broader terms as the cultural and social appropriations and implications of digital technologies in everyday life. In the following chapters I will use the term digitalisation to represent both of these processes, that is both the process of data transfer and cultural transformation.

The second problem concerns the study of digitalisation as a *sociology of the not-yet-there*. The tension described above around the shifting terminologies used to describe these digital technologies and cultures illustrates the emergent nature of these phenomena and of this area of study. The state of flux caused or represented (dependent on your position) by digitalisation is the second of these central problems.

This is a problem emerging from my own attempts 'to follow only a little way behind change' (Thrift, 2005: vi), which in turn creates two particularly significant problems. First, when viewed from close up, or closely behind, particular transitions may appear to have far greater magnitude than when time has been allowed for reflection. These are transformations that appear to be ground breaking or seminal from close up as they occur in real-time, but that may appear less significant as time passes. And, second, and perhaps more significantly in terms of the practicalities of this research, it

is often difficult to both keep up with these transitions whilst also remaining "behind" them.
For example, on the former, I have found a rapid proliferation of both academic and journalistic articles being published on the topic during the final stages of this project. This is in contrast to the early stages when very little literature had been published in this area. Indeed, the emergent state of the literature, forming a fragmented field of study within which the various perspectives remain largely detached from each other, and within which shared themes were yet to be embedded, created problems around the gathering together of the literature and the identification of emergent themes and questions for further investigation. This state of transition also made saying something that may possibly endure highly problematic. The main problem here being that the information upon which a study of digitalisation relies is always-already out-of-date (see chapter 8 in particular)[2].

On the latter issue of staying behind transition, it was possible in the case of the MP3 player, and particularly the iPod, to see that particular cultural transitions were *about to occur*. They appeared to be significant, or that they would be significant, but that this had not yet happened, hence the sociology of the not-yet-there. The powerful projection of these digital technologies in advertising and marketing rhetoric gave an impression that these technologies were widely used. At the time it was becoming increasingly obvious that music technologies such as MP3 players were going to have some cultural influence, but that this was a phenomenon of the future, it had yet to happen in any substantive sense. As a result finding people who actually owned an iPod or an MP3 player during the early stages of this research was difficult. Just over a year after the research for this thesis began, during the spring of 2004, I asked a lecture hall filled with around eighty students, the very target market of the iPod, if anyone owned or had used an iPod or MP3 player, none of them had. This meant that the research project had to adapt by waiting for these devices to be appropriated[3]. Fortunately the use of these devices increased dramatically during 2004 and 2005 (see chapter 7), enabling empirical material to be gathered. For this reason the gathering of

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[2] I would like to thank Roger Burrows for highlighting this problem to me during an informal discussion on the study of digital technologies.
[3] I collected the materials from newspaper, magazines, adverts, etc, that depicted and described digitalisation during these early periods, the interviews conducted then came later and many of the questions reflected issues or themes constructed in the marketing rhetoric (some intentionally some unintentionally).

empirical materials was necessarily dependent upon flexible and mobile methods drawing upon a range of sources.

The research for this thesis was constructed within the parameters imposed by a series of contextual factors relating to the uptake of digital music technologies, the rapid expansion of literature following in the wake of these social and cultural transformations, and the search for terminology to describe what was happening.

In actually conducting this research the issue of context, as is revealed by its centrality in this thesis, became *the* central issue of concern on three fronts: the *social and cultural* context, the transformation of social and cultural formations and practices through the appropriation of these digital technologies into everyday routines; the *academic* context, a mushrooming out or proliferation in the literature in the years following these social and cultural transitions; and the *analytical* context, who, where, when, and what, should be the focus of sociological investigations into digitalisation. Indeed, the re-theorization of digitalisation as a social process, or a set of ongoing and mobile social processes, reveals or illuminates context as a central digital problematic facing and implicating the sociology of ICTs in general. Particularly as everyday life practices intersect with digitalisation through mobile ICTs, software, and the internet, with the effect of transcending, interweaving or enmeshing virtual and physical, digital and non-digital, human and non-human bodies and spaces. The functionalities of these digital technologies clearly have implications for the way in which sociological research is done. Digitalisation as a social process requires research programmes sufficiently flexible and reflexive to react or adapt to these mobile and complex contexts and analytical problems[4] (see chapter 2).

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[4] The approach taken here is to localise, to focus upon digitalisation as the materiality of information in the context of everyday life (chapter 4). As such, this research has in one sense become a reflection of the state of the digitalisation of music and music culture in central York (with some exceptions, such as the noWax example discussed in chapter 7). As such, the claims that I make toward defining features of digitalisation based upon my findings are rather the result or consequence of my locality and of the particularities of digitalisation embodied or materially instantiated in York. However, this is not an attempt being a reduction of digitalisation as a process to the particularities of a specific locality, if digitalisation is ongoing and mobile, difficult to capture and complex, then it is possible to say something that may endure by carefully reconstituting the wider context within which localised studies may operate. I attempt here to write-in wider context, or to contextualise these localised interfaces or instantiations of information, by incorporating three aspects or dimensions to the analysis: (1) by incorporating a history of the digitalisation of music and music culture; (2) by adapting and applying the overarching theories and concepts from social theory; and, (3) by capturing the details of the digitalisation of music and music culture occurring across wider regional, national and international

Through the course of this research encountering these digital or analytical problematics, or the parameters facing a sociological study of digitalisation, has helped to inform my understandings of digital music technologies. In many respects this reflects the creative processes of using the digitalised recording studio described in chapter 6. One of the music technicians interviewed when reflecting upon the limitations of the limitless possibilities of the digitalised studio concluded that limitless creative environments do not necessarily improve opportunities for musical creativity, but that creativity instead comes out of the manoeuvres made to operate around the limitations or parameters of the environment. This thesis then is a product of my attempts to tackle these digital problematics, to re-theorise digitalisation as a mobile social process, to enrich social and cultural theories of ICTs through material instantiation, and to attempt to contextualise digital music technologies[5].

3. The chapters

The thesis itself contains ten chapters and is structured around three parts. Part I, *Theories of the digitalisation of music and music culture*, focuses upon constructing a theoretical foundation for the study by drawing upon a range of literature in social and cultural theory. Part I begins, in chapter 2, *Digital rhetoric: describing the digital media age*, by focusing upon social theory and the general conceptualisation of the digital age. It introduces a range of key questions or problems of digitalisation highlighted in this literature and then focuses upon a prominent metaphor in recent social theory, namely the fluid/liquid/flow metaphor. The chapter concludes by arguing that this dominant metaphor needs to be (re)connected and enriched with reference to specific material technological and cultural phenomenon to reveal the aspects of digitalisation that constitute these liquids, fluids, and flows. To achieve this material reconnection the focus of the thesis then shifts, in chapter 3, to the specific

contexts. In short this research attempts to operate across a range of complex and integrated contexts by reconstituting the material aspects of digitalisation as constituting and constituted by historical, social and cultural contexts.

[5] This thesis is a product of my own attempts to contextualise music technologies. Indeed, it was through my attempts to grasp the basics of reflexive inquiry during my supervisory sessions that I came to begin to see music technologies not as objects but as products of context. This is to think of the digitalisation of music and music culture as a deeply social phenomenon rather than a technical progression. Of course many of the ideas included in this thesis are the products of supervisory dialogues.

details of the digitalisation of music and music culture. Chapter 3, *Constructing the digitalisation of music and music culture: a literature review*, provides an overview of the emerging themes and areas for development in the existing body of literature on the topic. Developing Théberge's (1997) separation of production, mediation, and consumption/use, this literature review focuses upon three main sub-fields or spheres of music culture which act to organise Part II: *Production, reproduction,* and *appropriation.* This chapter identifies key themes across these three spheres of music culture, these include the technological transformation of musical practice, the connection of digital music technologies with wider social and cultural transformations, the blurring and problematisation of boundaries, and democratisation and access. Part I then concludes, in Chapter 4, *Approaching the digitalisation of music and music culture: toward information materialism*, by developing Friedrich Kittler's (1999) information materialist approach to construct a theoretical and methodological approach that informs the history and case studies in Part II of the thesis.

Part II, *Aspects of the digitalisation of music and music culture: a history and exemplary case studies*, investigates specific material aspects of the digitalisation of music and music culture in the form of a detailed genealogical history and case studies informed by the theories, key research questions, and approaches developed in Part I. Part II begins, in chapter 5, *Historical context: toward a history of the digitalisation of music and music culture*, with a history designed to contextualise the case studies that follow. This history, which argues for a first and second age of digitalisation, draws upon a range of literature to construct lines of genesis and conditions of possibility leading directly to the contemporary forms of digitalisation. This history is followed by three case studies. Chapter 6, *Acoustic environments: the digitalisation of the recording studio and the interconnected zones of music production*, is informed by recent theories of zones and zoning and applies these to the specifics of the recording studio space and the practices of music production. In this chapter I argue that amongst a series of functional transformations between analogue and digitalised recording studios, particularly concerning music editing and processing, it is the emergence of home recording studio software and the forging of *two zones of music production* (the home and professional recording studio) that is the most significant amongst these transformations. By focusing upon the music studio as a material example of zoning-in-action the chapter uses a series of photographic and interview based illustrations to suggest that these zones, demarcated predominantly spatial and organisational boundaries, may be thought of as interconnected in the everyday practices of individual agents. Chapter 7, *The iConic iNterface and the veneer of simplicity: MP3 players and the reconfiguration and recontextualsiation of music collecting and reproduction practices in the digital age*, focuses upon the specifics of the MP3 digital compression format, the MP3 player, and the digitalisation of music collecting and reproduction practices. The chapter argues that these technologies have reconfigured, from physical to virtual, and recontextualised, from private to public, music collecting and reproduction practices, but that, in contrast to advertising rhetoric, these reconfigurations and recontextualsiations are grounded in particular embedded notions of cultural artefacts and technological affordances. This chapter draws upon Katherine Hayles' theory of inscriptive and incorporative practices allied with Apple's own theory of the iPod as 'iconic interface' cultivating an auratic 'veneer of simplicity', to conceptualise these complex reconfigurations and recontextualisations. Concluding Part II, chapter 8, *Downloading culture: the technological and rhetorical construction and ordering of musical appropriation in the digital age*, examines the specifics of the music downloading phenomena and the digitalisation of the appropriation of music. Taking Lyotard and Thrift's arguments that contemporary capitalism is structured around the commodification of knowledge, it identifies ways in which particular rhetorical and technological formulations have been used to construct and order music downloading practices.

Finally Part III, *Conclusion: findings and futures*, draws together the central findings of the thesis and then identifies a range of theoretical direction that provide possible future directions for continued research in this area. Chapter 9, *Findings: the defining features of digitalisation*, illuminates the themes that emerge across the four chapters contained in Part II. Concluding the thesis, chapter 10, *Futures: alternative theoretical possibilities for future research into the digitalisation of music and music culture*, identifies and develops five theoretical pathways, that, in light of the findings described in chapter 9, may provide fruitful directions for further study.

The central argument of the thesis is that digitalisation should not be thought of as complete or discrete movement from an analogue to a digital era. Digitalisation is not a homogenous displacement of the new in place of the old, of the digital superseding or usurping the analogue, or of the movement from physical to virtual spaces and artefacts. Rather digitalisation represents a heterogeneous and complex interweaving of the old and new, the analogue and digital, and the virtual and physical, in the routines and mundane practices of everyday life.

Digitalisation is constituted within, or constructed by, a complex interplay of digitalised rhetoric, digitalised material artefacts, and digitalised practices. This thesis reveals that these interplays, which afford a series of reconfigurations and recontextualsiations, crystallize what might be thought of as a series of key characteristics or defining features of digitalisation. Three of the most prominent of these defining features are *miniaturisation*, the compression and increased mobility of cultural forms, *non-linearity*, the development of systems for cultural production and reproduction that afford the removal of boundaries of linearity, and *cultural archiving*, the storage and retrieval of digitalised libraries of cultural artefacts accessed through various interfaces or portals. These features are emergent, mobile, and fragmented, and as such are open to rapid and radical reformulation. Digitalisation in this sense may be thought of in terms of the dominant rhetoric of social theory in the sense that it is fluid, liquid, and defined by a complexity of interdependent cultural and technological flows.

Part I: Theories of the digitalisation of music and music culture

Abstract

Part I draws upon social and cultural theory to construct a theoretical foundation designed to inform Part II. It begins, in chapter 2, by focusing upon the ways in which contemporary social theory describes or constructs the digital age. Chapter 2 argues that the fluid/liquid/flows metaphor, which has become particularly dominant in this literature – as a strategy for encountering the analytical problems of digitalisation – requires grounding in the specifics of material technologies and everyday practices. The central contention is that the elements that constitute these flows need to be reconstituted through the interrogation of the material aspects of digitalisation. In order to provide a focal point for these materially grounded investigations the focus then shifts, in chapter 3, from general theories of digitalisation to the specifics of the digitalisation of music and music culture. Chapter 3 focuses upon themes, questions, and areas for development that emerge across the existing literature on the sociology of the digitalisation of music and music culture. And, finally, chapter 4, drawing upon the themes and issues highlighted in chapters 2 and 3, takes Friedrich Kittler's media theory as a point of departure to develop what is described here as an information materialist approach toward the study of the digitalisation of music and music culture.

Chapter 2: Digital rhetoric: describing the digital media age

Chapter contents

Chapter abstract

As a point of departure for the thesis, the aim of this chapter is to explore the ways in which social and cultural theorists describe digitalisation and the digital media age. The chapter begins by outlining the digitalisation of everyday life as a rationale for the urgency of sociological investigations into digitalisation. Section three then draws upon the key works of Walter Benjamin, Jean Baudrillard, and Donna Haraway – chosen for their influence and critical approaches to the new technologies – to suggest that digitalisation as a process presents certain analytical problems associated with the boundary dissolving properties of digital technologies. The chapter then, in section four, argues that one strategy employed for encountering these analytical problematics is the use of liquid/fluid/flow metaphors to capture the apparently mobile or dissolving boundaries of the digital age. The central argument of the chapter is that that we should attempt to enrich and develop these fluid conceptualisations through material instantiation and empirical detail. The primary aim of the chapter is to situate these investigations into the digitalisation of music and music culture within broader debates in social and cultural theory.

1. Introduction

> 'The twentieth century has witnessed the introduction of communications systems that allow a wide distribution of messages from one point to another, conquering space and time first through the electrification of analogue information, then through digitalization.'
> (Poster, 1996: 3)

> 'I believe a lot in digialization, which highlights or materializes social connections in a way that may be very productive for giving qualitative sociology its quantitative arm.'
> (Latour in Gane, 2004: 89)

The transformations associated with the processes of digitalisation have received significant attention from social theory. This has led to a vast range of theories of the 'information society' (see Webster, 2002). The aim of this chapter is to focus upon a selection of key theorists in order to open-up the questions and problems facing sociological studies of digitalisation.

The chapter begins by considering the digitalisation of everyday life and the increasing ubiquity of digital technologies. The proliferation of these technologies across everyday life has created a range of pressing sociological questions. To illustrate these questions I focus upon the construction of digitalisation in the rhetoric of social theory. By focusing upon the work of Walter Benjamin, Jean Baudrillard, and Donna Haraway, I will argue that the key writings of these foundational theorists highlight the boundary shifting and dissolving properties of the new technologies. These boundary dissolving properties have created analytical problematics that now face research in this area. The chapter argues that one outcome of these problematics is the rise of fluid and liquid conceptualisations of digitalisation. I argue that the central problem with these seductive fluid, liquid, and flow metaphors is that they tend to lead the analysis away from the substance or material properties of digitalisation as an everyday social process. I suggest here that sociological studies of digitalisation now need to engage with the everyday material aspects of digitalisation in order to uncover the specific properties, artefacts, processes and practices that constitute these fluids, liquids, and flows. This then is an attempt to ground social theories of the digital age in the materiality of everyday life.

2. The digitalisation of everyday life, or, why digitalisation is sociologically significant

As Woolgar has identified, the onset of digital technologies is often described in the literature as having the potential to 'radically...transform many fundamental and wide ranging aspects of society' (Woolgar, 2002: 1). From this, Woolgar claims, it is often concluded that 'these new technologies require us to rethink the very basis of the ways in which we relate to one another.' (Woolgar, 2002: 1-2). Indeed, the life changing digital technologies are now often understood as 'ubiquitous' (Galloway, 2004) and 'pervasive' (Poster 2004; Macgregor Wise, 2004). Anecdotal evidence would suggest that this imagery is accurate.

Even by briefly glancing around our everyday environments it is evident that digital technologies are now at the centre of many social and cultural practices, processes, and interactions. As I sit typing this chapter[1] I am operating a computer, looking at a monitor, saving the file to floppy disk, reading an article printed off from a PDF file accessed from an e-journal, surrounded by various framed images of The Clash (scanned and printed out on a colour printer). Indeed, as Idhe (1990) suggests, our contemporary 'lifeworlds' are 'technologically textured'. Our homes, our workplaces, our cars, and even our movements around or across urban spaces (Bull, 2000), are increasingly defined by our exposure to various digital media. The internet is one amongst an emergent plethora of digital technologies that constitute and afford the digitalisation of everyday life (Wellman & Haythornthwaite, 2002).

[1] This, unfortunately, suggests that the chapter was put together one afternoon with little effort, in fact writing this chapter was a process that was actually spread approximately over a two-year period and caused great headache and a number of rapid reformulations toward the conclusion of the project. The first version of this chapter was submitted to my thesis advisory panel sometime around June 2005 after being written in late 2004. This version remained unchanged and ended up being the final chapter that received substantive changes before submission. This revealed the way in which the thesis had slowly adapted over this period of time. Indeed, completing this chapter proved problematic. As the last piece of the jigsaw it proved difficult to fit in as its original content pointed in a somewhat different direction.

The appropriation of digital technologies in everyday life has spread rapidly in the last twenty years[2]. Our engagement with digital technologies now defines a broad range of our everyday routines: telling the time, banking, recording information, watching television[3], registering for a school lesson[4], listening to music, communicating (texting, chatrooms, instant messaging, e-mail, etc), taking photographs, purchasing groceries, cooking, and even showering and using the toilet[5], have all been digitalised[6].

We can conclude here, with little chance of recourse, that our everyday lives have been incorporated into the processes of digitalisation over recent years, or that everyday life has been digitalised. The rationale for this thesis is that in order to understand the social and cultural implications the ongoing processes of digitalisation further sociological research is required. Sociological research into the digitalisation

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[2] It is perhaps important to provide some historical context to the study of digitalisation. Understandably it is often the case that histories of digitalisation, as incorporated into research articles and book chapters, are designed to encompass particular fields of study, or are dedicated to development of particular technologies. Take for instance, Nigel Thrift's (2004) short history of computer software in his analysis of the relationship between computer software and biological metaphor. In this brief history he notes that as 'a general term 'software' dates only from the 1950s.' (Thrift, 2004: 463), but that it has only really evolved into its contemporary form in the 'last 20 years' (Thrift, 2004: 463) during which time it has 'grown from a small thicket of mechanical writing to a forest covering much of the globe' (Thrift, 2004: 463). Thrift contends that this growth in the use of software, central in the processes of digitalisation, occurred between 1984 and 2004 (when his paper was first published). This then begins to construct a time frame around digitalisation.

In the case of music it was perhaps the advent of *Musical Instrument Digital Interface* (MIDI) in 1981-1983 (see chapter 5) that facilitated a rapid growth in digital music technologies. It was MIDIs resolution of the problems of compatibility between different manufacturer's devices that is often understood to have enabled a proliferation of digital music production devices (Thѐberge, 1997; Taylor, 2001; Warner, 2003; Kretschmer, 2005; chapter 5). It appears therefore that digitalisation, as a significant social and cultural phenomenon, arrived sometime during the early 1980s. The lines of genesis or conditions of possibility of digitalisation may have existed previous to 1980, yet its growth period, in terms of appropriation and cultural significance, occurred in the years after this seminal date.

[3] In the U.K. the analogue signal switch off is planned for 2008-2010.

[4] The secondary school I attended (1989-1995), John Port School, Etwall, installed a digital swipe card system in 1994. Each classroom contained a wall-mounted box and each child was given a swipe card. At the start of every lesson each child, and the teacher, swiped their card through the machine. At the end of the week attendance reports were produced with records of the times and location of each child.

[5] See the San Francisco Business Times 12/12/2003 for a story about Google having digital toilets fitted in their offices. The story is also available online at http://www.bizjournals.com/sanfrancisco/stories/2003/12/15/tidbits1.html. In this instance it was 'Japan's Toto' toilet. Facilities include gender specific water directions, water temperature, and air-drying, amongst other programmable functions.

[6] However, we do not talk of digital food or a digital wash. Similarly we don't talk of digital music, which is interesting considering the significant cultural impact of 'electronic music' – such as the works of Walter/Wendy Carlos, The Tornados, Kraftwerk, and the BBC Radiophonic Orchestra, amongst others – the implications of which are still argued over amongst music fans.

of music and music culture is particular pressing considering both the significant changes and lack of research in this area (see chapter 4)

The problem here is, as Woolgar (2002) notes, that this rationale for investigation requires interrogation[7]. Woolgar's point is that by identifying the social and cultural impacts of digitalisation (as a point of departure) we are already prefiguring or projecting the implications of digitalisation. Furthermore, Woolgar, in his overview of the findings of the various projects on the ESRC *Virtual Society?* research programme, concludes that the programme as a whole revealed that 'new technologies are not being used to the extent we imagined, by the people anticipated, nor in the ways expected.' (Woolgar, 2002: 21). In light of these findings it is wise to proceed with caution when creating (or reading) rhetorical outlines or overviews of digital change (such as that found in my opening passages). Rather, considering the 'counter-intuitive findings' of the *Virtual Society?* programme, it is necessary to attempt to get at the *uses* and *users* of particular technologies, or at the functionalities of technologies in use, and to interrogate these uses in relation to dominant rhetorical projections of digitalisation in marketing and advertising as well as in social and cultural theory. The objective here is to avoid reducing the study of digitalisation to an account of the 'impact' of digital technologies (Woolgar, 2002; Hand & Sandywell, 2002; Sterne, 2003), and to focus instead upon 'implications' (Woolgar, 2002: 22). In short, as Woolgar suggests, this thesis aims to construct a more critical and reflexive theory of digitalisation as ongoing and complex social processes constructed in the interplay between material artefacts, everyday practice, and discourse/rhetoric (Pinch & Trocco, 2002).

3. Shifting boundaries: encountering the problematics of social theory's digital rhetoric

In order to understand the types of digital transformations of everyday life outlined above, the focus now moves toward conceptualisations of these social and cultural phenomenon in the rhetoric of social theory. I begin by outlining a range of social theories of the digital age before focusing in more detail upon the specifics of the

[7] According to Woolgar, it is the very imagery cultivated by this type of description that needs to be interrogated alongside the phenomena themselves (Woolgar, 2002)

perspectives of Walter Benjamin, Jean Baudrillard and Donna Haraway. The section then concludes by contrasting these influential, foundational[8], and critical theorists to identify particular problems and questions facing the study of digitalisation.

3.1 Social theories of digitalisation

As I have mentioned, digital technologies and digitalisation have received significant attention from social theorists in recent years[9]. This has resulted in a wide range of theories, concepts and perspectives concerning various aspects of digitalisation and the 'digital era' (Spiller, 2002).

The commentaries of social theory indicate that the emergence of digital technology and digitalisation has given rise to an 'information society' (Webster, 2002 & 2004; Lash, 2002; Loader, 1998) or 'network society' (Castells, 1996). The increasing ubiquity of ICTs and information (Galloway, 2004; Virilio, 1998 & 2000) have resulted in the ushering in of new 'virtual' (Jones, 1997), 'digital' (Trend, 2001), or 'internet' (Shields, 1996) cultures and cyberspace communities (Smith & Kollock, 1999).

According to this literature digital technologies are understood to have significant implications for a range of social and cultural issues. These include the digital transformation of social divisions (Loader, 1998; Dijk & Hakker, 2003; Nettleton et.al. 2005), community (Jones, 1997; Rheingold, 2000; Smith & Kollock, 1999), identity formation (Giddens, 1991; Jones, 1997), the human body (Haraway, 1991; Virilio, 1998; Featherstone & Burrows, 1995; Shilling, 2005), knowledge formation and access (Lyotard, 1999; Liu, 2004), time and space (Virilio, 1998; Castells, 1989; Cubitt, 1998), surveillance and control (Lyon, 1994 & 2001; Lyon & Zuriek, 1996; MacGregor Wise, 2004), cities (Castells, 1989; Lash, 2002; Graham, 2004; Sassen, 1999 & 2002; Thrift, 2005), democracy, policy and governance (Loader, 1997; Hague & Loader, 1999), ownership (Poster, 1996 & 2001), gender (Haraway, 1991; Cherney

[8] This is foundational in the sense that their theories offer a foundation for the study of digitalisation. They are not foundational in the sense that they offer foundational categories for research, in this sense these theorists are, in the large part, anti-foundational.
[9] Culminating in it being the focus of the 2007 British Sociological Association Annual Conference.

& Wise, 1996), and the structure and organisation of contemporary capitalism and the new economy (Castells, 1989 & 1996; Thrift, 1997 & 2005; see chapter 8).

We see in this literature that digitalisation is depicted as pervading most, if not all, aspects of contemporary social and cultural practices and processes. Also indicated here is the already vast body of literature that now faces sociological studies of digital technologies and digitalisation[10]. In attempting to form a point of departure for the thesis I am faced with the problem of where to enter into these debates. One possibility here is to consider the foundations of these debates and then to look at how these foundations may have come to influence more recent theories of digitalisation.

There are two things that underpin much of this literature on digitalisation. The first is that digital technologies are understood as being transformative and that digitalisation is a process of social and cultural transformation. The second is that these theories attempt to theorise or understand the intersections between digital technologies and various social and cultural spheres or phenomena. Often they attempt to understand how *existing* social and cultural formations, structures, practices, and processes are transformed as they come into contact with digital technologies[11].

To open this up further I turn initially to the writings of Walter Benjamin, Jean Baudrillard and Donna Haraway. Benjamin, Baudrillard and Haraway's works have come to shape and inform a range of contemporary theories of digitalisation[12]. These particular writers have been selected here for two reasons. First, they are all influential theorists of the digital age[13]. And, second, they all have a central concern with constrcuting critical theories of these socio-technological intersections.

[10] The texts listed represent only a fragment of the existing literature.

[11] A further question here concerns how or if digital technologies create new social and cultural phenomena that are not extensions or mutations of existing phenomena.

[12] Clearly not all social theory is directly influenced by these three writers, however, what is of importance here is understanding the nature and consequence of the intersections outlined, it is on this point that these three writers offer avenues for the development of a critical and social theories of technologies.

[13] Evidence of the ongoing influence of these can be found, in the case of Baudrillard, at the *International Journal of Baudrillard Studies*, edited by Gerry Coulter, and at the major international conference Engaging Baudrillard to be held next year at the University of Wales. In the case of Haraway it is notable the range of readers on digital culture, information society, cyberspace, etc, that carry excerpts from her *Cyborg Manifesto* (see for example Cherney & Weise, 1996; Spiller, 2002). Later in 2006 the Journal *Theory, Culture & Society* is dedicating a special section of its annual review publication to the anniversary of this essay. Benjamin's influence is less clear cut, but it is noticeable

3.2 Benjamin's aura

Clearly the work of the German 'critical theorist' and 'literary critic' (Arendt, 1999; Jacobs, 1999) Walter Benjamin does not deal directly with digital technologies. Indeed, it is well known that Benjamin died on the French/Spanish border in 1940 (Arendt, 1999; Adorno & Benjamin, 1999) some forty years before the seminal moments of digitalisation. However, Benjamin is of relevance for two specific reasons. First, the technologies of reproduction that he so effectively theorises can be understood as forerunners for contemporary digital reproduction technologies. And, second, Benjamin's theories of reproduction have come to be highly influential in contemporary social theories of digitalisation (see for example, Lash, 2002; Featherstone, 2000; Poster, 1996; Featherstone & Burrows, 1995; Baudrillard, 1983).

The key work, in terms of Benjamin's contribution toward contemporary theories of digitalisation, is his well known and widely cited essay 'The Work of Art in the Age of Mechanical Reproduction' (1999a). In this essay Benjamin claims that, 'in principle works of art have always been reproducible' (Benjamin, 1999a: 220), but that the 'mechanical reproduction of a work of art, however, represents something new.' (Benjamin, 1999a: 220). Tracking the history of reproduction Benjamin argues that photography usurped lithography, and by:

> 'Around 1900 technical reproduction had reached a standard that not only permitted it to reproduce all transmitted works of art and thus cause the most profound change in their impact upon the public; it also had captured a place of its own among the artistic processes.'
> (Benjamin, 1999a: 221)

Benjamin's argument is that despite the quality of the reproductions created through the emerging systems of reproduction, there are properties of the original that cannot be captured. He argued that 'even the most perfect reproduction of a work of art is lacking in one element; its presence in time and space, its unique existence at the place

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how widely cited his work is in contemporary social theory (see for example Lash, 2002; Bauman, 2003; Baudrillard, 1983; Poster, 1996).

where it happens to be.' (Benjamin, 1999a: 222). Originals, according to Benjamin, have a history of their own unique existence etched onto them, changes of ownership the physical conditions of storage, are all a part of the original's unique qualities but are absent even from the most perfect reproduction.

The difference Benjamin outlines was not just a transformation in the technical processes of reproduction but also in attitudes toward these processes. Whereas 'manual reproduction' was regarded as a 'forgery', thus preserving the 'authenticity' of the original, 'technical reproduction' was celebrated as authentic practice.

This acceptance and authentication of mechanical or technical reproduction, for Benjamin, is a consequence of two particular functions or properties of the new reproduction technologies. First, these 'reproductions can bring out those aspects of the original that are unattainable to the naked eye' (Benjamin, 1999a: 222). Second, the processes of 'technical reproduction can put the copy of the original into situations which would be out of reach for the original itself.' (Benjamin, 1999a: 222). We see here Benjamin mapping out the possibilities of *reconfiguration*, the alteration of the relations between bodies and their social and cultural surroundings, and *recontextualisation*, the movement of cultural artefacts in or across previously inaccessible spaces, inherent in the new technical reproduction technologies. These functionalities, in Benjamin's' terms, legitimise or authenticate the technologies themselves and the processes or practices that they afford[14].

The key difference between Benjamin's work and that of the more radical postmodern visions of reproduction that followed (see Baudrillard below), is that, for Benjamin, the particular qualities or properties of the original are illuminated in distinction to its reproduction rather than being destroyed or subsumed into its reproductions and pastiche. The key differentiator here is what Benjamin describes as the 'aura' of the original[15]. Benjamin's argument is that the aura of the original, its unique and un-reproducible properties, 'withers' in the age of mechanical reproduction. This

[14] This indicates toward Lyotard's (1999) 'legitimation through performativity' that I return to in chapter 8.

[15] Benjamin defines aura in the following terms: 'If, while resting on a summer afternoon, you follow with your eyes a mountain range on the horizon or a branch which casts its shadow over you, you experience the aura of those mountains, of that branch.' (Benjamin, 1999a: 225)

withering occurs not because it cannot be separated from its infinite copies, but rather that we less frequently seek opportunities to experience the original. As such, Benjamin claims that 'the product of mechanical reproduction...may not touch the actual work of art, yet the quality of its presence is always depreciated.' (Benjamin, 1999a: 223). So, although the original is distinguishable from its reproduction, its authenticity, rituals, heritage, and qualities are implicated by these reproductions. Access to reproductions, according to Benjamin, has implications for the rituals and traditional practices in which the original is experienced if not for the material properties of the artwork[16]. Benjamin suggests that the rise of mechanical reproduction has social implications in its 'liquidation of the traditional value of cultural heritage.' (Benjamin, 1999a: 223).

3.3 Baudrillard's hyperreal

Often understood to have been influenced by the themes of Walter Benjamin's work[17], Jean Baudrillard, the French 'poststructuralist' or 'postmodernist' thinker (Sandywell, 1995: 125), is well know for a range of abstractions on the implications of new media technologies (Baudrillard, 1983, 1988, 2001 & 2002). The central contention of his more recent writings has been that media technologies inextricabley interweave reality and non-reality creating a state of hyperreality (Baudrillard, 1983, 2001 & 2002). Indeed, it is:

> 'from the late 1980s we find Baudrillard's most notorious thought: that what we may have called 'the real' was in fact a product of unrecognised simulation; and that only with the epoch of electronic media do we realize how far the worlds of human culture are radically and irretrievably constituted through the work of signifying practices'
> (Sandywell, 1995: 131)

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[16] Benjamin also argues that 'to an ever greater degree the work of art reproduced becomes the work of art designed for reproducibility' (Benhamin, 1999a: 1999a). Perhaps more culturally focused studies of the digitalisation of music and music culture should consider how music has now become designed for downloading, polyphonic mobile phone ringtones, and Mp3 players.

[17] See for example Mark Poster's introduction to his edited collection of Baudrillard's work (Baudrillard, 2001)

This has led to a range of well known and provocative claims that major historical events, such as the gulf war (Baudrillard, 2001) and 9/11 (Baudrillard, 2002), did not take place. This, of course, is not meant literally, nor does it mean that these events do not have consequences. Rather he argues that 'war is not any the less heinous for being a mere simulacrum – the flesh suffers just the same, and the dead ex-combatants count as much there as in other wars.' (Baudrillard, 1983: 71). It is instead to claim that as these events are experienced through media technologies that they become 'hyperreal' or that they occur in a 'hyperreality'.

For Baudrillard these new mediated images, and media technologies, are all-pervasive. We are surrounded by 'simulations'. Baudrillard defines simulations as the 'generation by models of a real without origin or reality: a hyperreal.' (Baudrillard, 1983: 2). Simulation is a 'substituting of the signs of the real for the real itself' (Baudrillard, 1983: 4); it 'effaces the very difference between true and false, real and imaginary.' (Bauman, 1992: 150). Indeed, Baudrillard suggests that digitalisation or the digital era, defined by the primacy of the code, has come to pervade all aspects of our everyday lives. According to Baudrillard:

> 'the genetic code is not...limited to the laboratory effects or to the exalted visions of theoreticians. Banal, everyday life is invested by these models. Digitality is with us. It is that which haunts all the messages all the signs of our societies.'
>
> (Baudrillard, 1983: 115).

Everyday life, in Baudrillard's postmodern formulation, is mediated by and occurs within these digital codes. Baudrillard claims that we are no longer an appendage of the machine, as Marx and Engels foretold (2002: 227), and, furthermore, 'modern technologies...are no longer so much extensions of man, as McLuhan used to say, but human beings are now becoming, rather, a kind of extension of the logistical system.' (Baudrillard, 2001: 289). For Baudrillard, everyday life and digital technology have rather melted into one another (Baudrillard, 1983: 54-55). Or, as Baudrillard claims, 'life is so liquid, the signs and messages are so liquid, the bodies and the cars so fluid' (Baudrillard, 1999: 121).

According to Baudrillard we are now faced by the 'dissolution of TV into life, the dissolution of life into TV – an indiscernible chemical solution' (Baudrillard, 1983: 55). The prominent outcome of this dissolution of life and (digital) media is, for Baudrillard, the interweaving of 'reality' and 'illusion' (Baudrillard, 1983). This interweaving in turn creates a range of problems associated with the virtuality of culture where 'objects become undefined simulacra one of the others.' (Baudrillard, 1983: 97). Bauman explains this in the following terms:

> 'Everything is 'hyper' in Baudrillard's world. Everything transcends and leaves behind the very opposition which it stood for and which used to lend it an identity of its own. This transcendance itself is 'hyper': the oppositions have been in fact dissolved, and so things have lost their identity.'
> (Bauman, 1992: 151)

Hyperreality, in Bauman's interpretation, is a dissolving of boundaries, oppositions, and identities that results from the rise of the new technologies. The consequence of the rise of these new technologies is, for Baudrillard, the 'collapsing' or 'implosion' of poles into one another (Baudrillard, 1983: 57). It is here at this point of implosion, 'where the distinction between poles can no longer be maintained, one enters into simulation, and hence into absolute manipulation.' (Baudrillard, 1983: 57)

One such collapse of oppositions, echoing Benjamin's (1999a) position, is between the original and the copy, and between production and reproduction[18]. For Baudrillard, digital media technologies problematise the original by making it indistinguishable from its perfect reproduction. According to Baudrillard, the consequence of these perfect reproduction capacities of digital media is an 'obliteration of the original' (Baudrillard, 1983: 97) and an 'absorption' of production into reproduction. This then has implications not only for the original itself but also for the experiences of shared live events. David Chaney, extending Baudrillard's argument, claims that 'the significance of technologies of communication and entertainment is that it has become possible to produce infinite numbers of identical copies of cultural performances so

[18] Baudrillard claims that reproduction 'absorbs the process of production' (Baudrillard, 1983: 98). He also claims that with the rise of reproduction technologies 'production no longer has any sense.' (Baudrillard, 1983: 100)

that audiences no longer have to be local or no longer have to share collective occasions.' (Chaney, 1994: 27).

To summarise, Baudrillard's argument is that digital technologies and the processes of digitalisation are pervasive. Digital media and 'simulations' (Baurdillard, 1983) become an integral part of our everyday practices and as such mediate our understandings of events, artefacts, cultures, and places. The result of this is that as digitalisation comes to define everyday practices then reality and the virtual become intertwined in our practices and understandings.

It would seem that, for Baudrillard, digitalised power is distinct from both Ritzer's concept of *McDonaldization* (2000) and Adorno's concept of the *Culture Industry* (2001). Digitalised power is less about rationality, exploitation, and domination by one group over another for 'we're no longer in a power struggle between two systems' (Baudrillard, 2001: 279). Rather digitalisation has shifted power toward sets of agendas within the mediated milieu of the information age. These agendas are based around the issues of the 'thick environment' (Sassen, 2002; Sassen in Gane, 2004: 125-142) of the digital age; these include programming, manufacture, advertising, marketing, retail, instant global distribution networks, and e-commerce. Or as Baudrillard put it 'we're no longer in a situation of transcendent, vertical confrontation. We are, rather, in a horizontal situation of functioning and networks.' (Baudrillard, 2001: 289). Power is no longer about a clear hierarchical domination or clearly segregated conflict[19].

More recently Mark Poster's work on what he calls the 'second media age' (Poster, 1996) and the pervasiveness of digital media (Poster, 2004) has extended some of the central themes of Baudrillard's work. Poster argues that by 'outlining a logic of simulation, Baudrillard's writings form a transition to a second media age, one in which the constraints of broadcasting will be breached so that the politics of the media can emerge in other than modernist terms.' (Poster, 2001: 62).

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[19] Although it is perhaps still an issue of gender domination (Haraway, 1991; Sassen, 2002)

Highlighting the limitations of Baudrillard's postmodernist approach, Poster claims that:

> 'Baudrillard's work remains infused with a sense of the media as unidirectional, and therefore does not anticipate the imminent appearance of bi-directional, decentralized media, such as the Internet, with its new opportunities for reconstructing the mechanisms of subject constitution.'
> (Poster, 1996: 19)

For Poster, Baudrillard's work, understandably, does not anticipate the open and multidimensional fields of activity that we have seen realised by the ongoing rise to cultural prominence of music downloading and music file-sharing during the last two or three years. However, according to Poster, Baudrillard's work remains useful for theorizing the collapsing hierarchies of the emergent digital culture.

The advantage, according to Poster, that Baudrillard's position has over modern conceptualisations of media is its ability to capture the multidimensionality of power in the digital age. He argues that:

> 'Baudrillard's writings allow us to interrogate the broadcast media at the level of their cultural articulation; we are not limited to asking, as Adorno does, how one-way speech is fascist, especially when it is controlled by capitalists.'
> (Poster, 1996: 18)

In the digital epoch or 'the second media age' (Poster, 1996), broadcast models of centralized media broadcasting out to the masses have been replaced with decentralised, bi-directional and interactive media. Poster argues that with 'Baudrillard we can see that no one "controls" the cultural logic of the media' (Poster, 1996: 18).

3.4 Haraway's cyborg imagery

In very general terms Baudrillard's digitalisation is defined by the collapse of stable identities, originals, ownership, and is underpinned by the interweaving of the virtual and the real. Yet it is in the work of the socialist feminist Donna Haraway (1991 & 1995), and particularly in her highly influential essay 'A Cyborg Manifesto: Science, Technology and Socialist-feminism in the Late Twentieth Century' (1991), that the implications of this problematic are spelt out most explicitly.

Haraway's central argument is that in the contemporary epoch, as a result of a range of new technologies including body modification and increasingly miniaturised ICTs, 'the boundary between physical and non-physical is very imprecise' (Haraway, 1991: 153). In Haraway's view digitalisation is a process through which boundaries are made increasingly permeable as we use technologies to 'recraft' our bodies and environments. For Haraway, with the onset of digitalisation, the boundaries between virtual and physical, human and non-human, nature and the artificial, become increasingly problematic. Haraway's claim is that the new technologies transform us into cybernetic organisms or cyborgs, 'a hybrid of machine and organism, a creature of social reality as well as a creature of fiction.' (Haraway, 1991: 149). Indeed, for Haraway, our bodies are made virtual/physical as we become cybernetic-organisms, hybrids of machine and human, of physical bodies and virtual information (Featherstone & Burrows, 1995; Hables Gray, 1995, Hopkins, 1998, Wolmark, 1999, Kirkup *et al*, 2000, and Green & Adam, 2001). Haraway's contention is that information has concrete implications as it recrafts and reconfigures us and our surroundings.

Haraway's imagery, borrowing from cyberpunk literature (Burrows, 1995), is of bodies enmeshing with technologies of various types to the point that they become indistinguishable hybrids of human and machine. According to Haraway, it is this integration of the new technologies into our bodies, our everyday practices, and the social, that creates 'ideological' questions about the 'dichotomies between mind and body, animal and human, organism and machine, public and private, nature and culture, men and women, primitive and civilized' (Haraway, 1991: 163).

More recently Harway's cyborg imagery has resurfaced in the work of William Mitchell. According to Mitchell 'we are living our lives at the points where electronic information flows, mobile bodies, and physical places intersect' (Mitchell, 2003: 3-4). These intersections are not rigid or fixed, rather they are mobilised as information flows across the boundaries between the virtual and the physical. As such the informational has concrete social and cultural significance, information is not distinct from the material world. The consequences of these intersections, are, in Haraway's terms, a matter of 'life and death', of 'survival', (Harway, 1991), for our 'lives are at stake in curious quasi-objects like databases; they structure the informatics of possible worlds, as well as of all-to-real ones.' (Haraway, 1995: xix).

This is to say that the information and the physical or material world are not distinct but that they intersect and enmesh[20]. A theme that Mitchell elucidates in the following passage:

> 'Now the body/city metaphors have turned concrete and literal. Embedded within a vast structure of nested boundaries and ramifying networks, my muscular and skeletal, physiological, and nervous systems have been artificially augmented and expanded. My reach extends indefinitely and interacts with the similarly extended reaches of others to produce a global system of transfer, actuation, sensing, and control. My biological body meshes with the city; the city itself has become not only the domain of my networked cognitive system, but also – and crucially – the spatial and material embodiment of that system.'
> (Mitchell, 2003: 19)

Built into Mitchell's techno-biological imagery is the secondary problems of the separation forged in some instances between information and materiality. On this issue he argues that:

[20] A parallel argument to this (allied with detailed empirical investigation) has recently emerged in the area of social informatics, and particularly in the recent work of the ESRC *e-Society* research programme's *Sorting Places Out?* project (see Burrows, et. al., 2005; Burrows and Ellison, 2004). The outputs from this project argue that information technologies such as computer software packages, searchable database facilities, and various internet sites, implicate social spaces. The access to information about places reinforces, concretises, and perpetuates social divisions by mapping them onto geographical locations. I discuss this issue in greater detail in chapters 6 and 10.

> 'In the early days of the digital revolution it seemed useful to pry these elementary units of materiality and information apart...Now, though, the boundary between them is dissolving. Networked intelligence is being embedded everywhere, in every kind of physical system – both natural and artificial.' (Mitchell, 2003: 3)

It is this issue of the separation of information and materiality that I return to discuss in further detail in chapter 4[21].

In general, the problem here is that as the process of digitalisation interweave virtual and physical spaces the foundations of study become problematic. The requirement here is to study digitalisation as acting across the virtual and physical, and, where possible, to create conceptualisations that also operate across these boundaries and contexts. Haraway suggests, that one possible way to capture the movement between the virtual and physical, and to understand how the virtual and physical implicate one another, is to 'concentrate on boundary conditions and interfaces, on rates of flow across boundaries – and not on the integrity of natural objects.' (Haraway, 1991: 163).

A further question highlighted by Haraway's work concerns what might be described as the human/non-human divide (Haraway, 1991; Poster, 1996; Hayles, 1999; Lash, 2002; Gane, 2005b). The question here is one of the boundary dissolving properties of digital technologies as they become enmeshed with our bodies (Haraway, 1991). Haraway claims that it 'is not clear who makes and who is made in the relation between human and machine.' (Haraway, 1991: 177). Or, as Mitchell suggests, we 'construct' and are 'constructed' (Mitchell, 2003: 39). Developing Haraway's position Mitchell argues that we:

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[21] As a further problem here it may be that the term virtual, virtuality or virtualisation may be outdated, or problematic in that they suggest a dualism between the virtual and physical or informational and material. The processes of digitalisation act across these boundaries making them problematic systems of ordering and classifying particular phenomena. As Mitchell argues: 'The metaphor of "virtuality" seemed a powerful one as we first struggled to understand the implications of digital information, but it has long outlived its usefulness...we should think of that difference as something concrete, with definite spatial and temporal coordinates' (Mitchell, 2003: 4). We perhaps now need to look beyond these dualisms, this is the problem facing sociological studies of digitalisation.

> 'become inseparable from our increasingly capable electronic organs; our very limbs had become fleshy antenna supports; our interconnections had ramified and intensified to an almost incomprehensible degree. From prenatal imaging and heartbeat monitoring to posthumous persistence of our digital addresses and traces, our bodies now existed in a state of continuous electronic engagement with their surroundings.'
> (Mitchell, 2003: 2)

Indeed, digitalisation occurs in these 'continuous...engagements' with our 'surroundings'. The problem is, if the human and the non-human become increasingly indistinguishable in their continuously active networks and flows, then how is it possible to conceptualise these new digital formations without these previously distinct categories. Mobile and constant human technology relations require concepts and research strategies that capture these mobilities and complex interrelations at the point of boundary conditions or interfaces. The point here is that 'no objects, spaces, or bodies are sacred in themselves; any component can be interfaced with any other if the proper standard, the proper code, can be constructed for processing signals in a common language.' (Haraway, 1991: 163)

Haraway's argument here is that interfaces, as 'boundary conditions' between the organic and inorganic, are the sites of power flows, or the 'informatics of domination' (Haraway, 1991). The ubiquity of these 'polymorphous interfaces' means that the 'home, workplace, market, public arena, the body itself – all can be dispersed and interfaced in nearly infinite, polymorphous ways, with large consequences for women and others' (Haraway, 1991: 163). For Haraway, digitalisation opens up our bodies to pervasive, ubiquitous and inescapable information flows infused with new structures of power and domination.

3.5 Problematising the study of digitalisation

A number of shared themes and problems emerge out of this brief overview of these key theorists (see figure 2.1 below). Indeed, a number of these themes have come to inform contemporary studies into digitalisation. This is not to say that these are the only central themes or that *all* theories follow these critical schemas. But rather it is to say that that these theories have come to shape and influence a range of contemporary approaches, and, more crucially, to found critical approaches to the new technologies.

Theorist	Focus	Analytical problematics	Intersections	Consequences and implications
Benjamin	Technologies of reproduction (lithography, photography, film). The recontextualisation of artworks and the extension of the possibilities of vision. The distinctive properties of the original (aura).	Original/copy	Reproduction technologies and art. Reproduction technologies and politics. Reproduction technologies and the human body (prosthesis of the eye and visions of movement). Reproduction technologies and art	Aesthetic politics, the destruction of the properties of original artwork, dehumanisation, the misuse of technologies to manipulate and mobilise. The possibilities of technologies for capturing the beauty of nature.
Baudrillard	Proliferating media images, global events, the pervasiveness of digital media. Digital codes and the codification of life. The disappearance of the original	Real/virtual Original/copy Production/reproduction	Digital technologies, politics and consciousness. Digital technologies and everyday life. Digital technologies and place.	The new aesthetic politics, the irreplaceable impact of suffering. The manipulation of the illusion of reality.
Haraway	Body modification, the ubiquity of digital interfaces, boundary conditions, polymorphous interfacing and the new compatibilities.	Virtual/physical Nature/culture Human/machine	Digital technologies and the body. Digital technologies and gender politics. Digital technologies with other digital technologies (polymorphous interfacing).	The informatics of domination. The missed opportunity of new media to liberate women from oppression

Figure 2.1: An overview of the key themes in the work of Benjamin, Baudrillard, and Haraway.

Indeed, there are a number of comparative points between these three writers (see figure 2.1). The most obvious is perhaps Baudrillard and Benjamin's positions on the consequences of 'technical reproduction'. Both indicate toward a deterioration, problematisation and reconfiguration of the understanding of the original through its reproduction. Although for Baudrillard the perfect reproductions of the digital age subsume the original, whereas for Benjamin the original maintains its unique auratic properties and it is the technological transformation of the rituals in which the original is experienced that is of significance. Furthermore, Benjamin's essay, pointing out the potential of new technologies to move artworks out into new spaces, makes suggestions toward the proliferation of reproductions and reproduction technologies and the pervasiveness of information flows implied by Haraway and Baudrillard.

Indeed, it can even be argued that Benjamin's essay foretells the kind of prosthesis of the body found in Haraway's cyborg imagery. Benjamin's argument that the 'camera introduces us to unconscious optics' (Benjamin, 1999a: 239) and enables us to see things 'unnatainable to the naked eye' (Benjamin, 1999a: 222), illustrates the kind of technological enhancement of the human body and its capabilities to which Haraway refers.

On a more practical note, Benjamin's main contribution is that he describes and theorises the socio-technological processes that have led up to digitalisation. This makes it a key work in defining the *reconfigurations* and *recontextualisations* of digitalisation. This is to understand digitalisation as transforming the boundaries between material artefacts, practices, embedded understandings, bodies, and spaces. Themes that then emerge in the works of Baudrillard and Haraway and across the literature on digitalisation[22].

Here we see that all three theorists approach new technologies as significant in transforming aspects of human experience, consciousness, and practice. These critical approaches are based upon the disruptive properties of the technologies. Indeed, in particular Baudrillard and Haraway's theories are defined by the central premise that digital technologies problematise particular social and cultural boundaries and categories. Both define digitalisation as a process of 'boundary dissolving' (Sandywell, 2006). The crucial boundary for Baudrillard is between the real and the virtual, whereas for Haraway it is the enmeshing of humans and machines that has

[22] I am not claiming here the Benjamin is responsible for all contemporary theories of digitalisation, rather I am claiming that the themes that emerge in Benjamin's essay can be seen to have been perpetuated in some contemporary theories of digitalisation.

problematised a range of social and cultural boundaries. Indeed, in the critical theories of Baudrillard and Haraway the problematisation of boundaries becomes the defining feature of digitalisation.

We also see in this literature that the collapsing of these boundaries is understood to have particular implications or consequences. For instance, for Haraway, these digital technologies perpetuate, or even extend, systems of control and domination. Whereas, for Baudrillard and Benjamin, the implications or consequences of events are diminished through our experience of their 'simulation' or 'reproduction'. What is clear here is that digitalisation is theorised as having concrete implications and outcomes.

The central difference between Benjamin's 'modernist' theory of reproduction and the 'postmodernist' theories of Baudrillard and Haraway, is that it is unsurprisingly less radical. Benjamin's modernist approach is more clearly rooted in modern categories and concepts of authenticity, originality, beauty, progress, etc, whereas Haraway and Baudrillard seek to undermine these categories and extend the project of problematising studies into the social and cultural implications of new technologies[23].

What can be concluded here is that Haraway and Baudrillard's, and to a lesser extent, Benjamin's theories *problematise digitalisation.* That is to say that their arguments that the boundaries between human and machine, production and reproduction, and the virtual and physical have become blurred or problematic undermine the foundations of research into digitalisation. We are left with no solid foundations for study. Clearly it is far more straightforward to study digital technologies as distinct objects with which humans interact, or to say that virtual spaces are distinct and separate from real or physical spaces. However, a more critical vision of digital technologies requires a question mark to be placed around these categories. These then become analytical problematics that inform critical studies of digital technologies and digitalisation. The question then is how studies of digitalisation proceed in the face of these boundary dissolving critiques of the new technologies.

[23] It would perhaps be worth considering in more detail the individual social and academic contexts in which these key works were written. For example, it is clear that the NAZI's use of film had some influence on Benjamin's piece.

One outcome of the increasing mobility of social and cultural categories and boundaries is the construction of fluid or liquid conceptualisations of social and culture processes. The product of the collapse or blurring of boundaries and categories is that phenomena that were previously understood as stable or fixed, such as identity, organisations, the body, reality, physicality, materiality, knowledge, emotion, etc, become mobile and unstable. These mobilities and instabilities are now frequently conceptualised through the liquid/fluid/flow metaphor. A metaphor that we see used for this purpose by both Benjamin and Baudrillard.

4. The dominant metaphor(s) of the digital age: fluidity, liquidity, and the flow of information

I will now proceed by outlining three further theories of the digital or information age that rely upon such fluid/liquid/flow metaphorical formulations to overcome these shifting boundaries and analytical problematics. I will focus here upon three key texts; John Urry's *Global Complexity* (2003), Zygmunt Bauman's *Liquid Modernity* (2003), and Scott Lash's *Critique of Information* (2002).

4.1 Theories of global liquidity, fluidity, and flows

John Urry (2002, 2003 & 2005) has recently argued that social theory should appropriate complexity theory from the natural sciences to develop its theories of globalisation and global process[24]. Urry claims that the benefit of complexity theory is that it 'elaborates how there is order and disorder within all physical and social systems.' (Urry, 2003: 138)

Urry describes the digital globe as resting upon the edge of chaos founded by the tension between order and disorder. For Urry, we are 'living through some extraordinary times involving massive changes to the very fabric of normal economic, political and social life.' (Urry, 2003: 1). He suggests that these rapid and profound

[24] I explore complexity theory in further detail in chapter 10, and suggest that this may provide a particular direction for developing more specific sociological investigations into the digitalisation of music and music culture.

transformations, based around technologies which have become 'locked in over lengthy periods of time.' (Urry, 2003: 54), require social theory to create new terminology that overcomes the limitations of existing globalisation rhetoric, the purpose of which is to capture this complexity and near chaos of the digital age. Urry argues that terms like 'network' have limitations that now need to be overcome to elaborate the multidimensionality, chaos, and complexity of the digital age.

These contemporary technological transformations, Urry identifies, in agreement with much globalisation literature, have the effect of compressing time and space (Virilio, 1998), 'thus new technologies are producing "global times" in which the distances between places and peoples again seem to be dramatically reducing' (Urry, 2003: 2)[25]. This continues with the image that digitalisation transcends, or facilitates the transcendence of, space and time; it creates instant or rapid flows of information around global networks. In order to understand and conceptualise these changes, and their implications, Urry suggests that complexity studies offer the social sciences a way forward (see also chapter 10). This direction avoids the reduction of these complex global networks to their constituent parts. For Urry:

> 'Complexity investigates emergent properties, certain regularities of behaviour that somehow transcend the ingredients that make them up. Complexity argues against reductionism, against reducing the whole to the parts.'
>
> (Urry, 2003: 13)

He is arguing for a type of analysis that looks at contexts and interdependencies rather than individualised moments, events, or technologies[26].

[25] This compression of global relations creates an image of the 'thick environment' to which Sassen refers (Sassen in Gane, 2004)

[26] Although it is unclear why he feels it is not possible to study both a micro level of analysis of specific technologies in everyday life while also incorporating the macro structures of the globe. Perhaps we have a situation akin to that of quantum mechanics and general relativity in physics. This is a clash between the analysis of the micro-scopic detail within the context of the macro-scopic structures and systems. This is a problem that has resurfaced in recent debates in social and cultural theory (see Webster, 2005).

Urry places particular emphasis upon the emergence of the internet in the transformations he describes. Echoing Poster's (1996 & 2001) earlier arguments, he suggests that the 'internet enables horizontal communication that cannot be effectively surveilled, controlled or censored by national societies.' (Urry, 2003: 63). This is comparable with Baudrillard's assertion that we have moved from vertical to horizontal forms of confrontation, a form of democratisation where traditional social hierarchies are subverted or disrupted by ICTs in place of new structures of control and domination (Haraway, 1991; Sassen, 2002). As a result of these socio-technological transformations traditional understandings of power, structure, and class become problematic (Burrows, 2005b).

To conceptualise this complexity, disorder and chaos Urry talks of the *fluidity* of the digital age:

> 'The Internet can be seen as a metaphor for social life that is fluid, involving thousands of networks, of people, machines, programmes, texts and images in which quasi-subjects and quasi-objects mix together in new hybrid forms.'
>
> (Urry, 2003: 63)

Fluidity is used by Urry to describe the pervasive processes of digitalisation, to represent its complexity, and to overcome its various analytical problematics.

Indeed, Urry, Bauman, and Lash are all concerned with the ubiquity and pervasiveness of information flows. As Urry argues, 'information is everywhere (and nowhere), travelling (more or less) instantaneously along the fluid networks of global communications.' (Urry, 2003: 64). For Urry it is the 'fluidity' of the systems, networks, and boundaries of digitalisation that enables rapid flows of information to circulate around the globe. Urry also identifies the problems with contemporary terminologies and their inadequacy in capturing the phenomena they describe, hence his call for the re-conceptualisation of global processes.

Similarly Bauman is often understood to be a forerunner in the development of liquid conceptualisations of social phenomena. Bauman's *Liquid Modernity* (2003) appears to have had a significant influence and impact upon the direction and language of contemporary theories of the digital age. The objective of *Liquid Modernity* (2003) is to convince its reader of the suitability of the liquid metaphor for explaining or describing contemporary social formations, cultural artefacts, and technological interactions.

Bauman argues that 'liquids, unlike solids, cannot easily hold their shape.' (Bauman, 2003: 2), they 'neither fix space nor bind time.' (Bauman, 2003: 2), solids make time less important, their fixity makes time less relevant, whereas the mobility of liquids makes time more significant[27]. Furthermore, contemporary social and corporeal mobility has become more fluid, less constrained, less fixed, and is therefore comparable with the mobile boundaries of liquids (and the difficulty in restricting liquids from moving around and filling new spaces). For Bauman, these are the 'reasons to consider 'fluidity' or 'liquidity' as fitting metaphors when we wish to grasp the nature of the present' (Bauman, 2003: 2)[28]. For Bauman this increased liquidity is based upon the individualisation of society, the emergence of a powerful consumer society, the active construction and reconstruction of liquid identities (see also Haraway, 1991; Poster, 1996), and the unconstrained movement and redistribution of power[29].

Finally, the central argument of Scott Lash's *Critique of Information* (2002) is that technology and culture have collapsed into each other. This has created an inescapable information order that leaves no space or time for critical reflection. Lash's position is that we cannot step outside of the 'information flows' that 'run counter to all logics of reproduction, forsaking these for consumption, excess and chronic production.' (Lash, 2002: xii). As a result of these increased flows of information we cannot reflect on or produce effective forms of critique. For Lash, because 'information is compressed in time and space' (Lash, 2002: 1), we are left with no space or time for reflection.

[27] In fact, the space/time problematic could also be added to the list of analytical problematics described above. However, this is perhaps most clearly a product of the interweaving of the physical and virtual aspects of everyday life practices as they intersect with ICTs and global communication networks.
[28] Predicting the arguments that follow, it is notable that Bauman uses the term 'nature' here.
[29] Bauman also makes use of digital metaphors to further this distinction between the solid and the liquid. Bauman compares the solid era to 'hardware', the liquid era to 'software' (Bauman 2003: 113). Software is used here as both a product of the digital age and as a metaphor for its description. This is an illustration of how deeply technological metaphors have become embedded in both lay and expert discourse.

Lash's imagery is of pervasive and all consuming information flows. He argues that for critique to exist it must come from inside of these information flows.

Like Bauman and Urry, Lash constructs an image of digitalisation as complex and chaotic. This is perhaps best summarised in the following passage:

> 'The key to understanding this is to look at what is produced in information production not as information-rich goods and services, but more or less as out-of-control bytes of information.'
> (Lash, 2002: 2)

The flows and complexity of the digital order are to be found in these out-of-control bytes of information that are moving rapidly around the digital globe. Lash, like Urry, returns to notions of disorganisation replacing organisation (Lash & Urry, 1987), yet, unlike Bauman, he suggests that we are moving toward a new sociality of computer mediated communciations rather than individualisation (Lash, 2002: 39)[30].

If, for the moment, we overlook the various avenues of study that the above three texts offer, and concentrate only on the metaphorical images used to encounter the analytical problematics of digitalisation, then we find that despite some small variations in aims and scope they all adopt this central fluid/liquid/flow metaphor. As a secondary issue, all three theorists tend to intimate directions that suggest rapid social transformations that are created by the development of information and communication technologies (ICTs). These technologies and the information they communicate are constructed, to borrow Pinch and Collin's (1998) metaphor, as golems, as out of control, unrestricted (or unrestrictable), and unstoppable forces.

4.2 Nature in the digital

It would seem from this that emerging contemporary social theory, typified and influenced by the recent works of Urry, Bauman, and Lash, is moving, or 'flowing',

[30] Again there are a number of issues contained within Lash's text that I must now leave aside. The future of critique, the spatial consequences of information flows, and the constitutive power of digital media, are all illuminated by Lash in his depiction of the globe as enveloped in variable and inescapable information flows.

rapidly away from the rigid, solid, heavy, foundational conceptions of traditional sociology. It has also by-passed the wire and node formulations of the computerised network metaphor (Idhe, 1979). As outlined in the cursory overview above, it can be argued that social theory, and particularly mobility and globalisation theory, has moved toward paradigms and conceptualisations based upon liquidity (Bauman, 2003), flows (Lash, 2002), and fluidity (Urry, 2002 & 2003). These "new" conceptualisations are based upon free-flowing, deterritorialised, light, rapid, non-linear, movements of bodies, images, and information (Urry, 2002). For these theorists knowledge has been transformed into information, structure into dynamic mobilities, and, according to Sandywell (2003), *critique* into *commentary*.

This paradigm shift, it would appear, is the direct result of the analytical problematics of digitalisation and, possibly, the repositioning of sociology in the arid conceptual ground that has arisen as a result of the rise and ongoing fall of postmodern theory (Gane, 2004; Beer & Gane, 2004). The collapse of rigid foundational structures has to some extent left traditional social theory in need of reconfiguration (Urry, 2003; Beck in Gane, 2004; Burrows, 2005b). The emergence of theoretical positions that could overcome the problems associated with the collapse of hierarchy and truth, as well as the development of concepts for capturing what appear to be rapid and substantial transformations in the social and cultural fabric as a consequence of the rise of ICTs, became of primary importance to the survival of a credible, if 'parasitic' (Urry, 1981), sociology. This repositioning meant that cross-disciplinary movements occurred within the proliferating sub-genres of sociology. Politics, social psychology, geography, history, communications studies, philosophy, economics, biology (genetics), physics, literary studies, business studies, were all appropriated in the trans-disciplinary repositionings of sociology. The impact of geography is perhaps the most significant within the formulation of emergent theories of neo-globalisation, mobility, and flows of information[31]. The need for a structural framework on which to place social theory after the impact of postmodern theoretical positions enforced a kind of return to *memories of nature* (Sandywell, 2000) embodied in the fluid/liquid/flow metaphor.

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[31] See for example the work of the "geographer" Nigel Thrift (2005).

The natural or organic properties of *liquids* and *fluids* appear closer to the inaccuracy and unpredictability of digitalisation than more rigid and determinant *network* conceptualisations. The network implies the construction of circuits of man-made technologies based upon the fixed properties of wires, modems, fibre optics, servers, etc. Fluidity implies the uncontrollability, complexity, and unpredictability of nature[32].

If we accept these 'postmodern', complex, and chaotic visions of the digital age, which it seems is an entirely acceptable position to take, then we can understand digitalisation as creating an age of liquidity, fluidity and flows; an age of adaptability, interfacing, and mobility. However, this type of rhetoric has it limitations, particularly as it tends to lead us away from detail and back toward grand schemas. It is necessary therefore to approach this kind of terminology as a set of heuristic conceptual tools that require further substance or awareness of the processes and practices that constitute these liquids. Rather than being drawn into the seductive terminology of fluid and liquids we should instead aim to establish the properties of digitalisation that are responsible for these liquids, fluids and flows.

4.3 'Natural' rhetorics?

The dominance of the liquid/fluid/flow metaphor has become so pronounced that opposing positions are not easily identified[33]. As Burkitt (2005) has noted, these metaphors have even spread out into the mass media. There are, of course, still numerous examples of alternative positions. Terry Eagleton (2003: 57), for example, has suggested that the contemporary era only appears to suit these liquid/fluid/flow metaphors because the past is seen as being heavy and rigid[34]. He claims that the liquid/fluid/flow metaphor is based in opposition to these previous metaphorical formulations. This could be understood to be a kind of Derridean critique, both in the sense of this notion of difference, but more prominently in the idea that *the digital era*

[32] Semen, water, sweat, sea, saliva, rain, rivers, are all an integral part of the discourse of this sociological position. In this sense these liquid and fluid formulations can be said to contribute to perpetuating the myths of social vitality and renewability (Crook, 1998).
[33] Perhaps Lash's (2002) observation regarding the absence of the space and time required for critique is justified, particular considering the lack of any extended and engaged critique of his own text (the notable exception to this is Sandywell, 2003).
[34] 'Culture only seems free-floating because we once thought we were riveted in something solid, like God or Nature or Reason. But that was an illusion.' (Eagleton, 2003: 57).

is fluid because we call it fluid. According to Derrida, to 'say that force is the origin of the phenomenon is to say nothing. By its very articulation force becomes a phenomenon.' (Derrida, 2002: 31). The liquidity of social structures, bonds, and identities exists as a phenomenon because of its articulation as such[35]. And, like force, if we concentrate upon it as point of origin, as a cause, then we, as Derrida argues, are saying nothing. We now, to return to Woolgar's (2002) argument outlined at the beginning of this chapter, need to interrogate these metaphorical constructions of digitalisation.

A second critique of these liquid/fluid/flow metaphors appeared in a recent presentation by Ian Burkitt (2005). Burkitt argues that the dominant themes (fragmentation, detachment, the collapse of social bonds) and metaphors (liquidity, fluidity, flows) of contemporary social theory were too generalised and reductive to capture the complex details of individual biographies. By using Bakhtin's concept of the chronotope – which can be understood as the way in which time and space are presented in narratives[36] – Burkitt identified a greater complexity in the everyday life understandings of his interviewees, particularly on the issue of social bonds. He argued that the individual agent's personal narratives of their own lifecourse contain innumerable little narratives, and that these small narratives also have varying chronotopes – notions of time and space – written into them. Burkitt's argument is that the narratives used by individuals to describe their own life strategies were based upon structures of time and space that cannot be captured by social theory's overarching and generalised concepts of fragmentation, the collapse social bonds, or liquid/fluid/flow metaphors.

Of course, any attempt to capture or re-present the *complex social interactions* and *dialectical relations* of the digital age will inevitably have its flaws. Perhaps the way forward is to identify and accept the limitations of metaphorical descriptions of digitalisation, such as the liquid/fluid/flow metaphor, and to attempt to ground these concepts in material and reflexive research programmes. On this issue Sandywell notes that the 'questions of mediation in Adorno's sense are not avoided by adopting

[35] Much in the same way that Derrida (2002) argued, without wishing to sound to abstract, that a force exists as a force because we call it a force.
[36] See Bakhtin (2003: 180-187) for further information on chronotopes.

'fluid' metaphors and models. This simply pushes the problem of description and analysis back to a mediating theory of 'flows'' (Sandywell, 2003: 116). In other words the fluid/liquid/flow conceptualisation of contemporary social phenomena is not an answer to digitalisation's analytical problematics, or an analytical endpoint in itself. Rather these conceptualisations need to be treated as a point of departure that requires rigorous investigation to reveal the socio-technological questions and phenomena of digitalisation. To return momentarily to Derrida (2002), the term *liquid, fluid,* or *flow* should now be placed under erasure so that the limitations of this type of linguistic framework are always-already written into the concept. Yet in order to proceed it is important to have a conceptual or theoretical framework or space to operate within. Therefore, I will continue by appropriating these dominant liquid/fluid/flow rhetorical formulations of contemporary social theory whilst bearing in mind the problems associated with them[37]. In other words we now need to develop analytical strategies or approaches that identify the material properties that constitute and sustain these liquids, fluids, and flows.

5. Conclusion: beyond and within the world of digital flows?

As a rationale for this research this chapter suggests that our everyday lives have become increasingly digitalised, evidence for which can be found across a range of sources. However, the general approach of this thesis is cautious (and critical). We see sketched out in the work of the key theorists Benjamin, Baudrillard, and Haraway that the study of digitalisation is faced with a range of complex questions and analytical problems. These key theorists suggest that the new technologies have complex social and cultural implications, a position that resonates with much contemporary social theory (Lash, 2002; Bauman, 2003; Urry, 2003). The problem with conceptualising these complex implications and mobile or blurring categories and boundaries through the liquid/fluid/flow metaphor is simply that we are left without a clear idea of the material artefacts, practices and rhetoric that construct or constitute these liquids, fluids, and flows.

[37] I consider some alternative theoretical routes for future investigations into digitalisation in chapter 10.

As a point of departure, on the basis of this overview, we can construct a series of general research questions that face sociological studies into the various aspects of digitalisation. An inventory of these key questions would include the following:

i. What is the nature of the intersections between digital technologies and social and cultural spheres and phenomena? What are the social and cultural implications of digital technologies and digitalisation?
ii. How can the intersections between human (bodies) and digital technologies be conceptualised? How may these localised interfaces be integrated into wider social and cultural systems, structures, and processes?
iii. How do digital technologies transform existing social and cultural practices, processes and structures? How do digital technologies reconfigure and recontextualise everyday social and cultural practices?
iv. What are the possibilities for overcoming the analytical problematics of digitalisation? What are the relations between the 'virtual' and the 'physical', the 'human' and the 'digital', and the 'material' and the 'informational'?
v. How can the boundary dissolving potentials of digital technologies be conceptualised?

These questions will be used as a general schematic or broad point of departure for this research into the processes of digitalisation.

If we accept that the new digital technologies have become pervasive features of everyday life, and that the defining feature of these technologies is their boundary dissolving potentials, then the problem is how we may go about studying digitalisation as a set of interrelated concerns, processes or phenomena. In light of the emergence of the liquid/fluid/flow metaphor, one obvious direction is to conclude here that we need to look in some detail at the material processes, practices, systems and structures that constitute these liquids, fluids, and flows[38]. By this I mean that what is required is a

[38] This is not an argument for empiricism over theory. I am not suggesting here merely that social theory does not provide rich understandings of digitalisation. Rather it is to say that there is scope here

systematic examination of the material details, instantiations, functionalities, properties and appropriations of these proliferating digital technologies in the time and space of everyday life. This 'materialist turn' requires the detailed examination of the material aspects of digitalisation – the material artefacts, the practices, and the rhetoric – and its 'liquidation' of culture.

In addressing the broad questions outlined above I argue here for a materially grounded social theory that develops notions of the technological infrastructure, material artefacts, everyday practices, and rhetoric, that constitute digitalisation by focusing upon the details of 'interfaces' (Poster, 1996) and 'boundary conditions' (Harwaway, 1991). This is to seek to capture or locate the substance behind the apparent fluidity, liquidity, and flows of contemporary culture. In this thesis I argue that Friedrich Kittler's (1990 & 1999) information materialist approach, and its focus upon the technical and functional details of digitalisation, presents an opportunity to reconstitute this infrastructure. However, Kittler's work tends to go to the extreme in its radical notion that we should focus upon the technology at the expense of the social. The approach I take here, discussed in further detail in chapter 4, is to enrich and make pragmatic Kittler's information materialist project in order to capture and contextualise the technical infrastructures of digitalisation.

These materially grounded investigations into digitalisation address five more specific research questions:

i. What constitutes the liquids, fluids and flows of digitalisation? What are the defining features of digitalisation?
ii. How can the material details of digitalisation be captured and reconstituted?
iii. How can these material details be historically, social and culturally contextualised?
iv. How do the projections of digitalisation in digital rhetoric implicate material artefacts and everyday practices?

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to study material details through the optic of social theory, or to use social theory to contextualise close up analysis.

v. How can the material details of digitalisation be used to re-theorise or re-conceptualise both digitalisation in general and the digitalisation of music and music culture in particular?

To further this objective, the focus of the thesis now shifts from these broad foundational debates in social theory toward the specifics of the digitalisation of music and music culture. I begin in the following chapter with a review of the key literature in this area and by highlighting its central themes, issues, emergent questions, and areas for development.

Chapter 3: Constructing the digitalisation of music and music culture: a literature review

Chapter contents

Chapter abstract

Chapter 3 focuses more centrally upon the specifics of the digitalisation of music and music culture as constructed in, or by, the existing body of literature in this area of study. It begins by outlining what are described as the three spheres of music culture: production, reproduction and appropriation. It argues that large parts of the existing literature can be placed in one of these three categories. It then proceeds, in light of the key questions facing sociological research into digitalisation highlighted in the previous chapter, by identifying three vibes or common themes across the literature spanning these three spheres of music culture. It then deals with each of these in turn. The third section focuses upon the technological transformation of musical practice, the fourth section is concerned with the shifting, blurring and problematisation of boundaries, and, finally, the fifth section draws out themes of democratisation, access and liberation from constraint. I then conclude by identifying areas for development and by highlighting unanswered questions that may prove useful for further investigation in this thesis and elsewhere. The central question that this chapter addresses is simply this: what does the existing literature on the digitalisation of music and music culture reveal? How is the digitalisation of music and music culture constructed in this literature?

1. Introduction

> 'The advent of digital technology in the early 1980s marks the beginning of what may be the most fundamental change in the history of Western music since the invention of music notation in the ninth century.'
> (Taylor, 2001: 3)

> 'What is at stake is an opportunity for popular music studies to add to our understanding of technology's intersection with social life and social being, just as connection is at stake for the musician who desires an audience, or for the fan who seeks others.'
> (Jones, 2000: 229)

It has been argued that 'sound technology – so important as a carrier of global culture – gets reworked and appropriated in new local contexts, sometimes generating new cultural forms that in turn push global technology forward.' (Pinch & Trocco, 2002: 106). Pinch and Trocco claim that it is for this reason that 'an analysis of...music would be incomplete without a focus also on the technologies used.' (Pinch & Trocco, 2002: 106). Considering these bold claims it is surprising that in terms of the sociology of music and music culture the role or implications of music technologies represents a significantly understudied area of investigation.

Previous research in music culture tends to focus more centrally upon youth movements and subcultures and is often concerned with particular stylistic genre conventions (Sandywell & Beer, 2005). Very little work has been done on the implications of technologies for the way in which people make, obtain, or listen to music. Or, as Warner puts it, as 'audio technology develops, so pop music changes, yet the ways in which technology permeates pop music have received relatively scant attention.' (Warner, 2003: 11). This is not in itself a criticism, clearly these valuable studies into various aspects of music culture were not designed to encompass the part of (digital) technologies in these cultural phenomena, however, it is to point out that there is a hiatus in the literature that this thesis aims to address. This task has become increasingly salient with the ongoing rise of digitalisation across various musical spheres (see chapters 6, 7 and 8).

To this end this chapter focuses upon literature that deals directly with the digitalisation of music and music culture from a broadly sociological perspective. It begins in the following section with a general overview of this literature. Developing Théberge's (1997) model of design/production, mediation, and consumption/use, the chapter argues that this literature may be separated into three overlapping categories dependent on the type of technologies upon which the analysis centres. These three categories, or spheres of music culture, are labelled here as *production*, *reproduction*, and *appropriation*.

The aim of this chapter is to look across these three spheres to find emerging and unifying themes in the literature, or what might be called *vibes*. In light of the key questions facing sociological research into digitalisation highlighted in the previous chapter, the following sections focus upon three of these emergent themes. The third section deals directly with the question of how music technologies transform musical practices. The fourth section examines the ways in which digital music technologies shift, blur, and problematise particular boundaries. And, finally, the fifth section is concerned with the themes of democratisation, access and the liberation of practice from particular constraints[1]. I then conclude by outlining a way forward for this thesis in terms of unresolved research questions, areas that are yet to be investigated, and new phenomena and questions that require attention. The central question that this chapter addresses is simply this: what does the existing literature on the digitalisation of music and music culture reveal? How is the digitalisation of music and music culture constructed in this literature?

2. Constituting vibes: emerging themes across the three spheres of music culture

> 'DJs are kind of hyperconsumers of this music whose performances are ritualised ways of sharing their knowledge and connoisseurship with listeners...This energy, inspiration, union are, or course, all constituents of the vibe, the electronic version of groove.'

[1] This is intended to illustrate the integration of the digitalisation into the wider social and cultural context.

(Taylor, 2001: 200)

In general terms the *sociology of music culture* is a broad and fragmented field of academic research. The content of this field includes general studies of popular music audiences and the music industry (Wall, 2003; Negus, 1996), critical theories of music culture that extend the work of Theodor Adorno[2] (Witkin, 1998; Sharma, 2000; DeNora, 2003), empirical analyses of the reflexive use of music in everyday life (DeNora, 2000 & 2003; Shilling, 2005), postmodern theories of music culture (Kramer, 1995; Nehring, 1997; Brackett, 2002; Lochhead & Auner, 2002), theories of night club cultures and cultural capital (Thornton, 1995), studies of gender in/and popular music (Nehring, 1997; McRobbie, 1990; Bayton, 1990; Frith & McRobbie, 1990), and general theories of the 'auditory culture' (Bull & Back, 2003). The *sociology of the digitalisation of music and music culture* may be thought of, in terms of the direction of this thesis, as an intersection between this sociology of music culture and the sociology or social theory of digital technologies (see chapters 2 and 4).

In the wake of a series of high profile technological, social, and cultural transformations, recent years have seen a rapid growth in literature on digitalisation. The digitalisation of music culture is one such growth area[3] in which the literature continues to proliferate. Take for example the number of articles published since the beginning of 2005 that reflect upon the now infamous music file-sharing phenomenon (see McLeod, 2005; Leyshon, et.al., 2005; Hesmondhalgh, 2006; Spitz & Hunter, 2005; Rodman & Vanderdockt; 2006; as well as a number chapters in Ayers, 2006) The aim of this literature review is to take a snapshot of some of the most salient emerging themes in this growing body of literature.

Indeed, keeping pace with this literature has been problematic in itself. At the beginning of this research there had been very little published in this area. However, during the period of this project, as the following discussions reveal, the range of literature has grown sharply with publishers catalogues revealing that this is likely to

[2] See Adorno 2002.

[3] This is illustrated by the number of texts referenced in this literature review that have been published since the turn of the millennium. In fact virtually all of the literature covered has been published between 1997 and 2006.

continue to increase over the coming years. Clearly there is a need here, following a considerable wave of literature, to reflect upon the key defining themes that emerge (Beer, 2005a). These emergent themes may be thought of as vibes operating across the literature. However, identifying these points is not a simple task, the literature in this field is far from unified in the types of technologies it focuses upon, or in the approach of its various contributors. Furthermore, there has been nothing written so far that reflects on this as a sector of inquiry, no key debates have yet become embedded in the field (Beer, 2005a).

To begin to structure or organise the literature on the digitalisation of music and music culture it is useful to organise the literature into a typology or categories. This typology may be based, in the first instance, upon the types of technologies with which the work is concerned. Steve Jones contends that the 'simplest way to get at some of the issues concerning shifts in relations of music, geography and social relations is to divide the relation between technology and popular music into three categories' (Jones, 2000: 217). The literature reveals a range of such three-part models. Paul Théberge (1997), in his study of 'music making' and technological 'consumption' uses the categories design/production, mediation, and consumption/use. Jones uses a similar set of categories: 'music making (production), music consuming (consumption), and music distributing (distribution)' (Jones, 2000: 217). Finally, Timothy Taylor (2001: 15) uses music production, storage/distribution, and consumption. The problem here is perhaps one of separation between categories, for example, 'consumption' and 'mediation' are particularly difficult to quantify or to relate to particular specified practices and technologies, particularly as they act across production and distribution. Distribution and consumption may even be understood as two sides of the same coin. Drawing upon Jones, Théberge, and Taylor's categorisations it is possible that music culture, and also the literature on the digitalisation of music and music culture, may be roughly separated into three overlapping and interrelated categories (see figure 3.1): *music production*, *music reproduction*, and *music appropriation*. This chapter and the case studies that follow in Part II (chapters 6, 7 and 8) are structured around this three-part model.

The first category, *music production*, is defined by studies that concentrate on production technologies such as synthesizers, samplers, and drum machines, as well as the recording studio itself (Goodwin, 1990; Kealy, 1990; Théberge, 1997; Taylor, 2001; Pinch & Trocco, 2002; Warner, 2003; Fraser, 2005; Richardson, 2005; Beer & Sandywell, 2005; Beer, 2005a; Gibson, 2006). This first category is concerned with the ways in which technologies impinge upon or offer new opportunities for creativity[4] and cultural production. It focuses upon how cultural forms are produced or created in particular digitalised contexts.

The second category, *music reproduction*, represents studies that are concerned with the ways in which music is collected, listened to or reproduced in everyday life (Kittler, 1999; Bull, 2000; Taylor, 2001; Evens, 2002; Sterne, 2003; Thibaud, 2003; Bull, 2004; Shuker, 2004; Shilling, 2005; Bull, 2006; Farrugia & Swiss, 2005). These studies ask how and where people are reproducing music, and what the consequences or implications are for these spaces and individual agents. More recent literature in this category is particular concerned with mobile music technologies and the ways in which these technologies implicate spaces (Bull, 2000; Thibaud, 2003). More broadly this literature is informed by studies of cultural reproduction and the impact and affect of technologies on reproduction practices.

The third category, *music appropriation*, is perhaps the most difficult to define. Both production and reproduction are in themselves acts of appropriation. However, in this instance the term *music appropriation* is used to represent the act of obtaining music rather than how it is listened to (for the latter fits into the category of reproduction). Literature in this area asks the questions of how individual agents are obtaining music and from what sources, it studies the implications of these activities for individuals, organisations, and industries (Jones, 2000; Breen & Forde, 2004; Leyshon, et.al., 2005; Beer, 2005c; McLeod, 2005; Spitz & Hunter, 2005; Hesmondhalgh, 2006; Rodman & Vanderdonckt, 2006). Recent literature in this area has been particularly concerned with the implications of music downloading and music file-sharing for the music industry (Leyshon, et.al., 2005).

[4] Fraser defines creative activity as 'the process by which the potential sonic object is actualised, in different ways and at various different points' (Fraser, 2005: 183).

Category	Focal technologies	Guiding questions
Production	Recording studios, mixing desks, synthesizers, samplers, studio software	How is music made, created, or produced in the digital context?
Reproduction	Phonograph, Personal stereos, Compact Disk (CD), MP3, MP3 players	How and where is music listened to, played-back, or reproduced in the digital context?
Appropriation	The internet, music retailers online stores, file-sharing networks, downloading software, internet service providers, Napster, iTunes, Limewire, etc.	How do people obtain, purchase, or appropriate music in the digital context? Where is this music obtained from and with what consequences?

Figure 3.1: The three categories or spheres of music culture

Clearly this is a somewhat rigid and simplified categorisation of a complex body of literature and related practices. This is fair criticism, particularly considering how these categories tend to blur and overlap, particularly between production and reproduction (see below) and reproduction and appropriation, in the complex practices of everyday life. Indeed, this is not intended as a fixed or defining framework that may be used to clearly separate particular aspects of music culture. Rather this is intended to act as a point of departure that reveals the concentration and density of existing literature across these spheres.

There are, however, warranted grounds for separating the literature in this way. The most obvious being that there is currently little previous literature or sustained research in place that has studied digitalisation across these three spheres (with the possible exception of Jones, 2000; Taylor, 2001). The existing literature tends to fall into one of these categories based upon the type of technologies that it focuses upon. In line with the aim of this thesis, to identify defining features of the digitalisation of music and music culture, I intend here, in this chapter and in the thesis as a whole, to look across these categories or spheres of music culture. To this end the focus in the remainder of this chapter is upon emerging themes in the existing literature across the three spheres of music culture.

The emerging themes, or *vibes*, identified here may be grouped under three headings: *the technological transformation of musical practice*; *the blurring, shifting and problematisation of boundaries*; and, *democratisation, access and liberation from constraint*. I will now focus upon each of these emerging themes in turn.

3. The technological transformation of musical practice

Michael Bull's (2000) recent work on the tape based personal stereo, the research for which was compiled during the mid-1990s, claims that this mobile music device has transformed the soundscape of the city (see also Thibaud, 2003; Atkinson, 2005)[5]. Bull's work is concerned centrally with 'the multifaceted ways in which...experience is transformed and constructed through habitual use.' (Bull, 2000: 2). Or with how experience may be altered though the everyday routine use of particular devices. As these mobile music reproduction devices enable music to be reproduced across city spaces so 'urban experience becomes, in a significant manner, technological experience.' (Bull, 2000: 9). It is Bull's position that the personal stereo enables particular practices as it 'provides users with a vastly expanded range of management strategies as they go about their everyday life.' (Bull, 2000: 9). This is just one example of a fragmented and diverse range of approaches to the ways in which various music technologies (dependent upon your chosen terminology) manage, impact, implicate, impinge, transform, afford, or enable practice. It is not possible in this piece to examine all of the approaches to this question in the required detail, yet it is possible to get some sense of the range of approaches and their common properties, and, perhaps more importantly, to illuminate this understanding of the relations between music technologies and practice as a unifying concern or theme that runs

[5] Bull also argues that his analysis of 'the use of mobile sound communication technologies in automobiles and elsewhere...point to a transformation that has taken place within urban culture over the past 40 years. This transformation lies in urban citizens' increasing ability and desire to make the 'public' spaces of the city conform to a notion of a domestic or intimate private space.' (Bull, 2005: 255). These issues of the permeation of the boundary between the public is an issue that may be associated with the boundary shifting potentials of technologies discussed below (and returned to in chapters 6 and 7)

across much of this literature. Indeed, one of the key questions asked/addressed by this literature is how music technologies, or technologies in general, transform musical practices.

For example, Warner argues that 'musical creativity in pop music is inextricably bound to developments in audio technology and the working practices which ensue.' (Warner, 2003: xi). Indeed, for Warner (pop) music is 'realized with technology...and perceived through technology.' (Warner, 2003: 11). Similarly Théberge contends that music and technologies are increasingly interwoven:

> 'Over the past forty years, with the introduction of inexpensive electric and electronic musical instruments, multitrack recording equipment, and, more recently, digital keyboards, processors, and computer-based recording and editing systems, popular music has become increasingly integrated with technologies of sound production and reproduction.'
> (Théberge, 1997: 5)

Therefore, for Théberge, transformations in music technology implicate music, for these are 'not simply a change in technology – the substitution of one set of materials for another – but rather a form of practice' (Théberge, 1997: 5). The question then, for Théberge, concerns 'how one might conceptualise, study, and interpret the relationships between musical practice, technology, and culture.' (Théberge, 1997: 6). It would seem that the emphasis here is upon technologies in practice, or upon technologies in everyday life.

3.1 Music technologies in the everyday

It is often suggested that music technologies shape or mould everyday musical practices. For example, Jones claims that:

> 'At present, consumption of music via digital computer networks is of greatest concern to the music industry, insofar as it is the most clear way in which purchasing and listening practices are being reshaped by new technologies...These practices...involve a concomitant social reshaping by

shifting the sites of hearing and listening and of buying music in spatial terms'

(Jones, 2000: 218)

These digitalised networks directly implicate or reshape music appropriation practices by transforming the context of *collecting* and *reproduction* practices[6]. For this reason Jones argues that it is:

> 'important to attend to the role computing and the computing industry play in matters of music consumption. From the time that computer makers began including CD drives in personal computers (augmented later with good quality speakers) the music listening habits of many white-collar workers, students, and others who use personal computers on a daily basis have undergone significant change.'
>
> (Jones, 2000: 218)

In this account it is industry agendas via technology that have implications for musical practices. These industry led technologies, the personal computer and the internet, enable new practices and 'brings potential for connection to wide variety of music, broadening the scope of listening possibilities, but also potentially overwhelming the listener with choice.' (Jones, 2000: 218). Here technological potential leads to new potential practices and social 'spaces'. Jones thereby recommends that we 'approach the Internet as simultaneously a social space, medium of distribution, and engine of social change: as a space of interrelated practices rather than a text to be critiqued, or a technology in need of assessment and control.' (Jones, 2000: 222). This places emphasis on the social connectivity of these technologies as contextual cultural

[6] As Shuker has recently acknowledged, 'record collecting is a major activity, yet relatively neglected aspect of the consumption of popular music. While general studies of music consumption, especially fandom, provide some insights, more extended critical discussion is sparse.' (Shuker, 2004: 311). Indeed, I attempt to begin a study of the digitalised music collection in chapter 7 of this thesis, particularly considering the absence of literature that focuses upon the implications for technological transformations on the music collection. This it seems is an area that is open for future development. It is possible that the music collection may be considered to be a snapshot of the wider processes of globalisation, and that the functions of systems like iTunes may be used to capture particular practices such as most listened to tracks, etc.. These may illuminate particular details about globalisation and its impact upon everyday practices, spaces, and formation of identity (see chapter 10).

artefacts operating as, or in, communicative spaces and thus constituting identities and social relations. He argues that

> 'what has changed, been revolutionised, is not simply the technology, but the content that it has been created to accommodate. Instead of a technology that creates artefacts, goods, network technologies disrupt routine commercial practices, particularly ones of distribution, because they do away with artefacts, with goods that can be moved by means of physical transport.'
>
> (Jones, 2000: 227)

We see here echoes of Benjamin's (1999a) contention that art adapts to the medium (see chapter 2).

However, we still see in Jones' work an underlying sense that technologies when introduced into the market directly impact upon music production, reproduction, and appropriation practices. Jones' contention here is that the impact of digital technologies, as virtualised and networked, do not have the same implications as the physical cultural artefacts of the past. Rather these digital technologies disrupt established capitalist patterns and systems by removing the physical definition of ownership, resulting in a number of high profile legal cases (see also Breen & Forde, 2004; McLeod, 2005; Leyshon, et.al., 2005; Spitz & Hunter, 2005; Rodman & Vanderdockt; 2006; and chapter 8).

Despite these subtle distinctions it can be argued that in general the literature, and particularly the literature on music production, tends to take the technological transformation of practice as its central premise (Warner, 2003; Théberge, 1997; Pinch & Trocco, 2002)[7]. That is to say that in general this literature argues that music technologies cause some form of transformation in practice; they alter how agents perform particular musical tasks.

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[7] For example Warner argues that the 'rapid pace of technological change which characterized the period 1979-1985 led to the evolution of new working practices within the pop recording studio.' (Warner, 2003: 140).

A number of these studies take this technological implication of practice as connected to a combination of the material aspects of the technology and the marketing that surrounds it. For example, Théberge claims that 'if innovation is understood as a process, then marketing is one way in which the innovating firm established a dynamic relationship not only between itself and its market but also between invention and use.' (Théberge, 1997: 47). In other words technologies are reliant upon marketing to enter into practice, to come to wider attention, to be used. He concludes from this that 'an instrument is never really completed at the stage of design and manufacture at all; it is only made "complete" through its use, often in a variety of different ways and in different musical contexts.' (Théberge, 1997: 50). For an '"invention"...only becomes an "innovation" once it has been put into the hands of users.' (Théberge, 1997: 50). From this perspective it is how appropriators engage with the technology that is significant, how the technology, as a material artefact, is interpreted and incorporated in everyday practices. For Théberge, musical instruments, as a form of music technology, are not 'complete', that is they are not instruments or music technologies, 'until they are "made-over" by musicians in the process of making music.' (Théberge, 1997: 160). This illustrates a triangulation between manufacture, marketing, and use.

Taking a similar line toward the *construction* or *completion* of music technology in practice, Taylor (2001), Pinch and Trocco (2002) and Gibson (2006) draw upon theories of technology from the discipline of *Science and Technology Studies* (STS) (see chapter 4). Informed by this theoretical framework Taylor argues that,

> 'Instead of foregoing uses or reuses of the concept of technological determinism, I prefer to follow those historians, sociologists, philosophers, and other students of technology and media in science and technology studies who view technology as neither voluntaristic nor deterministic but as caught up in a complex, fluid, variable dynamic of each.'
> (Taylor, 2001: 30)

Technologies here neither determine practice nor are entirely neutral in the hands of the agent. Rather they are the product of complex relations between agents and material objects. For Taylor the level of determinacy of the technology is related to the agency of its operator, their desire to interpret, play, and alternate. He argues therefore that 'it is clearly agency that makes the difference: people are either agents in the face of technology, or they are unagentic.' (Taylor, 2001: 31). The relations between technologies and practice in this sense are not predetermined or standardised between users, but are open to transformation in line with their own interpretational initiatives.

In light of this type of agentic centred theory of use, Taylor is 'interested in everyday people and how they use everyday objects of technology, new or old, to make, disseminate, and listen to music.' (Taylor, 2001: 34). This is to contend that agents are open to interpret technologies in multiple ways, and, that, therefore we should focus upon these individual agents to understand some of the ways in which these technologies are understood and incorporated into practice. A compelling argument and approach which resonates with Michael Bull's recent work on the personal stereo[8].

With a similar desire to capture everyday practice and the ways in which users apply technologies, the aim of Bull's work is the unravelling of 'the significance and meaning of personal-stereo use in the everyday life of its users.' (Bull, 2000: 1). He focuses specifically upon how 'personal-stereo users, in their daily lives, move through a variety of urban spaces, which...have cognitive, aesthetic and moral significance that are all relational in so much as they inform us of the ways in which users relate to their surroundings, others, and themselves.' (Bull, 2000: 2). This work is concerned centrally with the ways in which the personal stereo, as a mobile technology, enables the management of daily experiences of time and space[9]. For, he claims,

> 'By attending closely to how users describe their activity, it is possible to develop a structural framework that incorporates notions of space, place, time, cognition (looking, listening, thinking, remembering) and the

[8] Released initially by the Sony Corporation in 1979.
[9] Bull's ethnographic study is particularly critical of du Gay and Hall's earlier work on the personal stereo which he claims lacks empirical content and is largely historical.

> interpersonal within a critical framework encompassing the concepts of control, management, contingency and asymmetry.'
> (Bull, 2000: 12)

Bull, using a phenomenological theoretical framework, looks to build a broad picture of personal stereo use to inform a 'typology of personal stereo use' (Bull, 2000: 185). Bull aims for this typology to form a focal point for understanding the mutually constitutive relations from which 'Personal-stereo users both present themselves via technology and construct the social via technology.' (Bull, 2000: 193). The ways in which 'the use of personal stereos enables users to successfully repossess time.' (Bull, 2000: 64), would be an example of this type of 'management' or 'construction' of both the everyday and the social through the personal stereo. Bull argues that the result of this process is that 'the audible, is...put back onto the cognitive map of urban experience' (Bull, 2000: 2). This also indicates the importance of understanding or analysing the spatial aspects and affects of music technologies, an issue that I return to in chapters 6 and 7.

To clarify this further it is Bull's contention that particular capacities are 'embedded' or 'inscribed'[10] in the technology under examination (Bull, 2000; Gibson, 2006). He contends that 'embedded in personal-stereo use are a variety of strategies that enable the user to successfully prioritise their own experience, personally, interpersonally and geographically.' (Bull, 2000: 9). According to Bull, it is by focusing upon the everyday realisation of these capacities that both agency and structure may be illuminated. Echoing Pinch and Trocco (2002), he argues that 'technologies are themselves embedded in social structures and social systems and the manner and significance of this embeddedness can be articulated through an analysis of everyday forms of usage.' (Bull, 2000: 195) Take for instance Farrugia and Swiss' (2005) argument that digital technologies 'are dramatically changing the art of DJing.' (Farrugia & Swiss, 2005: 30)[11].

[10] An example of this would be the claim that 'Mobility is inscribed into the very design of personal stereos, enabling users to travel through any space accompanied by their own 'individualized' soundworld.' (Bull, 2000: 3)
[11] For more on the consequences of digital technolgoeis for DJ culture see chapter 7.

Indeed, it would seem logical that in order to understand the implications of digital technologies for practice that everyday practice is accessed and reconstituted. Despite the apparent concern with this issue, there is still scope for further investigations of digitalisation in the context of everyday life 'management' (Bull, 2000), 'embeddedness' (Bull, 2000; Sassen, 1999 & 2000), technological 'completion' (Théberge, 1997), 'agency' (Taylor, 2001), and the 'disruptive' effects of the new technologies (Jones, 2000).

3.2 Humans and (digital) music machines

Continuing the theme of the everyday as a site, focal point, or context for the relations between individual agents, technologies, and the social, Taylor contends that humans and machines interact and implicate each other. In this sense, he argues that (music) technology is what he describes as 'a special kind of structure' for it 'is both a schema or set of schemas, and a resource or set of resources.' (Taylor, 2001: 36). Technologies both enable and constrain practice; they enforce rules of use but are also a resource for exploration and creativity[12]. This process of appropriation is grounded in the material aspects of the technology, but that these material aspects are open for interpretation, or as Taylor puts it,

> 'Any music technology, then, both acts on its users and is continually acted on by them; MP3 – or any software or hardware – have designed into them specific uses, which are followed by listeners, but at the same time, listeners through their practices undermine, add to, and modify those uses in a never ending process.'
> (Taylor, 2001: 38)

[12] As Fraser has argued, analogue and digital 'emerge out of particular events, rather than describe them.' (Fraser, 2005: 183). For this reason she claims that it 'does not make sense therefore, to privilege digitisation as *the* site of transformation.' (Fraser, 2005: 183) Rather than being a product of digitalisation or defined by digitalisation, 'creative, differentiating, activity is everywhere on-going. It is on-going and also limiting.' (Fraser, 2005: 183). For this reason studies in this area may understand creativity as continuous but that it occurs in the contemporary context of digitalisation. To refine this approach to digitalisation further then, we may think of digitalisation as something that emerges out of particular social and cultural circumstances, and as such is a means to understanding these circumstances rather than an end for describing the 'site' of transformation. Fraser's suggestion, returning to the incorporation of the constraining and limiting potentials of digitalisation, is that we should emphasise 'what is *not* 'there', as well as what 'is'' (Fraser, 2005: 184).

Music technologies, for Taylor, implicate musical practice but this is not determinate, these musical practices are rather a product of the tension between technological 'schema' and the interpretations of the user. Take for instance the issue of portability; the material properties of technologies, through what Mitchell (2003) describes as 'downsizing' or 'miniaturization'[13], facilitate the mobility of music across the spaces of everyday life. According to Mitchell:

> 'The Walkman became wearable...MP3 players have become even smaller still, since they do not need to accommodate relatively bulky tapes or CDs. More and more music gets stuffed into smaller and smaller boxes. Once you might carry two or three tracks on your person; now you can carry thousands. The evolutionary path has led from heavy furniture to tabletop and desktop devices to handhelds and wearables.'
> (Mitchell, 2003: 64)

By finding some 'effective way to shrink it' (Mitchell, 2003: 64), the 'music storage and playback device' increased the portability of music reproduction enabling it to move relatively freely around everyday spaces. The highly portable MP3 player, for instance, is placed in Mitchell's work, in contrast to the heavy piano and gramophone, or even the realtively 'bulky' portable CD players (which were restricted by the size of the CD they had to accommodate and couldn't fit into the pocket as a result). The miniaturisation of these mobile music reproduction devices then has consequences for the spaces in which they are activated.

This is a position that is not dissimilar to that of Pinch and Trocco's analysis of the Moog synthesizer. Their central premise is that 'technology and cultural practices are deeply intertwined.' (Pinch & Trocco, 2002: 9). As such accessing or even seeing the implications of music technologies is a problem. As Taylor explains,

[13] It is possible that compression can be added to this list of shrinking processes (see chapter 9). In terms of MP3 Mitchell notes that 'Digital compression is one of the newer forms of lightening in order to speed movment. Files are digitally processed to reduce their size for transmission, then reprocessed at the receiving end to decompress them. This entails some loss of quality, but it is within acceptable limits for most purposes.' (Mitchell, 2003: 233).

> 'technology...however awe inspiring and anxiety producing it may seem to be upon its introduction to the realm of human social life, quickly becomes part of social life, naturalized into quotidian normality as it helps people do things they have always done: communicate, create, labor, remember, experience pleasure, and, or course, make and listen to music.'
> (Taylor, 2001: 206)

For Taylor (2001), Pinch and Trocco (2002), and Gibson (2006), music technologies are 'intertwined' with musical practices; through this process they become 'naturilized' into 'normality', they become invisible in the mundane routines of everyday life, they lose their unusual or startling qualities associated with newness. It is the seeing of these embedded technologies and practices that becomes a key methodological question (see chapter 4). Once strategies are composed for addressing this problem the question is how do these technologies become a naturalized part of everyday life and how do they implicate practice in this complex to-ing and fro-ing of technological realisation of 'completion'?

One possible avenue that arises in the literature is to take on a broader definition of music technologies as opposed to understanding technologies merely as 'tools' or 'instruments' (see chapter 4 for further clarification). Extending Taylor's point about the triangulation of technology, discourse, and use, Pinch and Trocco contend that technology may be conceived of 'as sets of practices, discourses, and material artefacts that have evolved over human history and that can take on new forms in different social, cultural, and historical contexts.' (Pinch & Trocco, 2002: 10).

In understanding technologies, as practices, discourses, and material artefacts, formed in particular contexts (social, cultural, and historical), we are again returned to the ordinary flows of mundane routine in which technologies are 'completed' (Théberge, 1997). For, as Pinch and Trocco argue, 'the way to understand musical instruments is not from their essences – what their theoretical possibilities are – but from the way people who actually make the music put them into practice.' (Pinch & Trocco, 2002: 10). Or, to extend this point further, to understand music technologies it is necessary to study the way that people who actually produce, reproduce and appropriate music put them into practice (see also Bull, 2000 & 2005)[14]. The important point here is that music technologies may be thought of as complex amalgamations of practices, discourses, and material artefacts operating across different contexts, and that the way to investigate these technologies, therefore, is to somehow access these various contexts to investigate these technologies-in-action. The focal point here in terms of a study of digital music technologies or digitalisation is 'what people themselves make of it – the meanings they derive from its use.' (Pinch & Trocco, 2002: 308).

As well as Pinch and Trocco's (2002) detailed examination of the Moog Synthesizer, examples of this type approach – in which access is gained to the details of particular contexts – can be found across this literature. Take for example Warner's various case studies on the musical works of the producer Trevor Horne, Taylor's (2001) investigations into specific 'strange sounds' in recorded music, Bull's (2000) focus upon the specifics of the personal stereo and the city, Farrugia and Swiss' (2005) analysis of DJing and Final Scratch, Richardson's (2005) case study of the Gorillaz' track "Clint Eastwood", amongst others (see also Fraser, 2005; Bull, 2006).

The central issue in this focus upon the relations between technology and practice – or technology as always-already constituted by the interplay of practice, discourse, and material artefacts – concerns the social context in which use occurs. For example Pinch and Trocco's work 'draws attention to the different cultural meaning and social worlds woven around the synthesizer by its *users*.' (Pinch & Trocco, 2002: 309). They argue that technologies 'are never neutral; they are always embedded in and generated by cultural context, and the most important cultural context is that of use.' (Pinch & Trocco, 2002: 309). In other words, to study music technologies in practice it is important not only to situate the analytical gaze upon the minute details of the moment but also to consider the context in which use occurs. On this issue Pinch and Trocco suggest that the concept of 'technological frames' can be used to understand these contexts. With some similarity to Taylor's technological 'schema', technological frames is 'a term that captures the way a whole series of practices, ideas, and values

[14] Likewise Bull suggests that the focus on the 'structures or use', the 'investigation' of communications technologies 'sheds light on the dialectic of 'technology' both as 'artefact' and 'practice'.' (Bull, 2005: 245) Bull is specifically concerned in this with the ways in which 'users use these technologies to re-appropriate urban space actively and 'fluidly'.' (Bull, 2005: 245). This clearly resonates with the issues raised in this chapter with regard to the consequence of mobile technologies for communal spaces (Mitchell, 2003; and chapters 6 and 7).

get built around a technology. It includes both the ways technologies are produced and the ways they are used and consumed.' (Pinch & Trocco, 2002: 310). By linking this into accounts of the Buchla Box and the Moog synthesizers they conclude that the 'different technological frames of the two synthesizer pioneers were shaped by the wider culture within which they both worked, and both in turn shaped that culture.' (Pinch & Trocco, 2002: 310).

However, for Pinch and Trocco the rhetoric surrounding technologies, as embodying wider social and cultural values, ideas, and imagery, does not directly determine practice. Rather they argue that 'designers "script" or "configure" ideal users into their machines...Scripts try to constrain the agency of users, but users can exert agency, too, and can come up with their own alternative scripts.' (Pinch & Trocco, 2002: 311). Again, as with Taylor's position, we find that agency is central in musical practices, it is what people make of the technologies influenced by particular contexts that is the central issue. To refine this model further we may suggest that (digital) music technology, and digitalisation in more general terms, is constituted by a contextually embedded interplay of practice, discourse/rhetoric, and material artefacts. Thus, when appropriating these technologies individual agents 'come prepared' as 'part of a wider culture of use, and they learn within that culture.' (Pinch & Trocco, 2002: 311)

Clearly significant emphasis is placed here upon agency and the agents power to appropriate or interpret technologies outside of the 'scripts' or 'schema' that are embedded within them[15]. The clearest examples of this open interpretation of technological frames, scripts, or schema, are illuminated by the contrast between the accuracy of digital technologies and the inaccuracy and relative unpredictability of analogue technologies (Evens, 2002)[16]. As a result of this technological shift toward the accuracy of music production and reproduction, we find, in the literature descriptions of examples of resistances toward digitalisation leading to unpredictable forms of technological appropriation. Or as Pinch and Trocco claim, for 'some people, digital sound is too perfect, too clean, too cold – they long instead for the imperfection of the warm, fuzzy, dirty analog sound.' (Pinch & Trocco, 2002: 319). The accuracy

[15] A position that surprisingly appears to resonate with Adorno's work on music reproduction technologies (Adorno, 2002a, 2002b, 2002c, & 2002d).
[16] According to Evens, the 'reproduction of sound is not a matter of physics, but of affect and percept. Expression exceeds fidelity, so hold on to your LPs.' (Evens, 2002)

and predictability of digital technology is framed here as 'coldness', whereas the inaccuracy and unpredictability of analogue is (regularly) framed as 'warmth' (see chapter 6). This is an example of what Taylor terms 'technostalgia' (Taylor, 2001), of nostalgia about previous technologies. The result is that agents appropriate digital and analogue technologies in unforeseen and unintended ways thus adapting the 'scripts' of the technology to suit their practices, perceptions and values of sound production:

> 'By adapting and changing old analog technologies and using it as it was never intended to be used, and by combining it with new digital techniques, they have found a way once more to shape the technology and to revive the alchemy of sound.'
> (Pinch & Trocco, 2002: 323)

Thus, as a consequence of the movement toward the accuracy of the digital, 'there is a longing to get back to what was lost; an 'analog revival' is taking place.' (Pinch & Trocco, 2002: 9). This *technostalgic analog revival*[17] illustrates the tension between the projection of technologies in rhetoric – as scripted preferred uses, frames, or schema – and the appropriation of technologies in everyday practice (Taylor, 2001; Pinch & Trocco, 2002; Spitz and Hunter's, 2005, Gibson, 2006). I explore this tension between practice and rhetoric in further detail in Part II.

4. The shifting, blurring and problematisation of boundaries

Perhaps the most dominant image of music technologies that emerges from the literature, resonating with the themes of social theory identified in the previous chapter, is that they have radically reconfigured or blurred a range of existing social and cultural boundaries.

In light of these boundary reconfigurations it is worth now considering further the problems that may be aimed at the three-part model or three spheres of music culture that I outlined at the beginning of this chapter, particularly considering the notion that,

[17] Returning to the issue of the creative potentials of the inaccuracy of analogue music technologies, Pinch and Trocco claim that with analogue synthesizers, there 'was no guarantee you could find exactly the same sound again. That was the beauty and the frustration of analog synthesis.' (Pinch & Trocco, 2002: 121)

as Baudrillard (1983) has previously argued, digitalisation has the effect of blurring or making indistinguishable the boundaries between production and reproduction. Steve Jones faced a similar problem:

> 'It is important to note, then, the convergence between the divisions I have constructed between these categories, and important to attend to the ways in which technologies, and technical processes, cause them to overlap and fold back on one another. Indeed, a fourth category could well be argued for, one that would call for the assessment of the means by which music making, music consuming and music distributing are intertwined, and have become more so over time.'
> (Jones, 2000: 221)

However, rather than making these similar three part models redundant this problematisation of boundaries, as illustrated by the application of these models to the complexity of everyday practice, highlights instead the particular 'boundary dissolving' properties of digital media (Sandywell, 2006; and chapter 2). As Jones notes, a 'variety of issues do not easily fit the tripartite division proposed, and for good reason: few technological transitions have had as much across-the-board impact on cultural, business and industrial processes' (Jones, 2000: 220).

Indeed, digital technologies are often regarded as 'boundary shifters' (Pinch & Trocco, 2002) and boundary dissolvers (Sandywell, 2006), acting to reconfigure existing social and cultural boundaries and orderings. The boundary shifts, or the blurred boundaries, identified in the literature fit into three categories: *production/reproduction, original/copy, ownership/non-ownership.* I will now focus upon each of these in turn.

4.1 Production/reproduction

The most prominent of these boundary shifts in the literature concerns the increased blurring of production and reproduction (chapter 2; Baudrillard, 1983), or, as it is often described, production and consumption, resulting from the increased appropriation of digital music technologies. This is often associated with music production increasingly being an act of simultaneous production and reproduction. The practice of the sampling of recorded sounds (reproduction) to create 'new' cultural products (production) is perhaps the most obvious instance in which the processes of digitalisation facilitate this blurring[18].

In terms of a techncial genealogy of the blurring of production and reproduction, it has been claimed that musical 'notations changed the ways music was made, stored and distributed, and heard' (Taylor, 2001: 3). For Taylor the development of notation had implications for the boundaries between these categories. Taylor argues, however, that it 'wasn't until the invention of the player piano and, more importantly, the gramophone in the late nineteenth century that production, storage, and portability were once again greatly altered' (Taylor, 2001: 3) The significant development here was that 'music as *sound* could be moved about, bought, sold, and, with the invention of radio, broadcast.' (Taylor, 2001: 3). In this sense digital reproduction technologies have genealogical connections to earlier technologies, as digitalisation 'accomplishes many of the same things as the gramophone: music storage and retrieval is greatly facilitated, though this time it is not simply music as sound, but music as bits – combinations of zeros and ones.' (Taylor, 2001: 3-4). This position indicates again the historical connectedness of digitalisation by locating its conditions of possibility (see also Kittler, 1999; Sterne, 2003). For example, Taylor notes that, 'it is important to remember that all previous modes of the distribution of music were physical: the notated or recorded object had to be moved from place to place' (Taylor, 2001: 4). In other words the digitalisation of music is a part of a shift toward the *virtualisation of culture*, the movement away from physical to virtual cultural artefacts (as exemplified by the movement toward MP3 described in chapters 7 and 8). Indeed, it may be argued that the blurring of boundaries in general is a consequence of the general boundary shifting of culture between the physical and the virtual, implicating a range of other boundaries, including production and reproduction. As Taylor argues:

> 'digital technology is helping to challenge – even, in some instance, break down – the difference between production and consumption...nowhere is

[18] This, according to Théberge, is both a material practice and a way of thinking, he claims that this 'feedback – of consumption into production – is then, both conceptual and physical in nature, both fully intentional but also intuitively felt.' (Théberge, 1997: 172)

> this convergence – or confusion – of production and consumption more evident than in the rise of MP3.'
> (Taylor, 2001: 16)

MP3 is of particular significance in this shift as 'digital technologies like CD and DAT no doubt have the capacity to break the barrier between the original and the copy, they are in fact more likely to be used to enhance the power of the aura of the original moment of recording, via the consumerist practices of hi-fi.' (Goodwin, 1990: 270). Therefore, CD, for example, as a digital music technology, has the capacity to problematise the original, yet its physical properties mean that it tends to offer only limited boundary shifting potential. It is rather the virtual properties of MP3, the removal of the physical definition of ownership through the object, that enables a more radical reworking of the line between the original and the copy (see below).

Similarly Théberge claims that:

> 'Digital music technologies are hybrid devices: when one plays (or programs) a drum machine, synthesizer, or sampler, one is not only engaged in production of sounds and melodic or rhythmic patterns but in their technical *re*production as well.' (Théberge, 1997: 2-3)

Here we see that this blurring of production and reproduction is not restricted to the use of pre-recorded sounds in music production practices, but also pre-programmed sounds and patterns. Both of which contribute toward 'the evolution of the synthesizer from an instrument that could produce a variety of unknown sounds to one that reproduced a standard package of familiar sounds.' (Pinch & Trocco, 2002: 130). Théberge continues:

> 'Popular musicians who use new technologies are not simply the producers of prerecorded patterns of sounds (music) consumed by particular audiences; they, too, are consumers – consumers of technology, consumers of prerecorded sounds and patterns of sounds that they rework, transform, and arrange into new patterns.'
> (Théberge, 1997: 3)

It would seem that Théberge's claim is that production and reproduction/consumption have become blurred as production and reproduction technologies have become integrated in what were *previously distinctively music production practices*. Pinch and Trocco describe this in terms of an embedding of sounds in production practices:

> 'Only certain sounds could be recognized, described, and communicated, and these sounds become embedded in the technology, first with sound charts and later pre-sets, thereby reinforcing the recognizability and reproducibility of these same sounds.'
> (Pinch & Trocco, 2002: 318)

For this reason this boundary shift is attached in the first instance in the literature to early digital music technologies which expanded the use of boundary shifting technologies, and as the 'use of pre-recorded material (as the basis of the work of art) began to permeate a far greater range of musical genres with the invention and development of the digital sampler in the late 1970s.' (Warner, 2003: 95). Leading to the point at which 'making music with new technology has indeed become a process of simultaneous production and consumption.' (Théberge, 1997: 213)

This not only has consequences for music but also for general understandings of cultural production. On this point 'the use of the term "live"...is of fundamental import because it reflects a new perception of the role of technology in musical practice and a redefinition of the distinctions between production and reproduction.' (Théberge, 1997: 231) We see here, therefore, a blurring, or redefinition, of the boundary between 'live' (the moment of production) and 'copy' (reproduction). The redefinition of what constitutes live-ness in music culture may well be directly associated with the emergent digital production/reproduction problematic, in which production, generally understood as the live act of creation, may be based upon the reproduction of pre-recorded or pre-programmed sounds. This redefinition of liveness may also be connected to the real-time composition and performance practices illustrated in Fraser's (2005) *Thought Condutor #2* case study, in which the 'signals generated by an individual hooked up to an electroencephalogram are converted, via a relational database devised by Johnny Bradley, into 'musical score'. (Fraser, 2005:

173). At these events that musical 'score spears on computer monitors, ready to be played by a string quartet.' (Fraser, 173). The result, Fraser argues, is that this processes 'lends new meaning to the notion of a 'live' performance.' (Fraser, 2005: 173).

Indeed, it has been argued that through the 'introduction of digital technologies and their attendant uses, the distinction between production and consumption has become increasingly blurred and, to a certain degree, meaningless.' (Théberge, 1997: 242). In other words, the blurring of this boundary is based upon the notion that 'consumption has become an integral aspect of...musical production practices.' (Théberge, 1997: 245). Indeed, there is little disagreement across the literature on this point. Indeed, if we accept this weight of opinion then the next question is how we should now conceptualise these new production and reproduction processes in the wake of this cultural redefinition.

4.2 Original/copy

Linking into this blurring of production and reproduction is the argument, reflecting Baudrillard's (1983) depiction of the destination of the original in a context of perfect digital reproduction (see also chapter 2), that the boundary between the original and the copy has been problematised. Indeed, the problematisation of the original and copy (or reproduction) may be understood to be an extension of the production/reproduction problematic. The integration of reproduction into production processes, for example in the processes of sampling, causes the original to be simultaneously original and copy.

In addition to this, the perfect reproducibility of digitalised musical artefacts, unlike the deterioration of analogue reproduction, means that the digitalised original and copy are indistinguishable in terms of (sound) quality. The implications of this perfect reproducibility, and the removal of sound deterioration are not limited to the sphere of music reproduction. As Warner contends:

> 'Each time an analogue recording is copied, the audio quality of the copy will always be less than that of the original, while it is possible to copy a

> digital recording infinitely without any deterioration of audio quality...For the pop musician this enables a much more fluid approach to working directly with sound: single sounds, parts and even whole sections of pieces can be arranged and rearranged within the whole until the ideal settings are found.'
> (Warner, 2003: 21)

The implications of perfect reproduction are wide ranging in scope. Warner claims that these transformations in reproduction technologies also impinge upon music production practices, enabling music to be worked and reworked, manipulated, edited, and processed in new ways (see chapter 6). This paradoxically both protects the original recording (see non-destructive editing in chapter 6) whilst also making it indistinguishable from its perfect reproduction.

On this point of infinite and perfect reproducibility, drawing directly on Walter Benjamin's (1999a; see chapter 2) work on reproduction technologies, Goodwin argues that

> 'Digital recording techniques now ensure that the electronic encoding and decoding that takes place in capturing and then reproducing sound is such that there is no discernable difference between the sound recorded in the studio and the signal reproduced on the consumer's CD system. This is something new: the mass production of the aura.'
> (Goodwin, 1990: 259)

Digitalisation, in this respect, is a perfect reproduction of the moment of creation that may in turn be infinitely copied without deterioration. Goodwin then locates this blurring of the boundary between originals and copies with the development of particular sampling and sequencing technologies. He claims that:

> 'It is this combination of sampling and sequencing (as evidenced in drum machines and digital music computers) that has eroded the divisions not just between originals and copies, but between human- and machine- performed music. In each area, that of originality and of "feel," the new music

technologies raise some fascinating questions for cultural theorists. They place authenticity and creativity in crisis, not just because of the issue of theft, but through the increasingly automated nature of their mechanisms.'
(Goodwin, 1990: 262)

Goodwin argues that a combination of the collapse of the original, the blurring of production and reproduction, and the automation of music production or creative processes[19], contribute toward a collapse in authenticity and the legitimacy of creative action – a reflection of the various crises of legitimacy in postmodern and poststructuralist social theory (see chapter 2). Yet Goodwin is careful to distinguish his work from these postmodern approaches. He suggests that the problem with

> 'conflating postmodernism as theory and as condition, the former finds itself with a vested interest in promoting the latter, if not morally and/or politically, then as a cultural form of far greater significance than the evidence often suggests. It is for this reason that we need to probe beyond the ritual incantation of pastiche.'
> (Goodwin, 1990: 272).

Goodwin's position appears to be that we should instead ground this type of conclusion in material cultural and technological phenomena rather than merely relying upon the notion of cultural pastiche as representative of the collapse of particular cultural divisions such as that between original and copy[20].

Indeed, there is clear attempt in Goodwin's work, like that of Taylor (2001), Pinch and Trocco (2002), and Théberge (1997), to ground these transformations in material technological transformations, with particular digital technologies and their specific functionalities acting as 'boundary shifters' (moving or altering boundaries) or 'boundary dissolvers' (removing or permeating boundaries)[21].

[19] A process that might be labelled techno-poiesis (Sandywell, 1995)
[20] Further questions about creativity and the original are raised in Fraser's (2005) work on digital composition technologies and live performance.
[21] A further example of boundary blurring can be found in Bull's work. He claims that 'the dividing line between the 'public' and the maintenance of a 'private' realm has proven to be dialectically linked as mediated private realms have been demonstrated as increasingly existing in public spaces.' (Bull, 2000: 193)

4.3 Ownership/non-ownership

Echoing the general questioning of notions of ownership in the digital age (chapter 2), the issues of the boundaries around ownership finds its way into the literature on the digitalisation of music. Indeed, as Breen notes, 'ownership is an important consequence of the digital technology paradigm shift.' (Breen & Forde, 2004: 87). The problematisation of the boundaries between ownership and non-ownership occurs in two distinct ways. In addition to the arguments attached to music sampling and the use of recorded sounds to create musical pastiche, more recent debates over ownership concern the rise of music file-sharing. As Taylor foresaw, 'the technology that has really changed storage and portability for consumers is the Internet.' (Taylor, 2001: 16). It is this issues that I shall concentrate on here.

For Rodman and Vanderdonckt the legal conflicts and discourses surrounding the music downloading or music file-sharing phenomenon reveal a much wider conflict over cultural ownership that has come to define the digital age (see chapter 2). They argue that this is:

> 'ultimately a struggle over the very ownership of culture, where the media monopoly is working to transform intellectual property into something that more closely resembles physical property: i.e. a phenomenon where 'ownership' entails absolute control over how (or if) one's property circulates through the world.'
>
> (Rodman & Vanderdonckt, 2006: 257)

The movement from physical to virtual cultural artefacts is the question here, for it is this shift that has created and perpetuated the problems of ownership and facilitated the mass piracy, theft, or sharing (dependent on your position) that we have seen over recent years, and which has lead to continued legal conflicts over ownership and copyrights – it is this issue that is discussed in some detail in chapter 8. What is owned and by who, and the boundary between the ownership/non-ownership opposition, comes into question as 'the relationships between subject (experiencing subject) and object (cultural forms) are subject to complex sets of mediations,' (Bull, 2000: 9)[22].

Indeed, this notion of the shift toward virtual culture, whether implicit or explicit, underscores the literature on music downloading and the music industry (McLeod, 2005; Leyshon, et.al., 2005; Hesmondhalgh, 2006; Spitz & Hunter, 2005; Rodman & Vanderdockt; 2006; Ayers, 2006). Yet this is not reduced in these constructions to merely the collapse of ownership and the unrestrained swapping of files. For example we find here that the music industry acts to reassert notions of ownership in the digital age, or to demarcate its ownership of cultural forms to protect (perceived) lost or potentially lost revenues (Forde in Breen & Forde, 2004; Leyshon, et.al., 2005, Hesmondhalgh; 2006). Or that individuals regulate their own file-sharing practices in line with a sense of community and responsibility to the artist (McLeod, 2005; see chapter 8). This then is not a simple crisis or collapse of ownership but a complex site of enforced and self-enforced restraint. Indeed, it is this question of the ways in which the music industry, in response to the (perceived or real) threat of music downloading, and, more specifically, music file-sharing, use technological infrastructures and rhetoric to construct and order musical appropriation in the digital age that I return to in chapter 8.

Clearly, digitalisation is constructed here as both boundary shifting and boundary dissolving, with the consequence of problematising a series of existing categorisations, structures, and understandings[23]. It is perhaps this overwhelming vision of digital technologies breaking down or 'challenging' (McLeod, 2005) existing boundaries and structures that is responsible for creating theories of new exclusions from, or new opportunities for, empowerment, engagement, and access.

5. Democratisation, access and liberation from constraint: music technologies in a wider social and cultural context

[22] I explore these mediations further in examining the implications of MP3 and the MP3 player in chapter 8 and the music-downloading phenomenon in chapter 8.

[23] The boundaries around the album format may also be added to this list. As Mitchell notes: 'If you purchase a CD from a record store, for example, you get the set of performances that the record producer has chosen to bundle together...if you rip all your CDs, and store the MP3s on your hard drive, you can group and sequence performances in any way you want. And if you download MP3s from Napster or one of its successors, you gain even more freedom.' (Mitchell, 2003: 138)

The digitalisation of music and music culture, as processes of social and cultural transformation constituted by boundary dissolving media, is often imagined as a process of democratisation and empowerment, where access and availability dramatically increase[24]. This democratisation is embodied in this literature in three forms: (1) the availability of cut price music technologies having increased the access to musical practices (Taylor, 2001; Warner, 2003); (2) that the increase in creative possibilities has been dramatically increased by digital music technologies enabling a greater range of practices and removing creative boundaries (Théberge, 1997; Taylor, 2001; Warner, 2003); and, (3) That music reproduction and appropriation has been democratised as a result of *disintermediation*[25], as such music is globally distributed across networks of decentralised media by individuals and organisations (Jones, 2000; Taylor, 2001; McLeod, 2005; Poster, 1996; see also chapter 2).

These democratising potentials can be placed into two categories with access on one side and the expansion of possibilities on the other. The third issue of mediation then operates across these two categories.

The literature, however, far from creating unified positions on these democratising potentials offers forth a range of often-polarised utopian and dystopian positions (Hand & Sandywell, 2002) arguing that digitalisation is democratising and disintermediating with benefits for the consumer (McLeod, 2005) or that digitalisation merely facilitates a reforming or reworking of existing power and industry structures (Leyshon, et.al, 2005; Hesmondhalgh, 2006).

[24] Although in broader terms, outside of this field of study, the emphasis is increasingly moving away from utopian images of digitalisation toward issues of exclusion, domination, and the forging of digital divides. Digital divides may be thought of as digitalised or digitally reinforced social divisions creating an information rich and information poor (Nettleton, et.al. 2005; Sandywell, 2006). In terms of music Breen has argued on this point of digital divisions that 'research must be aware of the dramatic and widening gap between rich and poor in the world and while our research may examine the rich, the majority of the world's population may be making and consuming music with very little reference to technology – except radios and localised public performances.' (Breen & Forde, 2004: 82)

[25] A study of disintermediation and emergent online only record labels may prove a fruitful area of investigation if access can be gained to observe the operation of these organisations. Exactly how direct are these forms of distributions? What aspects of mediation are concealed here? Is this disintermediation or remediation?

A clear example of this polarisation can be found in the recent exchange on the state of the contemporary music industry between Marcus Breen and Eamonn Forde (2004). Breen argues that the music industry is facing a crisis in what he calls the 'Internet Age' because it can 'no longer be assumed to mediate the relationship between the producer and consumer.' (Breen & Forde, 2004: 80). The reason for this shift is that the particularities of the 'the Internet offers to remove the middleman…and in so doing change the nature of mediation.' (Breen & Forde, 2004: 80). This process is one of 'disintermediation', which 'was a term couched in the Internet boom of the late 1990s to describe circumvention of the middle person with a Direct Access Relationship between producer and consumer.' (Breen & Forde, 2004: 80). Breen claims that this is a process that is 'still happening' (2004: 80). As Taylor argues, 'MP3 distribution can be accomplished without any need for the music industry whatsoever, except in the initial production of the distributed music. There is no need for a centralized distribution system either physical or virtual.' (Taylor, 2001: 24). Examples of this might be found with online record labels such as Toast Hawaii and Poptones, who distribute directly to consumers, or, more visibly, in music distribution sites such as Garageband (www.garageband.com) or MySpace (www.myspace.com)[26] that enable individuals to upload their own self-produced music for their peers to download and disseminate. A process that McLeod describes as holding 'the potential to create an alternative means of music distribution of artists who are often marginalized by the mainstream music industry.' (McLeod, 2005: 521).

The question here is whether these examples are merely depicted as distintermediated when in fact they act to conceal embedded layers of mediation behind a rhetorical gloss of democratisation. Perhaps the biggest shift in this sense has been the rise of the music downloading phenomena and particularly music file-sharing. Music file-sharing sites, software, and networks enable individuals to distribute music to each other[27], and as such represents a 'highly decentralized, peer-to-peer, web-based distribution system' (Mitchell, 2003: 99). This practice, as described and discussed later in this thesis (chapter 8), may be understood as disintermediated or direct and non-hierarchical distribution. The pressing question now is what the consequences or

[26] At the time of editing this chapter, on the 19th of June 2006, Sandi Thome is at number one in the sales charts after (reportedly) achieving recognition through MySpace.
[27] These sharers are simultaneously distributors and consumers.

implications are of file sharing. This type of 'second media age' distribution model (Poster, 1996; chapter 2) has created a series of legal conflicts and challenges with regard to ownership, copyright management, and the restriction of file-sharing activities in place of legal music purchasing that I will return to in Part II (see for example the legal morphing of Napster highlighted in chapter 8).

On the other side of this debate Eamonn Forde argues that the music industry has responded and continues to respond to the rise of MP3 technology and the music downloading phenomena, and that rather than disintermediation we are instead seeing a reestablishment of the music industry (Breen & Forde, 2004: 84). Forde takes the position that the rise of music file-sharing, as disintermediated music distribution bypassing the music industry, is temporary, and that the music industry will reassert itself by adapting to this transformation in musical appropriation (see chapter 8). The question here is one of the likelihood that the music industry will be usurped by chaotic and uncontrollable musical appropriation such as file-sharing, as Hawkins, Mansell and Steinmuller put it; 'reintermediation' is a 'more likely scenario than outright disintermediation' (in Jones, 2000: 219).

As previously described, leaving the debate over mediation to one side for the moment, the key issues in these and other debates over the democratising potentials of digital technologies concerns the role of access and the expansion of possibilities afforded by these devices. I will now look at these two issues in more detail.

5.1 Access

The digitalisation of music and music culture, of course, may not be thought of as distinct or operating outside of capitalism (see chapter 8). It is even possible to talk of a 'commodification of sound' (Théberge, 1997: 203) acting across the three spheres of music culture. As such it is necessary to consider questions of access, who has access to what? How is this access controlled and by whom? In this literature two particular types or modes of access emerge: (1) access to music technologies themselves, and, (2), the access to sounds, practices, cultural products, etc, that music technologies afford.

In terms of the former we find that the reduction in cost of music technologies, and particularly music production technologies, is called upon as an example to illustrate an increase in access to music production and, therefore, a democratisation of these processes and practices. The latter is generally based upon the proliferation of functions offered by digital technologies that demarcate these technologies from analogue devices, this may be understood on a technical level, where digital technologies enable users to access particular sounds, or on a cultural and social level, where digital technologies enable users to access particular spaces, practices or even enter social groups or new communities (take for example the technologically afforded free-to-all access of music file sharing)[28].

To look at these in more detail, Taylor argues that the 'decreasing cost of technology to the average consumer has resulted in the last decade in entirely new kinds of musics that rely heavily on personal computers, synthesizers, drum machines, and other electronic gear.' (Taylor, 2001: 139). This perspective clearly indicates that it was cost reduction that enabled access to digitalised music production. Taylor's position is that, 'with digital technology, there is some hope that people - at least those who can afford computers – will begin to make music for themselves again using computers and cheap, easily available software' (Taylor, 2001: 5). This suggests that reductions in the costs of music production technologies leads directly to a greater quantity and diversity of access to music production technologies and spaces across a range of social stratifications. This opening-up of access, associated particularly with the mass production of the microprocessor and the compatibility potentials of Musical Instrument Digital Interface (MIDI) (see chapter 5), transforms access from a small group of people with the capital to purchase digital music technologies to a much larger quantity of potential users. Further to this the opening-up of music production is often associated with the user-friendly-ness and increased compatibilities of digital music technologies. As Warner adds, 'the impact of MIDI has been profound and far-reaching. It has not only changed the ways in which pop music is made, but also, in many cases, who is making it' (Warner, 2003: 28)

[28] The following sub-section on the liberation of creativity through music technologies is an extension of this paradigm i.e. access to creative possibilities through technologies.

However, there are some dissenting voices that challenge this utopian imagery of digitalisation as synonymous with democratisation and improved access. For example Théberge contends that there 'has long been a tendency to equate simple technical improvement or the increased distribution of consumer goods in capitalist society with greater levels of freedom and democracy.' (Théberge, 1997: 72). Théberge argues that this rhetoric of freedom and democracy is not restricted to the digitalisation of music but that it reflects wider rhetorical patterns of technological progress and empowerment. He claims that the 'idea of "no barriers" between low- and high-end users reflects the same utopian rhetoric – a rhetoric that assumes "democratisation" of the marketplace – that has been typical of consumer culture throughout the twentieth century.' (Théberge, 1997: 250). This is because, 'from the outset, microcomputers and computer networks have been the focus of a largely uncritical and utopian rhetoric of personal and political empowerment.' (Théberge, 1997: 72). In this rhetoric of empowerment democratisation 'is related to little more than the breaking of the early price barriers that had kept the synthesizer from becoming a broad-based consumer item until the 1980s.' (Théberge, 1997: 73). According to Théberge, not only is this an uncritical approach but it ignores the functional restrictions of the most 'affordable' digital music technologies, which, he argues, were significantly less powerful and more functionally restrictive than the more expensive technologies of the time. For this reason, an entirely utopian image of digitalisation as the democratisation of music production, based centrally upon a lowering of prices, is too simplistic[29].

More recently the issue of access has also become prominent in relation to discussions of music reproduction and appropriation. As indicated in the following passage, Jones identifies this as being a consequence of the relations between music and the internet opening-up the possibilities of internetworking:

> 'Internetworking technologies assist with overcoming distance between performers and/or studios, stages, etc...However, other related technologies deserve consideration, as they are the means by which distribution over computer networks is made possible. Consequently one must also take into

[29] Indeed, this also suggests the question of how more recent innovations have brought the functionality of professional and amateur (or domestic) music technologies into line. This is a question I consider in chapter 6 in comparing the functions and practices of home and professional recording studios.

account the visualisation of music through the use of sequencing software, the digital sampling of audio, digital audio workstations, new forms of software for music compression, encoding and decoding, and the like, that enable the ready mobility of digitised audio and MIDI files across networks.'

(Jones, 2000: 218)

These are complex technological and social conditions of possibility that, in turn, produce complex outcomes and consequences for access (Dijk & Hacker, 2003; Nettleton et.al. 2005). This returns us to the issue of mediation, for the 'issue that has been uppermost on the music industry's agenda in regard to music distribution and new technologies has been the disintermediation and concomitant disruption of routinised business practices and processes' (Jones, 2000: 219). The access to music afforded by its relations with the internet, in the form of disintermediated distribution and appropriation through music file-sharing networks such as Napster and Limewire (see chapter 8), has had the effect of disturbing, disrupting, and reconfiguring the organisation of the music industry.

Although it is worth noting that this large scale impact and reconstruction of the music industry is disputed in some instances. For example, Hesmondhalgh questions the 'view that digital distribution is profoundly unsettling prevailing relationships of power in the recording industry and other music industries' (Hesmondhalgh, 2006: n.p.), and argues that a 'long-term shift of control from the entertainment corporations to audiences is highly unlikely.' (Hesmondhalgh, 2006: n.p.). Hesmondhalgh acknowledges, however, that there have been 'major changes' but that these have not necessarily empowered individual agents or removed, in any substantive sense, existing power structures.

The questions then, five years after Jones' key article on music and the internet, concerns the outcomes of these economic, social, and technological disruptions (see chapter 8). What Jones identified in his seminal piece was that 'new intermediaries' were 'being put in place' (Jones, 2000: 218) as the music industry responded to disintermediated forms of musical appropriation. As Jones argues, it 'is important to keep in mind that the capitalisation and market power of major labels may significantly affect the degree of disintermediation and its consequences as well as the development of online media and tools themselves.' (Jones, 2000: 219). The question is perhaps now not so much whether music culture or musical appropriation is disintermediated[30], or to what degree they are disintermediated – for it is clear that music file sharing is direct, non-hierarchical and non-linear[31], and, furthermore, that mediation by definition is difficult to define and identify. Rather the question is how has the music industry responded to the *perceived threat of disintermediation* embodied in the activities of musical file-sharers and, more generally, the music downloading phenomenon. In other words it is the construction and perception of disintermediation that is important rather than the 'actual' presence of disintermediation. As Jones has argued, it is important to investigate the many ways in which music is distributed or appropriated 'in relation to issues of industrial control, legal control, recording and fandom.' (Jones, 2000: 220). This is to attempt to understand the ways in which music culture is constructed across these varying agendas. It is this issue that I return to most centrally in chapter 8 but which also informs the body of work in Part II.

5.2 The expansion of possibilities

Digital music technologies, as is the case with digital technologies in general (if advertising rhetoric is to be believed), is often constructed as providing liberation from established constraints. Digital technologies solve our everyday mundane problems (chapter 5). Access to digital technologies provides, in turn, access to new possibilities for practice and experience. For example Taylor claims that digitalisation, as 'related to the increasingly technologized social life', leads to a high 'degree of eclecticism' based upon 'reflexive accumulation facilitated by the digital distribution

[30] Furthermore I have argued elsewhere (Beer, 2005a) that this type of disintermediation, as exemplified by the notion that musicians can distribute their own music online direct from them to the audience without the necessity for a record label, marketing, etc, is not in fact a process of democratisation. Rather it creates a 'cacophony of competing voices' that are struggling to be heard. The question of which voices are heard may produce further insights into the details of disintermediation and its possible concealment of power structures and layers of mediation. The point here is that the appearance of democratisation through disintermediation needs close examination rather than unequivocal acceptance.

[31] In terms of music distribution models, however this may not be matched by a levelling of social hierarchies. Indeed, it is possible that new social hierarchies, which may be virtual in nature, may be emerging. For example, the various rating and feedback systems that are common on various internet, in which peers review each other contributions to the online community (see www.garageband.com for instance) may be responsible for forging and reinforcing new virtualised social and cultural hierarchies.

of music' (Taylor, 2001: 20). In other words digitalisation enables eclectic musical collections to be accumulated[32] as a wider range of music becomes accessible through these networks (Farrugia & Swiss, 2005: 34-37) – alongside the drop in capital required to accumulate the collection, particularly if any of the opportunities for the free appropriation of MP3 files are taken. This is a point that McLeod makes when suggesting that 'these technological changes...threaten to help break the music monopoly...something that, at the very least, will increase the diversity of music available to music fans.' (McLeod, 2005: 530-531)

Somewhat surprisingly then, the most prominent arguments concerning the expansion of possibilities through digital music technologies relates to music production. Warner (2003), who, like Kealy (1990), identifies the record producer as a key figure mediating music production practices, identifies that the 'transition from analogue to digital technology in the recording studio...enabled new ways of working with sound and gave rise to new approaches to creativity.' (Warner, 2003: xiii). According to Warner, whose focus is upon 'the relationship between technology and creativity in pop music.' (Warner, 2003: xiv), digitalisation directly implicates and liberates creativity and creative musical practices. Indeed, he extends this point by claiming that the 'transition from analogue to digital audio technology has had a profound impact on all aspects of pop music production' (Warner, 2003: 20).

To consolidate this thesis Warner applies this point to a range of recordings to advance the point that 'the advantages that digital audio technology provides over analogue technology initially appear relatively minor...however, each of the features has precipitated important changes not only in how pop music is made but also in what it sounds like.' (Warner, 2003: 21). In other words, resonating with complexity theorists conceptualisation of emergence (Urry, 2003; see also chapters 8 & 10), even small seemingly insignificant technological transformations open up new often unforeseen possibilities for practice that produce significant yet unpredictable

[32] As Taylor puts it, 'the main difference...isn't merely the speed of dissemination, or even the seeming glut of forms or signs, but rather, the fact that there are more and more signs from elsewhere coming to the developed countries.' (Taylor, 2001: 119) For Taylor the digitalisation of music culture is cosmopolitan (see chapter 10) and eclectic, it is a product and part of gobalisation and the rise of global cultural networks enabling the appropriation of music from international places.

transformations in music and music culture, or, in Warner's (2003) terms, changes in the 'artistic' production of artefacts.

The consequences of the sum total of these transformations, which may be thought of as the contemporary state of the digitalisation of music, have removed, for Warner, virtually all concrete creative boundaries. He contends that 'since so much is possible with digital editing systems, it is the creative imagination of the pop musician that becomes the determining factor in pop music production, rather than any physical limitations.' (Warner, 2003: 21). The limitations on creative musical practice, for Warner, as a direct outcome of the processes of digitalisation, have shifted from the machine to the human. The musician is liberated from the boundaries placed on musical creativity by technologies, which are replaced by the limitations of human imagination[33]. In other words digital musical technologies have completely dissolved technological or functional boundaries and have replaced these with limitless possibilities dependent only on the individual agents ability to imagine new techniques and outcomes.

John Richardson, echoing Warner's focus on the technologies used to create particular musical tracks, relates this issue of possibility to the virtual popstar parodies of the animated music ensemble the Gorillaz. He argues that their 'hit song "Clint Eastwood" (Geep) belongs to a new generation of recordings that could not have come into existence without the assistance of digital recording technology.' (Richardson, 2005: 9). However, he is careful not to 'imply a technological determinist view of music change' (Richardson, 2005: 9), but, rather, that 'human actions and interventions invariably come into play' (Richardson, 2005: 9). In other words the possibilities of the technologies in practice are 'bound up with the ethos and attitudes of individuals acting in particular times and places.' (Richardson, 2005: 9). Creativity in this sense is not liberated by technological function, as Warner contends,

[33] As Warner puts it, 'the human creativity involved in the manipulation of this technology, is far from mechanical.' (Warner, 2003: 142). This it would seem, paradoxically, is the re-naturalisation or rehumanisation of creativity as a result of digitalisation and its liberation of music production from the constraints of previous technologies through which music was realised. Music is rehumanised, for Warner, by the process of the technological process of digitalisation.

but is always-already about 'individual motivation' and 'cultural significance' (Richardson, 2005)[34].

These questions of creativity and the removal of constraint are questions that require further examination (some of which can be found in chapter 6). How, for example, do digital technologies impinge or restrict musical practices and music production? Has music production and/or creativity been liberated by digital music technologies? How do digital music technologies constrain music production and/or creative practices? What, if any, are the new limitations that digital music technologies and the digitalised studio place on practice? This can even be reduced further to more exact questions, such as, have digital music technologies caused an 'eradication of distortion' (Warner, 2003: 21), or have new distortions replaced the old?

What is clear across this literature is that digital 'recording differs in several important ways from analogue recording offering increased flexibility and resourcefulness to the musician.' (Warner, 2003: 23). Or as Théberge describes,

> 'With the expansion of sonic technologies, the musician is able to engage with the micro-phenomena of musical sound itself, and such an engagement often forces a reassessment of the role of more traditional categories of musical practice.'
> (Théberge, 1997: 186).

The questions highlighted above suggest that we interrogate the boundaries and limits of these new 'flexibilities', for this is not to argue that digitalisation does not facilitate new possibilities, or the nuanced microscopic control of recorded sounds, it is rather to suggest that we question the claims that this is unbounded. Taking Théberge's line, this would enable a study of the digitalisation of music production, in particular, that captures the intricacies of the tension between the possibilities and inconsistencies and incompatibilities of digital music technologies and the digitalised recording studio (see chapter 6). An approach that may be applied across music production, reproduction, and appropriation (see Part II)

[34] Indeed, Warner's 'imagination' and Richardson's 'motivation' are comparable as agentic production powers of music creation practices.

This approach may take as its central premise the critique of 'the more idealistic discourses from computer culture [that] have...manifested themselves within the musical community; in particular...the utopian belief in the essentially democratic, participatory nature of technologically mediated forms of communication.' (Théberge, 1997: 131). The aim of a critical study into digitalisation, such as this, should be to contrast, where possible the rhetorical construction of technological phenomena alongside everyday practices. In this sense the literature on digitalisation is both a part of the rhetoric constructing and ordering digitalisation, as well as a critical examination of it. For this reason reflexivity is of particular importance here so as to avoid, where possible, the allure of the gloss and seduction of digital music technologies. This is to say that the digitalisation of music and music culture, as well as digitalisation in general should be investigated in line with defining sociological questions of the day, that is 'not only in terms of technology and economy but also in terms of power and democracy.' (Théberge, 1997: 148). Perhaps, rather, the study of *power and access*, and how these technologies 'afford' (Gibson, 2006) and restrict potential and possibility, would be a more viable alternative route. It is this approach that most centrally informs the direction taken in the following chapters.

If, as it seems is suggested by much of this literature, digitalisation is studied through the focal point of the issue of democratisation, then the analytical framework necessarily needs to be located in how people access and engage with music technologies in the time and space of everyday life. For, as Taylor argues, 'the claim that a particular technology is democratising should always be accompanied by questions: In what ways? For whom?' (Taylor, 2001: 6). It is through this kind of focus upon the everyday that substantive notions of transformation, or of the implications of digitalisation, may be established with some level of certainty. In attempting to capture some sense of transformation this type of approach would need to ask such questions as: 'Is a computer used in making music a qualitatively different form of technology than an analog tape recorder?' (Taylor, 2001: 6). In this sense, any study of digitalisation as a transformative concept must, by definition, be embedded in historical and functional details. A number of these studies provide a historical framework (Théberge, 1997; Taylor, 2001; Warner, 2003), yet despite the detailed historical dimensions of the works of Kittler (1999), Sterne (2003) and Pinch and

Trocco (2002), there is still significant scope for a history of the digitalisation of music and music culture that stretches across music production, reproduction, and appropriation. This type of history may then be used to cross reference the defining features of the contemporary state of the digitalisation of music and music culture – through case studies of contemporary phenomena – with the lines of genesis and conditions of possibility leading up to digitalisation. This is to approach digitalisation as an ongoing social process rooted in particular technological, social and cultural transformations.

6. Conclusion: where to now?

Resonating with the themes of social theory (chapter 2), it is clear from this chapter that there is some consensus on the point that boundary shifting or boundary dissolving digital music technologies have to some degree transformed or reconfigured practice. However, the depictions of these transformations vary both in scope and in the ways in which they are theoretically conceptualised. Indeed, the fragmentation of positions in this literature, and the lack of apparent debate or interaction between these texts, leaves a somewhat open field of study in which the following questions require further consideration: How are digital technologies and digitalisation reconfiguring and recontextualising music production, reproduction and appropriation? How does digitalisation impinge upon, frame, script, or afford musical practice? How does digitalisation implicate music and musical artefacts? How can digitalisation as a product of rhetoric/discourse, material artefacts, and everyday practices be conceptualised and understood?

Furthermore, in terms of specific technologies and technosystems (Idhe, 1990), there are a number of areas that have yet to receive sustained sociological attention. There is, for instance, virtually a complete absence of substantive research into the implications of MP3 players[35], and there is very little sociological research on the digitalised recording studio or the music downloading phenomenon. It is this absence

[35] With the exception of Bull's (2006) very brief article (just under four pages) in the new journal *Senses & Society*. Bull has also written a book dedicated to the MP3 player, titled *Sound Moves: iPod culture and Urban Experience*, which will be published by Routledge in October 2006.

that I attempt to address in the case studies that follow in Part II (see chapters 6, 7 and 8).

A final point uniting this fragmented field, and other literature on the history of music technologies discussed in chapter 5, is that digitalisation is often treated as a separation, distinction, or transition between an analogue and a digital age or era. The process of digitalisation is depicted as a movement from the old to the new, from analogue to digital. This claim requires further interrogation. How, for example, does the analogue implicate the digital? Should the processes of digitalisation be thought of as a movement from the analogue to the digital, from the old to the new, from the physical to the virtual? Or, alternatively, is it now viable to argue that the 'Analog still lives on in a digital world' (Pinch & Trocco, 2002: 320)? This then is to suggest from the outset, predicting the arguments of the following chapters, that 'the transition from analogue to digital audio technology is far from complete and remains an ongoing process.' (Warner, 2003: 22).

In light of these discussions, and in order to extend the scope of this literature, what is now needed is historically embedded sociological research into the digitalisation of music and music culture across the three spheres of music culture – production, reproduction and appropriation. The aim of this approach is to interrogate the issues of access and the fluidity of boundaries, amongst other issues, across the various spheres of music culture. For this reason the case studies in Part II of this thesis – chapters 6, 7, and 8 – are organised around the three spheres of music culture identified in this chapter, rather than around particular emerging themes in the literature. I have taken this approach for two distinct reasons, first it allows *new* issues to be explored that are yet to arise in the emergent literature, enabling new issues to be illuminated through theoretically informed empirical research of various types, and, second, it enables unifying themes to be studied across the digitalisation of music production, reproduction, and appropriation. This fits with the central objective of this thesis – to identify defining features of the digitalisation of music and music culture.

To begin to flesh out this position it is worth returning to the key argument that is sustained, in various formulations, across much of this literature, which is that the digitalisation of music and music culture, or, more specifically in the terminology used, digital music technologies, are constituted by a triangulated interplay between practice, rhetoric/discourse, and material artefacts (Pinch & Trocco, 2002). These interplays fall into various patterns and constellations yet all share an attempt to study music technologies not as 'tools' or 'instruments' but as social and cultural phenomena. The following chapter looks to expand on this position by developing an approach toward studying digital music technologies, or what I label the digitalisation of music and music culture, that builds upon this established position whilst attempting to address the 'gaps' and areas for further investigation highlighted in the existing literature. Also, as this may be regarded as an emergent rather than established area of investigation, the approach outlined in the following chapter, and the thesis as a whole, aims to locate and exemplify *new* properties and unifying phenomena. For this reason the content of the thesis is built around what I have labelled the three spheres of music culture – chapter 6 focuses upon production, chapter 7 on reproduction, and chapter 8 on appropriation – rather than tying the content of these chapters down to particular themes that have already been identified and researched. The agenda here is one of expansion and development of this emerging field based upon these reflections. The thesis, therefore, is an attempt to build on this literature and to expand the existing defining themes of the digitalisation of music and music culture by relating these more closely to the material instantiations in everyday practices.

To conclude, as a final point, it would seem that the literature outlined in this chapter gives pertinence to Steve Jones' suggestion that it 'is time for scholars to stretch their imagination, to ask questions about music, place and space in relation to diaspora, community, technology and business.' (Jones, 2000: 228-229). Indeed, it is this observation that guides the following study of the material aspects of the digitalisation of music and music culture as embedded in a context of information or global capitalism, localised communities, and everyday life practices. It is hoped that these attempts to expand and develop this emerging field in some way stretch the imagination to locate new concepts and areas for further investigation. Jones continues this point by arguing that the 'connections and reconnections typically experienced in hearing and listening to music, along with the affective dimensions of that experience, have been reconfigured.' (Jones, 2000: 228). Informed by these projections this thesis asks the question: what are these reconfigurations and how may they be captured or conceptualised? The aim is to attempt to say something that may endure about a set of dynamic and ongoing socio-technological transitions, reconfigurations, and transformations.

In light of these areas for further investigation the following chapter aims to further clarify the specifics of the approach taken in this thesis.

Chapter 4: Approaching the digitalisation of music and music culture: toward information materialism

Chapter contents

Chapter abstract

The purpose of this chapter is to set out an approach, based upon the areas for development outlined in the previous chapter, that may be used to inform and order the history and case studies in Part II. To this end this chapter begins by taking a step backwards to reconsider the definition of technology. The remainder of the chapter then takes the development of Kittler's information materialism, representative of work based around the intersections of social theory and the sociology of music culture, as a point of departure. In section three I identify key areas for development by contrasting Kittler's approach with other key positions. I then focus upon each of these areas in turn. Section four focuses upon affordance theory, section five upon the relations between information and materiality, and section six, upon the strategies that may be employed for capturing affordances and the localised material instantiation of information. I then conclude by drawing these points together to formulate a framework or schema of information materialism.

1. Introduction

> 'There are two things that a philosophy can do: It can provide a perspective from which to view the terrain – in this case, the phenomenon of technology, or better, the phenomenon of human-technology relations. Second, a philosophy can provide a framework or "paradigm" for understanding.'
> (Idhe, 1990: 9)

In response to the need for clarifications and further research outlined in the previous chapter, this chapter aims to develop an approach toward the study of the digitalisation of music and music culture designed to inform the history and case studies that follow in Part II. I begin here by re-considering, through Heidegger's (1953/2004) key work on technology, what technology is and how it may be defined. This definition – understanding digital music technologies, and digitalisation itself, not merely as 'tools' or 'instruments' but as formed in an interplay between practices, discourse/rhetoric, and (both physical and non-physical) material artefacts – then forms a backdrop for the development of an *information materialist* approach to the study of digitalisation. In other words, following Sassen's recommendations, this chapter sets out from the premise that 'understanding the place of these new technologies from a sociological perspective requires avoiding a purely technological interpretation and recognizing the embeddedness and the variable outcomes of these technologies for different social orders.' (Sassen, 2002: 365).

Following these reconsiderations in section three I take Kittler's media theory, whose study of the gramophone represents a key work in the social theory of music technologies (Kittler, 1999), as a point of departure. By identifying areas in which this theory may be developed I aim to enrich Kittler's media theory to construct an approach or analytical framework which is labelled here as *information materialism*. To this end I identify three areas for development in Kittler's key work: (1) the conceptualisation of the relations between humans and information and communication technologies, (2) the details of the relations between materiality and information, and (3) that Kittler's abstractions tend to avoid providing the reader with heuristic or definable model that may inform more empirically focused research. This chapter aims to address these three areas by focusing first upon affordance theory in section four and the relations between materiality and information in section five. From here I develop an approach or strategies for extending Kittler's information materialist project in section six. I then conclude the chapter by offering a five point schema defining an information materialist approach to the study of the digitalisation of music and music culture. I will begin with the question of technology.

2. What is technology?

> '**technology**...the application of scientific knowledge for practical purposes...machinery and equipment based on such knowledge...the branch of knowledge concerned with applied sciences...from...*tekhnologia* 'systematic treatment', from *teknē* 'art, craft' + -logia (see **–LOGY**).'
> (*Concise Oxford English Dictionary*, 2002: 1471)

> '**-logy**...denoting a subject of study or interest'
> (*Concise Oxford English Dictionary*, 2002: 835)

Don Idhe begins *Technology and the Lifeworld* (1990) 'with a broad, but also concrete and experiential, notion of technologies as those artefacts of material culture that we use in various ways within our environment.' (Idhe, 1990: 1). Technologies for Idhe, in the opening passages of his work, are defined simply as the material items that we use in our everyday lives, the objects that surround us and are utilised, it would seem, in the construction or consumption of cultural forms or practices. This, in a sense leads us toward a kind of established definition of technology in which the technical object is clearly defined. We are then left with a vast category in which any system of communication, mobility, storage, activity, or construction, in a sense, becomes technological. This is perhaps the most solid and universally accepted definition of technology.

Alternatively Kirkpatrick has argued:

> 'If the technological is constituted in and through actions and attitudes themselves manifest as socio-cultural variables then it can be things, or people, or situations, processes...The definitive point would be the

orientation that people had to the thing; its capacity to attract the right (technical) kind of attention.'
(Kirkpatrick, 2004: 3)

Here Kirkpatrick accepts this broad definition of technology but suggests that technology is defined within practice, it becomes technology when interpreted as such. For Kirkpatrick, individual agents lavish 'technical' forms of 'attention' on those objects considered to be technology. It is the reaction of the agent to the material artefact that the 'thing' becomes technology. This is a compelling approach as it suggests that what constitutes a technology becomes established, demarcated (through key signifiers or styles), and standardised so as to be recognised as such by the appropriator. However, as Kirkpatrick notes, this is still a somewhat ambiguous definition of technology for 'in terms of the radical redefinition, money and power are technologies.' (Kirkpatrick, 2004: 4). Yet considering his premise that technology is defined by 'attitudes' and a particular 'kind of attention', it seems unlikely that money or power would receive this defining technical kind of attention.

Here we find the problem which lies at the separation between the relatively stable culturally determined definition of a technology, which in a sense can be understood as the established (whilst mobile or changeable) definition of particular objects as technologies, and the more unstable critical definition of technology that has the question of what it is to be a technology written into it and as such is the broadest definition. Kirkpatrick identifies that there 'is, perhaps, a degree of slippage...between technology as thing or things and the idea of technology as attitudes embodied in a practice.' (Kirkpatrick, 2004: 4).

As a resolution to this problem Kirkpatrick simply allows these definitions to operate together. Technology can be defined and redefined in praxis simply because it can move around between rigid technical objects and technologies as the embodiment of particular kinds of attitudes. What we recognise as a technology then may shift around within the broader boundaries of *technology*. There may be things that are technologies that we do not recognise as technologies; the alphabet or the musical score are often cited in this context. The question then is this: is a technology still a technology if we do not recognise it as such? It appears that for Kirkpatrick the answer to this is *no*, for technology is constituted in the act of recognition. He argues that we recognise things 'as 'technology' then constitute them as such through our practice.' (Kirkpatrick, 2004: 4). Kirkpatrick, drawing on the work of Andrew Feenberg, argues that 'Feenberg is surely correct to maintain that defining technology is, first and foremost, an issue of interpretation.' (Kirkpatrick, 2004: 4). Here then it is possible to see that material artefacts are defined as technologies in the practices and discourses of users. Technologies are not merely technical but are social and cultural phenomena, or, as Feenberg argues, 'technology...can no longer be considered as a collection of devices, nor, more generally, as the sum of rational means. These definitions imply that technology is essentially non-social.' (Feenberg, 1999: 83).

It would seem that there are echoes here of Heidegger's (1953/2004) key essay 'The Question Concerning Technology' (2004), in which he identified and defined these two distinct definitions of technology. He suggests that of these two voices 'One says: Technology is a means to an end. The other says: Technology is a human activity.' (Heidegger, 2004: 312). To resolve this problem Heidegger argues that the 'two definitions of technology belong together. For to posit ends and procure and utilize the means to them is a human activity.' (Heidegger, 2004: 312). For Heidegger, we need not attach ourselves to one definition and reject the other, rather we should be attempting to incorporate both definitions in a more rounded and complete study of technology and its understandings.

The definition of technology as tool, is referred to by Heidegger as the 'instrumental' definition of technology. It is this definition of technology as instrument that can perhaps be referred to as the established or conventional definition of technology as a technical object with defined boundaries and purposes. This instrumental definition of technology excludes notions of activity or practice encompassed by Heidegger's second voice. He argues that it 'is in obvious conformity with what we are envisaging when we talk about technology. The instrumental definition of technology is indeed so uncannily correct that it even holds for modern technology,' (Heidegger, 2004: 312). So when we talk about 'modern' technology, which for Heidegger would have been the technologies of the 1940s and 1950s, then the instrumental definition is still applicable[1]. In light of this, he concludes that 'the merely correct is not yet the true...Accordingly, the correct instrumental definition of technology still does not show us technology's essence.' (Heidegger, 2004: 313). So the instrumental definition, the definition of technology as instrument, works as a definition, it is correct, yet there are aspects of technology that it fails to illuminate. It does not, in Heidegger's terms, show us the *essence* of technology, it does not show us the 'utilizations' the activities and practices within which it is appropriated, nor the social and cultural forces which impinge upon these practices. So whilst the instrumental definition of technology should not be abandoned, for it reveals something about the understanding of technology, we need to add an extra dimension that encapsulates technology's essence. Indeed for Heidegger we should use the instrumental definition in order to uncover essence, an angle to which Kittler's (1999) work on information materialism can be associated (see below). Heidegger suggests that in 'order that we may arrive at this [the essence of technology], or at least come close to it, we must seek the true by way of the correct.' (Heidegger, 2004: 313). We must seek essence via the instrumental; we must begin with the technical or instrumental and move toward appropriation, a movement from the purely technical or technological to the sociological[2].

According to Heidegger technology 'stems' from the Greek term *Technikon.* He claims that:

> '*Technikon* means that which belongs to *technē*. We must observe two things with respect to the meaning of this word. One is that *technē* is the name not only for the activities and skills of the craftsmen but also for the arts of the mind and the fine arts. *Technē* belongs to bringing-forth, to *poiēsis*; it is something poetic.'

[1] The question then is whether or not the instrumental definition of technology holds true, or is still applicable, for post-modern technologies. A better way of putting this might be, can we still think in terms of instrumentality in a digital or information age.

[2] As a side issue it would seem that Heidegger's use of the word 'true' to suggest possible findings beyond the merely correct is tied into a notion of essence as the pursuit of being or of what it is to be. In short, this is not truth in the sense of the metanarrative, or the universal, or the totalising, it is a more subjective version of truth. The true in this sense is the truth of the everyday, the actuality of the practices in which these technologies are appropriated. This is not an objective or deterministic version of truth but rather a plural version, an attempt to get inside presumed truth to find the *truths* about human/technology relations; that is simply *what they are.*

(Heidegger, 2004: 318)

Technē, from which technology is derived, was not just about craft and construction it was also a term that encompassed the arts. *Technē* was about creation, about 'bringing-forth', about *poiēsis*, and, therefore, was about the accumulation of skill and knowledge by craftsmen and artists. As Heidegger argues:

> 'From earliest times until Plato the word *technē* is linked with the word *epistēmē*. Both words are terms for knowing in the widest sense...Such knowing provides an opening up. As an opening up it is revealing...*Technē* is a mode of *alētheuein*.'
> (Heidegger, 2004: 318-319)

Technē as an application of knowledge and skill reveals something about the nature of this knowledge, and, as such, *Technē* is a mode of revealing, a mode of *alētheuein*.

It is not the means or the manufacture that is important, but rather it is the creation, the revealing, the bringing into existence, revealing something about being. This then suggests that understandings and definitions of technology are mobile, indeed the dictionary definition given at the beginning of this chapter appears problematic in its fixity and lack of scope. According to Heidegger there 'was a time when it was not technology alone that bore the name *technē*...There was a time when the bringing-forth of the true into the beautiful was called *technē*.' (Heidegger, 2004: 339). Technology has found a much narrower definition in the contemporary age, a definition that reduces it to the means, to manufacture, to the instrument or tool rather than the complete process. Heidegger is suggesting here that re-opening the definition of technology to look beyond mere manufacture is a fruitful process, and one that may be replicated by understanding digitalisation, for instance, as a process rather than merely a set of digital instruments or tools.

Technology then, as a set of processes embodying vast sets of accumulated knowledge and skills, as Heidegger argued, is a 'mode of revealing.' (Heidegger, 2004: 319). For Heidegger, 'unlocking, transforming, storing, distributing, and switching about are ways of revealing.' (Heidegger, 2004: 322). This is to say that all technologies, through their appropriation, reveal or unconceal some of the details of the human experience. However, unconcealment, from Heidegger's perspective, is not an intentional outcome of technology, technologies are *not* designed to reveal, they do not purposefully reveal something, rather revelation is an inevitable part of the process of technological development and appropriation. Technology always-already reveals, it reveals things about us, about the social or cultural spheres of which it is a part, about the economic or manufacturing structures of the day, about the history of technology, about the context in which it was created, and about everyday experiences. Revelation is not a designed consequence it is an unintentional inevitability, technology reveals not what is intended but that which is written into or inscribed upon all technologies: *its context.*

It is clear from this that, for Heidegger, 'technology is not equivalent to the essence of technology.' (Heidegger, 2004: 311). He contends that 'the essence of technology is by no means anything technological. Thus we shall never experience our relationship to the essence of technology so long as we merely represent and pursue the technological, put up with it, or evade it.' (Heidegger, 2004: 311). It is this issue that is of central concern in this thesis. This thesis is not an attempt to track the isolated technical details of the movement from the analogue to digital, it is not concerned solely with digitalisation as a technical transformation, although technical details are of concern in these processes. By concentrating *solely* on technicality then the essence of technology will remain concealed by wires, chipboards, digits, and programming languages. The essence of technology can only be found by re-culturising the study of digital technologies, both historically and empirically. Often technical studies of technologies *culture-strip*[3] the objects under focus, they reduce them to purely technical objects, Kittler (1999) is perhaps more guilty of this than others. The intention of this piece is to *re-place* digital technologies materially in a corporeal and cultural sense, to write-in the cultural context in which technologies are realised. Here the emphasis is upon capturing the essence, the socially and culturally embeddedness of music technology, via the technology itself, the specific technological detail: or, in Heidegger's terms, to find the 'true' via the 'correct'. As Kirkpatrick has recently argued the 'essence of technology should not be conceived outside of social relations.'

[3] I would like to thank Barry Sandywell for suggesting this terminology during one of our many discussions on the writing of history.

(Kirkpatrick, 2004: 5), this is perhaps because the essence of technology is to be found within these social and cultural relations and revelations.

3. Practice/discourse/material artefacts: enriching Kittler's media theory

Using this definition of technology as a backdrop, I will now focus more centrally upon the work of Friedrich Kittler (1999 & 1990) with the aim of enriching, developing, or adapting his information materialist approach.

3.1 Kittler's media theory

As I have already discussed (see chapter 2), Kittler argues that 'Understanding media-despite McLuhan's title – remains an impossibility precisely because the dominant information technologies of the day control all understanding and its illusions.' (Kittler, 1999: xl). This is to say that the 'media of the present influence how we think about the media of the past or, for that matter, those of the future.' (Winthrop-Young & Wutz, 1999: xii). Hayles claims that for 'Kittler it is all about media: the technical configurations they impose on representations, and the content of representations that reflect and reinscribe these configurations.' (Hayles, 2005a: 35). This suggests that technologies should take primacy in the study of contemporary social relations for they not only determine how these relations are performed, they are also increasingly autonomous, intelligent, or even ambient[4] (see also Haraway, 1991; Hayles, 1999; Lash, 2002). Therefore, for Kittler, the study of the social is not so much about meanings or interpretations of technologies but about the technologies themselves, hence the label *post-hermeneutics* (Gane, 2005a). Furthermore, and relating to this, in Kittler's formulations, and in a similar sense to that intended by Haraway (1991), the emphasis is placed on the power systems of increasingly intelligent information technologies, hence the label *post-humanism* (see Gane, 2005a). As Hayles explains, 'Kittler's strategy for escaping from the confines of humanist discourse is to focus on media rather than subjects.' (Hayles, 2005a: 33-34). In general Kittler's project then may be described as a historically embedded reconstitution of the 'archaeology of the digital takeover' (Winthrop-Young & Wutz, 1999: xxx).

[4] There is currently research being conducted on 'ambient technology' as part of the ESRC e-society research programme.

Nicholas Gane, in his key essay on the work of Kittler, contends that:

> 'Friedrich Kittler is one of the pioneers of what might be called *media materialism* – an approach that privileges, at all costs, analysis of the material structures of technology over the meanings of these structures and the message they circulate.' (Gane, 2005a: 25)

As Gane describes here, Kittler's media materialism, or as I will describe it here, *information materialism*, is concerned centrally with the material structures of technologies. This takes precedence over the meanings people attach to technologies or to the messages that they mobilise. Media or information materialism in its simplest form is the study of the material structures of information and communciation technologies (ICTs). Kittler's bold claim is that, 'Media determine our situation, which – in spite or because of it – deserves description.' (Kittler, 1999: xxxix). According to Kittler, the material structures of information media have determining implications for our everyday lives, and this makes their description increasingly salient as they become more pervasive. Kittler does not 'ignore bodies and subjectivities, he positions them as being constituted by the media they use.' (Hayles, 2005a: 34).

Kittler's terminology may seem a little overbearing, but this is most likely the reflexive construction of a polemic that attempts to oppose the increasingly established perspectives of social constructionist discourse. Perhaps, in light of Kittler's work, the language can now be softened somewhat without departing too radically from Kittler's information materialist directions[5]. Indeed, the intention here is too remove some of the radicalness of Kittler's position to posit a more practical

[5] It is clear that Kittler plays the role of 'enfant terrible' (Winthrop-Young & Wutz, 1999: xxxiii). It would seem that his writing is in fact defined by 'spirited playfulness meant to assault and shock conventional scholarly sensibilities.' (Withrop-Young & Wutz, 1999: xxxiv). Appropriating and adapting these writings, as I have attempted here is to rework the extremities of Kittler's theory to make it usable, rather than to overlook its boundary pushing potentials. I am aware that in doing this I am detracting from or sanitising the shock potential of an information materialist approach in favour of the requirements of the formulation of a research project. Once the shock of a particular position has been felt then it seems only right that the issues it relates to have been illuminated and are then open to practical reformulations. In the extremely unlikely event that Kittler ever comes to read this piece, I hope he will forgive my treatment of his work.

and pragmatic version of his information materialism. As Winthrop-Young and Wutz put it, 'media determine our situation, but it appears that our situation, in turn, can do its share to determine our media.' (Kittler, 1999: xxxv). So, for instance, rather than setting out with the central premise 'media determine our situation', it is possible to proceed with the claim that *media afford our situation* (see below). We need not subscribe to Kittler's media *determinism*[6] to accept his proposed technological primacy embodied in that notion that technology should be placed at the centre or pinnacle of our investigations. Affordance, as I discuss below, does not exclude the technological *a priori*.

Taking this position of the primacy of technologies into account Kittler's objective is 'not to understand media as such but rather to document the historical conditions of their emergence and the structures of communication and understanding they subsequently make possible (what might be called the technical *a priori*).' (Gane, 2005a: 29). Kittler claims that through this process we have reached a point where 'there is now only one medium, the digital computers' (Hayles, 2005a: 31). Reflecting on Kittler's claims, Hayles suggests that this has in fact had the effect of 'flattening into a single causal line – the convergence of all media into one – social and cultural processes that are in fact much more complex.' (Hayles, 2005a: 31). Here Hayles suggests that rather than capturing complex lines of genesis in this media history, Kittler's approach reduces complexity to convergence. A clear limitation of the reductionist tendency can be found within the declaration of the computer as the 'medium to end all media' (Withrop-Young & Wutz, 1999: xxx).

In terms of the possible directions this work suggests, Kittler's approach to media theory as media history implies a dichotomous course of analytical action that includes historical studies of the emergence of technologies or technological possibilities (see also Sterne, 2003) operating alongside empirical investigations or accounts of contemporary technologies – understanding digitalisation's present in terms of its past. The analytic that underpins both is defined by an approach where 'description and analysis of technological forms come before, and are used in turn to inform, questions of meaning.' (Gane, 2005a: 29).

[6] This is not intended here as the insult it has become in much contemporary social theory (Lin & Beer, 2005).

3.2 Kittler as sociologist

What then is this primacy of technology and how can this fit into a sociological analysis? According to Gane:

> 'This...*post-human* method of analysis is quite different from the subject-centred approaches that are commonly found in traditional (sociological) approaches to media technology...It reverses traditional procedures by reconstructing humanness from the machine world, rather than vice versa' (Gane, 2005a: 29)

Here Gane highlights that Kittler subverts the human-to-technology in favour of a movement (analytically speaking) from technologies to human experience. This, if we accept that the contemporary everyday has come to be defined by increasingly pervasive (digital) technologies, is a logical route, for it is the technology then that comes to define everyday spaces and practices.

If we then place some level of transformative power in the hands of technologies – whether in terms of determinism, causality, or affordance – then the next step is to argue that the purpose of:

> 'media theory, or in Kittler's terms media *science* (*Medienwissenschaft*), is to focus on the material structures of technologies and the changes these introduce into culture, not the ways in which these are *used* or the content of the messages that pass through them. For Kittler, this means pushing McLuhan's study of media into the digital age so that computers, their storage capacities and their networks are placed at the centre of analysis.' (Gane, 2005a: 29)

Gane, citing Kittler, is arguing here that the study of the contemporary 'social' should focus centrally on technologies, and specifically computer technologies, for these technologies are at the centre of social relations[7]. Digital technologies are not peripheral to everyday life, they are embedded in all dimensions of the 'lifeworld' (Idhe, 1990). According to Kittler, this approach should aim to 'rethink media with a new and uncompromising degree of scientific rigor, focusing on the intrinsic technological logic, the changing links between body and medium, the procedures for data processing, rather than evaluate them from the point of view of their social usage.' (Winthrop-Young & Wutz, 1999: xiv). Why though does this attempt to illuminate technical detail need to be fenced off or detached from social usage? There seems no reason here, even if we accept the level of determinism and technical detail suggested by Kittler, that we should not study these media in use.

Furthermore, what is also important here is the point of focus for Kittler's descriptions, this may be reframed as the question: What are we describing? If we talk of a computerised, information, or, like Gane, a hyper social (Gane, 2004), it is possible for example to extend the notion of materiality to include not only the materiality of the computer as object, but also the materiality of the information it stores, reproduces, and mobilises. For in the digital epoch:

> 'with this emphasis on storage or technologized *memory*, information is no longer treated as purely a probability function (as it was for Shannon and Weaver), but as a material property that is in no way distinct from the physical components that make it – or the choice between different variables – possible. In view of this, Kittler terms his approach 'information materialism''
> (Gane, 2005a: 29)

Information materialism is, as the name suggests, concerned also with the virtual, with memory, with the storage and transfer of data, in short with the materiality of the device and with the materiality of the digitalised information. The materiality of the internet, of websites, of MP3 files, for example, can then also be included in information materialist analysis. This resonates with the concrete values and implications of the virtual outlined in Haraway's 'informatics of domination' (1991),

[7] See also Nicholas Gane's introduction to his text The Future of Social Theory (2004) and particularly the passages concerning the hypersocial.

and more recently with the concerns of urban sociology (Sassen, 2002; Graham, 2003; Burrows & Ellison, 2004; Burrows, et.al., 2005; Burrows, 2005; Mitchell, 2003)

In short Kittler's approach encourages us to study the material structures of technologies whilst simultaneously unearthing the historical lines of genesis that led to their emergence. Gane, in relation to genealogy, identifies that 'Kittler is... sympathetic to Foucault's practice of genealogy...and employs it to bring the histories of these neglected discourse networks and their technologies into sight.' (Gane, 2005a: 31). The notion of genealogy here represents a rich, textured, and detailed account of lines of genesis, a complex non-linear history of the emergence of technologies, or of the emergence of the possibilities of particular technologies. Indeed:

> 'Just as Foucault presents historical material in its own terms in a bid to disturb our understanding of the present, Kittler's *Gramophone, Film, Typewriter* also exhumes a range of different (largely forgotten) texts that provide a snapshot of the immediate past,'
> (Gane, 2005a: 31)

This exhumation of a variety of texts captures the concrete descriptions of technologies by collating the writings of people who were directly engaged with the technologies or studied their forms. It is this genealogical 'exhumation' of technologies that is described in more detail in the following chapter in which I develop a genealogical history of the digitalisation of music and music culture (see chapter 5). For the moment I will leave this issue to one side so as to concentrate solely on developing the notion of information materialism in more detail.

The question of why information materialism is relevant for a sociological study of information communication technologies or, indeed, of digitalisation, remains unclear. The focus upon the specificities of technologies appear to erase the social and cultural aspects of these processes. However, Gane, referring to Kittler's work suggests that:

> 'Embedded within media technologies (be it a text or the chipset of a computer) are *power* structures that elude the control of the user and

> configure the basis of communication from within (...) The introduction of this...dimension shifts Kittler's work, in turn, from a largely descriptive account of the material basis of communication to a critical analysis of the underlying connection of power and technology.'
> (Gane, 2005a: 34)

It is for this reason, amongst others, that the description of the materiality of technologies is an essential part of a theory of, or approach toward the study of, (digital) technologies. If we take power as one amongst a number of social factors within or inscribed upon the machine (see chapter 2) then we can move from the technology to the human through technologically embedded power structures. For this central reason information materialism can be considered sociological. Although there is clearly scope here for extending information materialism as a sociological project.

In summary Gane contends that 'the logic of Kittler's argument is clear: the increased and often invisible powers of technological systems to structure that space traditionally thought of as being 'human' (and by extension 'social') are to be placed at the centre of critical analysis.' (Gane, 2005: 39). These technologically structured spaces of everyday life can only be accessed through a reconstitution of the details of the technologies that structure them, these technologies provide a portal into the study of the experiences of everyday life, social relations, and the implications of appropriation. The social then, if rethought as the (information) technological centred social, requires us to look at this technological centre around which the everyday operates. And with this it must be remembered that we are not merely dealing with the physical, 'media technologies are more than just objects; they are *processors* of information.' (Gane, 2005a: 39). Therefore information materialism must attempt not only to account for the technology but also for the processes that occur in the complex and multidimensional interfaces between technologies and humans. It is perhaps on this point that Kittler's position becomes problematic, for if we describe media, even as power inscribed cultural intermediaries, there is still a lingering doubt about how people appropriate these technologies in everyday life. This may be a matter of taste, but this apparent assumption that the material structures of technologies determine everyday life, to simplify Kittler's position, is to presume, or at least to neglect, the intricacies, resistances, and conflicts that may play out as these technologies are appropriated or incorporated into mundane routines.

For Gane the 'way forward is for sociologists to think not just about 'people', or computers as such, but also 'programs' (Kittler cited in Gane, 2005a: 39) it is this that is central to '*information materialism*' (Gane, 2005a: 39), we must think not just in terms of the material as physical but also as informational, as technical and also sociological.

3.3 Kittler vs. the agent

Despite this central criticism concerning the absence of everyday practice in his accounts, Kittler's work on the gramophone, as a detailed reconstitution 'of the ruptures brought about by the differentiation of media and communication technologies' (Winthrop-Young & Wutz, 1999: xxvii), is particularly useful in that it represents an intersection between social theory and the sociology of (digital) music culture[8]. As I have already outlined, it is this area or intersection with which I am particularly concerned. For this reason I will take Kittler's theory as a point of departure with the aim of enriching or developing this into an approach that will inform the empirical investigations in part II.

As the previous discussions of Kittler (both in this and previous chapters) may indicate, Kittler's approach to technologies may be summarised as the prioritisation of the material properties of information and communication technologies (ICTs) over the meanings or messages that they communicate. Simply, for Kittler, media 'determine' our 'situation'. For this reason the ICT, the interface, the media, requires description, for it is through and within this that we may understand digitalisation. This, for Kittler, requires a historical context, in which lines of genesis may be constructed between contemporary technologies and those of previous eras. For instance, Kittler (1999) identifies the gramophone, film, and the typewriter as having particularly significant consequences for contemporary media and, therefore, culture.

[8] A more detailed theoretical and disciplinary context for Kittler's work can be found in Withrop-Young and Wutz's (1999) introduction to Kittler's *Gramaphone, Film, Typewriter* (1999).

In the previous chapter, drawing particularly on the work of Pinch and Trocco (2002), I argued that technologies are constituted by a combination of practice, discourse, and material artefacts. This matches closely with the broadening out of the definition of technology described above – the movement from the instrumental definition toward technology as practice, discourse, and tool. The problem then is exactly how to approach or study digitalisation as complex intersections or interplays between these three constituent elements. It is this question to which the remainder of this chapter is dedicated.

To extend the critique of Kittler's position, so as to highlight areas for development, it is worth comparing Kittler's approach with the more open and agentic focus of the majority of theories of technology. Take for instance Kirkpatrick's theory of critical technologies, he argues that the:

> 'uniquely open character of the PC; the fact that its function has not been, and probably cannot be finally pinned down, means that its design remains contested on a daily basis even though it is a mass commodity.'
> (Kirkpatrick, 2004: x)

Here Kirkpatrick outlines an approach in which the design of ICTs are contested with implications for how they are interpreted (Hand & Sandywell, 2002). As such merely focusing upon the material form of the technology, would, for Kirkpatrick, be to overlook the contested nature of their appropriation. Indeed Kittler, in many regards, represents an attempt to reclaim what is often described as technological determinism, embodied in his view that technologies have determinate outcomes and that they, rather than human practice, should be the focus. The problem here, as Frank Webster (2002) argues, is that treating technology as the 'prime social dynamic' in this way is not only an 'oversimplification of processes of change', but it also 'relegates…social, economic and political dimensions of technological innovation.' (Webster, 2002: 11). Although, having said this, there may be some scope for differentiation here, as in Kittler's case it is possible to argue that rather than relegating these factors he is instead attempting to access inscriptions of power structures through the material details of media technologies.

Indeed, in contemporary debates on human/technology relations, to which there are many, it is often the binary opposition between technological determinism and social constructionism that takes centre stage (Idhe, 1990). This is comparable with the irresolvable nature/nurture or quantitative/qualitative debates that have come to define, and, some would argue, restrain (Webster, 2005), sociology as a discipline. These are complex and far reaching debates that cannot possibly be resolved here. Rather I somewhat sidestep the determinism/constructionism debate by focusing centrally upon the development of Kittler's information materialism. I conduct this manoeuvre for two specific reasons. The first is that it builds upon the existing approaches to the digitalisation of music and music culture outlined in the previous chapter, and, second, it operates at the intersection between social theories of ICTs and the sociology of music culture[9].

Having said this, despite this focus upon Kittler's work, more broadly defined this study falls under the vast and growing umbrella of *science and technology studies* (STS). Nicholas Brown and Andrew Webster (2004) formulate the following five-point matrix in defining this field of study:

1. Science and technology are socially embedded and crafted; they thrive through being mobilized via complex, heterogenous networks, but their meaning in such networks is never singular or uniform.
2. There is no pre-given linear path that they take, and they might take different paths simultaneously as they build – in a socio-technical sense – various versions of nature, 'reality' or materiality.
3. Innovations in any field...have to work within and through existing socio-technical regimes or systems, and are more or less successful because of this: no technology ever 'speaks for itself'.
4. Technological change will be part of a wider socio-technical transformation, since the social and the technical are co-produced.

[9] The far reaching debates on science and technology are not of concern here, but this is not to say that they should not be used to inform future studies in this area. Rather these debates are extremely widespread and for the purposes of focus I chose to concentrate on the directions taken in the existing literature as a backdrop. This however leaves open the possibility of an STS type investigation of music culture.

5 Contemporary society might be characterized as having a risk culture not least because of the new, intangible risks that we create for ourselves through the very innovations that science and technology produce.

(Brown & Webster, 2004: 38)

These five key summary points from Brown and Webster's text are based upon the constitutive sub-disciplinary approaches that are positioned within the category of science and technology studies[10]. These points roughly define my own approach, it can be seen that the definition of technology I have chosen, which is centralised on technologies as practice, discourse, and material artefacts, is very much geared toward science and technology studies' central philosophies. Indeed, Trevor Pinch, the co-author (Pinch & Trocco, 2002) of the work from which this formulation was taken (see chapter 3), is known for his work in STS (Collins & Pinch, 1998).

The social-technical systems described by Brown and Webster require us to question the natures of the intersections between the social and the technical, located in social spaces, the human/technology interface, the elasticity and plasticity of the membrane between the (human) body and the technology (Brown & Webster, 2004: 29). For, in accordance with Brown & Webster's (2004: 1) request, it is essential that the body is written into these (sociological) accounts of technology (see Hayles, 1999; Shilling, 2003 & 2005). The body is the site for the activation of technologies, the site of 'boundary conditions' between humans and machines (Haraway, 1991). For Brown and Webster 'STS has shown how science and technology are deeply social phenomena.' (Brown & Webster, 2004: 37) and that the social is 'completely interwoven with nature, technology, materiality, and so on.' (Brown & Webster, 2004: 30). Clearly there is a substantial body of thought that technology rather than merely being technical devices are socially and culturally embedded phenomena.

To summarise it is possible that Kittler's work may be held up as an example of the two 'analytical flaws' of contemporary theories of digitalisation identified by Saskia Sassen (2002: 366). The first 'confines interpretation to a technological reading of the

[10] These include the social construction of technology, actor network theory, and innovation and risk analysis (Brown & Webster, 2004: 30-39).

technical capabilities of digital technology. This is crucial for the engineering side but problematic for a sociological understanding.' (Sassen, 2002: 366). The problem here, for Sassen, is that work such as the information materialist project as a 'purely technological reading of technical capabilities inevitably neutralizes or renders invisible the material conditions and practices, place-boundedness, and thick social environments within and through which these technologies operate.' (Sassen, 2002: 366). The second analytical flaw evident in Kittler's work is the 'tendency to conceive of the digital as simply and exclusively digital and the non-digital' (Sassen, 2002: 366; see also chapter 2). The problem being that these 'either or categorizations filter out alternative conceptualisations, thereby precluding a more complex reading of the impact of digitisation on material and place-bound conditions.' (Sassen, 2002: 366). These problems of analytical exclusion and categorisation, perhaps best summarise the problems faced by studies attempting to expand upon Kittler's information materialist project.

Further to these analytical flaws, it would seem that Kittler's approach, although rich in its analysis of historical possibility, detail of description, and materiality or concreteness of digital implication, contains three areas for development that may be used to enrich his information materialist approach, or, at least, make it more pragmatic. The first is the problem of determinism as an oversimplification of a vast array of socio-technical phenomena, that by focusing upon the materiality of media we exclude the complexity of appropriation in everyday spaces. The implication here is that the locality, the place, the agent, are excluded from the analysis. The second is that, despite Kittler's careful analysis, the detachment of media from the everyday effectively results in a separation of information from materiality. It is this issue of the apparent separation of the information from the material or of the relations between the information and material (essential to information materialism) that requires further consideration. The third issue is simply that Kittler's abstractions, although rich in insight, provide only limited intimations toward strategies for the development of information materialism as a programmatic contribution toward the growing literature on the study of digital technologies and digitalisation. There is a need here for a more solid heuristic model or framework that may be appropriated and applied to extend Kittler's rich and engaging project. Kittler doesn't really suggest ways in which we may proceed with his information materialist project[11]. In short, his theoretical outlines do not provide the reader with strategies that may be used to construct the required descriptions. The questions then is how we may proceed with information materialist descriptions? How may we locate media for information materialist investigation? Which methods or strategies, or even approaches, are relevant to information materialist investigations? The aim of what follows is to address these questions so as to convert Kittler's radical post-humanist approach into a manageable model for research into digitalisation[12].

Extending my earlier point concerning the exchange of Kittler's *determinism* for *affordance*, I will begin by further developing affordance as a central concept of information materialism. This is intended to provide an avenue for addressing the issue of the absence of practice in Kittler's technological *a priori.*

4. Affordances

One possible direction for understanding the implications of digitalisation or digital functionality in practice is a theory of technological affordances (Gibson, 1979; Hutchby, 2002; Gibson, 2006). Originally devised by the psychologist James Gibson[13] (1979) a theory of affordances[14] claims that the '*affordances* of the environment are what it *offers* the animal, what it *provides* or *furnishes*' (Gibson, 1979: 127)[15]. Gibson argues that the 'medium, substances, surfaces, objects, places, and other animals have affordances for a given animal.' (Gibson, 1979: 143). This in its simplest sense is based upon the premise that technologies as (attached or detached) objects or surfaces both enable and constrain practice, that technologies are social phenomena but that they occur within boundaries of material constraint and as such 'implies the

[11] This is perhaps not what Kittler would wish for, but there is a need here to make this a more structured and clearly defined research project.

[12] It is of course possible that this will water-down Kittler's approach with the effect of deflecting its purpose. I am however bound by issues of practicality in this reworking. I simply require a platform for study. This is not an attempt to detract from Kittler's text, rather it is an attempt to build upon its contents and findings.

[13] Although Gibson himself offers a history of the origins of the concept (see Gibson, 1979: 138-140)

[14] As Gibson notes in this text, the 'verb to *afford* is found in the dictionary, but the noun *affordance* is not. I have made it up.' (Gibson, 1979: 127).

[15] It is worth noting here that despite the suggestion here that Gibson is talking of what might be termed 'natural' environments, for he argues, that the artifical environm,ent of man should not be treated any differently, and that it is a 'mistake to separate the cultural environment from the natural environment' (Gibson, 1979: 130).

complementarity of the animal and the environment.' (Gibson, 1979: 127). The purpose of this is to cut 'across the dichotomy of subjective-objective' (Gibson, 1979: 129). As Kirkpatrick puts it, technology occurs 'within the field of social relations, contested – susceptible to being pushed as well as pushing.' (Kirkpatrick, 2004: 1-2). Technologies are not neutral or passive, ready to be pushed in any direction without resistance; rather, their material properties push back upon the agent. Gibson's claim is that these affordances of the environment 'constrains what animals can do', but these constraints are always present without necessarily being rigid or fixed, rather, within 'limits, the human animal can alter the affordances of the environment but is still the creature of his or her situation.' (Gibson, 1979: 143).

A theory of affordances then does not suggest that technology is not a social phenomenon, rather it is to place some transformative power with the material properties of the technology and the environment. It is to highlight and emphasise 'those functional and relational aspects of technology that frame but do not determine the possibilities for action in relation to an object.' (Rappert, 2003: 566). As Kirkpatrick has identified,

> 'The social shaping of technology can be illustrated with reference to any number of examples highlighting the ways in which various social actors and groups have perceived different, sometimes conflicting potentials within identical technical objects.'
> (Kirkpatrick, 2004: 2)

It is to say that technology is not restricted to the outcome of social relations – discourses and practices – but that it has a material dimension in the 'fundamentals of the environment...the substances, the medium, and the surfaces' (Gibson, 1979: 130) that impinge upon practice. Of course, to complicate Gibson's vision, in some instances, or all instances in the case of technology, the form of these surfaces are a consequence of social factors. That is that the material properties of these devices, the designs, are not *a-social*. For Kirkpatrick, technology 'is shaped by social forces and changes but it is still always technology and, as such, it is more than the sum of its social relations.' (Kirkpatrick, 2004: 3). This is to say that the materiality of the technology, which of course, it could be argued, is the consequence of social relations and the context in which it is commissioned, designed and manufactured, takes on a material form that impinges directly upon the interpretation of the technology and its incorporation into practice.

Indeed, James Gibson's (1979) affordance theory has gained substantial purchase in the study of ICTs (Kirkpatrick, 2004; Hutchby, 2001 & 2003; Shilling, 2005; Gibson, 2006; Beer, 2006), although this is far from a universally accepted concept (Rappert, 2003). Affordance theory provides an opportunity for the materiality, or 'surfaces' (Gibson, 1979) of artefacts to be triangulated with practice and discourse. On this issue Kirkpatrick focuses upon the practicalities of affordance theory:

> 'When I approach anything – a bit of paint on a palette, or a lathe – I necessarily look for affordances, else I will fail to adopt a practical orientation to the world and constantly run up against it instead.'
> (Kirkpatrick, 2004: 6)

Similarly for Hutchby,

> 'different technologies posses different affordances, and these affordances constrain the ways that they can possibly be 'written' or 'read'.'
> (Hutchby, 2001: 447)

Hutchby, in his article 'Technologies, Texts and Affordances' (2001), cites James Gibson's work in the proposition of what he describes as an 'approach to the study of technologies and social life which offers a reconciliation between the opposing poles of constructivism and realism' (Hutchby, 2001: 444). This involves seeing technologies neither in terms of their 'interpretive textual' properties nor their 'essential technical properties, but in terms of their *affordances*' (Hutchby, 2001: 444). In this essay Hutchby argues that

> 'affordances are functional and relational aspects which frame, while not determining, the possibilities for agentic action in relation to an object. In this way, technologies can be understood as artefacts which may be both shaped by and shaping of the practices humans use in interaction with,

> around and through them. This 'third way' between the (constructivist) emphasis on the shaping power of human agency and the (realist) emphasis on the constraining power of technical capacities opens that way for new analyses of how technological artefacts become important elements in the patterns of ordinary human conduct.'
> (Hutchby, 2001: 444)

Reducing this argument to its simplest form; affordances are both 'shaped and shaping' (Rappert, 2003: 566), *technologies both enable and constrain human practice*[16]. Simplifying to the extreme, technologies allow us to do some things but not others. This is perhaps social constructionism with boundaries. The interpretation of technologies is not without restriction, we cannot for example, without wishing to sound glib, watch television on an air purifier, fly to France on a calculator, etc. These affordances do not exist outside of the social; rather they are inscriptions of social systems and the wider social, cultural, and historical context. Affordances are the consequence of a vast array of social practices and processes that may include the rhetorical projection of technologies in advertising and marketing campaigns, design agendas, the understanding and representation of previous technologies, manufacturing, economics, amongst many others. If affordances are a consequence of the social then it reads that technology is an embodiment of the social, and, as such, to return to Heidegger, it can reveal the social to us. This is perhaps the central rationale behind Kittler's primacy of technology (see Gane , 2005).

Therefore, if we work from the basis that technologies have material possibilities and restrictions written into them. If we are, as Hutchby (2001: 445) suggests, relying on the metaphor of technology as 'texts', then we do not need to abandon the notion that technologies are socially constructed, the physical or virtual material form of the technology, its shape, design, mould, is not formed outside of the social. It is to suggest that the social construction of technologies does not solely occur at the point

[16] For critical response to Hutchby (2001) see Rappert (2003) and Hutchby's reply to Rappert (Hutchby, 2003).

of appropriation by the individual agent or 'user' but that it occurs within a material as well as social context[17].

In terms of refining affordance as an approach for the study of technology Hutchby argues that 'a new empirical perspective is possible on the nature of the relationship between technological artefacts and human practices. That...needs to be grounded in a conception of the constraining, as well as enabling, materiality of the technology as a worldly object.' (Hutchby, 2001: 444). It is not clear what is meant by the term 'worldly object' – it suggests that there is another world beyond the social – it is clear, however, that from this position a pragmatic approach can be developed. When studying technologies we do not need to focus entirely on what it opens up, on the possibilities of new or fetishised technologies as constructed in the gloss of marketing rhetoric, but also on what it prevents, on the constraints and limitations that it places on practice. Affordance then can be understood to be a point of focus through which we can illuminate aspects of everyday life, of how technologies impinge upon practice, culture, the everyday.

The remaining problem here is that of determinacy, or the misreading of affordance theory as technological determinism. To this problem Hutchby responds that neither 'the writing nor the reading of technology-texts is determinate: both are open, negotiated processes. Although there may be ways that technology-texts have 'preferred' readings built into them, it is always open to the user to find a way around this attempt at interpretive closure.' (Hutchby, 2001: 445). Affordance is not limited to explications of impact or determinism. It is merely to say that when technologies are read or interpreted by individual agents they may be appropriated in innumerable configurations, yet these interpretations have boundaries, limiting potentials, and that these boundaries may vary dependent upon the type of technology[18]. These

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[17] This leaves open a number of questions, some of which can be found in Gane's essay on Kittler: 'In an age of intelligent machines, for example, what does it mean to be human or social? How is the human or the social brought to life and sustained by various technologies across time? And what point do technologically mediated relations become specifically *social* relations?' (Gane, 2005: 40). Here I can only highlight this as an ongoing problem, the problem of redefining and reassessing the social in the digital age. It can perhaps at least be tentatively concluded here that the social is reliant on, or actually is, the interlocking of digitalised everyday practices, technologies are not passive within this, they take on both active and passive roles, as does the human body.

[18] Clearly some technologies are more flexible than others, or afford a greater range of possibilities. Whereas others are more determinate and limited in affordances.

affordances will always be open enough, particularly in the digital age, for technologies to be re-configured, re-assessed, and appropriated in different practices and processes. Relying upon affordances is to say that the social construction of technologies has limits that are written into technologies and their interfaces. Or as Hutchby puts it, 'the affordances of an artefact are not things which impose themselves upon humans' with, around, or via that artefact. But they do set limits on what it is *possible* to do with, around or via the artefact.' (Hutchby, 2001: 453)[19].

4.1 Locking-in affordances

The question then is how these affordances become established as interpretations of the potentials of particular technologies. For Kirkpatrick:

> 'The problem is that in theorising the technical encounter itself we need some notion of preparedness, of human beings as ready to hear that such and such is technology.'
> (Kirkpatrick, 2004: 5)

If we deal in affordances then this creates questions about how these affordances become fixed or concrete, how they are established or perpetuated, in short, *how do affordances become locked into technologies?* Or as Gibson puts it, 'how do we go from surfaces to affordances?' (Gibson, 1979: 127)

[19] As a final point in this definition of affordance theory, and to distinguish my own position from that of Hutchby, I wish to focus upon the issue of interpretation and representation. Hutchby contends that affordance 'tells us something about how the relationship between user and technology is bounded not so much by a politics of speakership and representation, but by ordinary practices interfaced with material enablments and constraints.' (Hutchby, 2001: 453). Here Hutchby is suggesting that the ordinary practices in which affordances are activated occur outside of representation. Contrary to this I am suggesting here that representation is central to a theory of affordance. Here the question of possibility has been reduced to a question of the material form of the technology, its shape, its design. *Affordances do not and cannot occur outside of representations, outside of the rhetorical projection of technologies in advertiing, packaging, user guides, etc.*. We are surrounded by images of technologies and their projected appropriations. The interpretation of technologies cannot exist outside of these representations, they colour our understanding and appropriation of technologies (Hine, 2000). Of course affordance is about materiality, yet we must avoid curtailing the understandings of these technologies that crystallise their possibilities in as powerful a way as the material factors. The images of technologies and technological appropriations combine in this with the material factors as interwoven in our 'technologically textured' (Idhe, 1990) or 'thick' (Sassen, 2002) environments.

When dealing in affordance it is imperative that we are not constructing an axiomatic concept or arbitrary set of detached technological possibilities. The question behind affordance is that of locking-in, of the establishment and continuation of affordances, of how affordances come to be what they are. These are questions that require greater attention than can be provided here, instead I will make a few suggestions to supplement those already made in the above passages concerning how affordances may possibly become locked-into technologies or how surfaces become affordances.

The first possibility is what Andrew Feenberg (1999) calls *technological hegemony*, that is that technological affordances are tied into wider systems of social dominance and oppression. Kirkpatrick argues that:

> 'One of Feenberg's most exciting theoretical insights...is the notion of technological hegemony, which concerns the way that dominant social interests are reflected and reproduced in and through technology design.'
> (Kirpatrick, 2004: 9)

Here we return to the argument that social structures are written into technologies. It suggests that the power to interpret and re-interpret technologies is restricted to those decided upon by the socially powerful. In this formulation affordances are a consequence of power structures rather than agency. This is an approach to affordances that suggests that agency has relatively little consequence for affordances, or that the constraints and possibilities of technologies are narrow or limited in scope and possible interpretation.

However, to dismiss technological hegemony as merely technological determinism cloaked as an exercise in socio-political critique would be somewhat underestimating it as a concept. For to say that technologies are materially formed within wider systems of power is not as rigid as it may appear. This is for two reasons, first, as I have already discussed, digitalised power is complex, imbricated and fragmented (see chapter 2), it is not about domination of one over another. Therefore, the notion that technological hegemony is a simple one-way flow of power is perhaps a misrepresentation. Rather it is to say that various power strcutres pull upon affordances. And, second, technological hegemony does not mean that technologies can only be 'read' and appropriated in a particular way. Technological hegemony is simply a powerful and dominant *preferred reading.*

Technological hegemony provides suggests that a degree of control on the part of designers, manufactures, and marketing departments, in terms of defining what technologies are for, and therefore what they afford. For Kirkpatrick 'technological hegemony is secured by controlling the dominant perception of what technology can do and of the limits it imposes; it is successful management of the ambivalence of technology.' (Kirkpatrick, 2004: 9) Technologies are defined and projected before they enter the spaces of our everyday lives, their ambiguities are framed as uses in the marketing rhetoric, users guides, etc, that surround their approriation. They are described in magazines, catalogues, websites, emails, adverts, guide books, instruction manuals, etc. They exist before they reach us, 'we always approach technology from within a society that pre-shapes our encounter with it, determining how it will appear to us and what we will try to do with it.' (Kirkpatrick, 2004: 9).

However, the problem with the term technological hegemony is its discursive baggage, it generates a notion of pre-digital power structures, of two great hostile camps, of the provider and the consumer as distinct[20]. To avoid this, but to still allow for a conceptualisation of power in the formulation of technological affordances, we can perhaps re-label this *technological preferencing* – an approach that considers the implications of the projection of technologies. It is perhaps worth reiterating that affordance is not a measure of the potential of technologies but of the *perceived* potential of technologies.

A second possible answer to the question of how affordances become locked-into technologies can be found in Heidegger's work. He suggests that not only are we locked-into the things that technologies afford, but that we are also locked-into technologies themselves. In Heidegger's vision 'everywhere we remain unfree and chained to technology, whether we passionately affirm it or deny it.' (Heidegger,

[20] This is perhaps what Kirkpatrick is suggesting in the following passage: 'The social influence on design is not, then, a set of substantive ideologically driven requirements of the capitalist class. Rather, it is mediated through the perceived need, under capitalist conditions, for those in power (controlling organisations etc.) to select strategies that maximise their operational autonomy...the resulting web of strategies is embedded in capitalist rule.' (Kirkpatrick, 2004: 11)

2004: 311). He contends that technology is not something that occurs outside of social factors. For 'we are delivered over to it in the worst possible way when we regard it as something neutral; for this conception of it, to which today we particularly like to pay homage, makes us utterly blind to the essence of technology.' (Heidegger, 2004: 311-312). If we assume neutrality, if we assume that the affordances of technology are neutral, in other words are a consequence of the technology as a paradoxically autonomous and neutral device, or that this device is situated outside of or beyond the social waiting to be 'read', then we cannot access its essence. Here again affordances are presented as social consequences both in the material form of the technology (as an embodiment of the social) and in the ways that technologies are (re)presented to us. This is to say then that as we are enframed by technologies, so we our practices are enframed by technological affordances. To be enframed is to be locked-in. We can see then that these affordances are a part of the enframing described by Heidegger, within which technological processes swamp all practices and processes, in which these processes become technologised thus locking-in affordances as standardised versions of these practices operating within enframed limits rather than on creatively unconstrained pathways.

Affordance it would seem, whether we consider it to be highly restrictive, in the sense of Heidegger's (2004) *enframing*, or a loose set of flexibly-constructed boundaries, in in relation to Kirkpatrick's (2003) critical technologies, are a socio-technological phenomena rather than a technical restriction upon practice. The social then is behind the locking-in of affordance in both a material sense and in a conceptual sense. Affordances are locked-in to the form of the technology, the shape, the design, the appearance, the aesthetic, which is the consequence and materialisation of social phenomena both in terms of material artefacts and the discourse or rhetoric that surrounds them. Affordances are locked-into technologies through their representation in the images and rhetoric that surround their appropriation as well as through the functionalities they present in their material structures or surfaces. This however does not take appropriation out of the hands of the individual agent, it is not suggesting that the social determines everyday life, or that the social determines appropriation, in the same way as it is not to suggest that technologies determine appropriation, it is merely to suggest that the social influences the appropriation of digital technologies in everyday practices (as well as increasingly being constituted by these technologised and networked practices).

The study of affordances requires a focus upon the moments in which humans and technologies, or particular environments made up of surfaces and objects, intersect[21]. It is in these moments that affordances are created and realised in the interpretation and appropriation of technologies in everyday life. Capturing affordances then requires a focus upon interfaces, interfacing, and intersections, and, more specifically, the problem of how we may capture the complexity of the relations that they constitute[22]. The conceptualisation of interfaces, as affording surfaces, and interfacing, as the human-digital intersection as both material and informational, relates directly to the second area for development, the relations between information and materiality.

5. Materiality and information

Donna Haraway claimed in her *Cyborg Manifesto* (1991), that there is a permeability emerging between the physical and the virtual as a result of the rise of digital technologies. Indeed, it seems logical to consider materiality as both physical and virtual, that is to say that materiality is not the opposite of virtuality, particularly if we consider virtuality to be 'the cultural perception that material objects are interpenetrated by information patterns.' (Hayles, 1999a: 13-14). Rather virtual

[21] Having outlined this theory of affordances it is worth acknowledging that a range of criticisms exist of this as a position. These are most clearly outlined by Brian Rappert (2003) in his reply to Hutchby's (2002) article on affordances. The most significant of these is formed in response to Hutchby's claims of the newness or the third-way of affordance theory, which, Rappert claims, when contrasted with leading STS theory becomes less significant. Indeed, Rappert's clarifications reveal that Hutchby's readings of Grint and Woolgar's writings fail to acknowledge their own concerns with the material properties of technologies. However, these debates are more skilfully and knowledgably conducted in STS, it is not possible to explore these here, yet it is worth acknowledging that this thesis is not a definitive statement of what technologies are or how they should be conceptualised, rather it relies, upon a theory of affordances, or affordance as a concept, to provide a theoretical backdrop that enables a development of Kittler's approach. A more detailed examination of the digitalsiation of music culture as an STS project, thus extending the works of Pinch and Trocco (2002) and Taylor (2001), suggests itself as one possible future direction.

[22] There are now further questions resulting from this brief discussion that may require further attention in future studies in this area. A list of these questions is not limited to but would include: How are affordances realised? Are affordances also a product of the 'users' technological knowledge, memory, or history of practices? How are affordances of fixed technologies variable between appropriators? How fluid are affordances? How can affordances be isolated and reconstituted for particular technologies? What are the limits of affordance? Who or what determines affordance? What are the force fields within which affordance operates (e.g. rationality, materiality, representation)? How do systems of power, domination, and oppression affect affordance? Can a study of class, power, of the digital divide, use affordance as a central concept?

objects, spaces, and interactions have material properties. Take for instance the MP3 file as an example of a virtual cultural artefact. This has a presence on the hard drive, it takes up space, and then when reproduced through an MP3 player or on a computer, the music has material properties, rhythm, the vibrating sound waves, etc. The point here is that in order to study digitalisation as an enmeshing of the physical and virtual it is necessary to operate a more open understanding of materiality (as well as objects and artefacts).

The issue here is that if information materialism is taken as a framework for study then it is necessary to have a clear understanding of the relations between the two words that describe it: information and materiality. It is possible to obtain a clarification on this point by turning to the work of the post-human social theorist Katherine N. Hayles.

Hayles work covers a wide variety of issues concerning the posthuman[23] (Hayles, 1999a, 1999b, 2005a & 2005b), however, here I will focus only upon the way in which she theorises the relations between information and materiality. The problem, on this issue, according to Hayles (1999a), is that in contemporary understandings materiality and information have become detached, or that 'information lost its body' (Hayles, 1999a: 2) in the movement toward digitalisation and virtualisation. The rise of the virtual led to understandings of information that removed or merely ignored its material properties. This separation or 'seperatability' of materiality from information, is according to Smith and Jencks, 'increasingly untenable' (Smith & Jenks (2005: 158). They argue instead that 'material and information are mutual attractors. Beyond a certain level of complexity, neither is conceivable without the other.' (Smith & Jenks, 2005: 158).

Likewise, the central premise of Hayles work is that we as digitalised or posthuman subjects are 'an amalgam, a collection of heterogeneous components, a material-informational entity whose boundaries undergo continuous construction and reconstruction.' (Hayles, 1999a: 3). As this position intimates, through the connection

[23] Hayles offers the following definition of the posthuman: 'In the Posthuman, there are no essential differences or absolute demarcations between bodily existence and computer simulation, cybernetic mechanism and biological organism, robot teleology and human goals.' (Hayles, 1999a: 2-3).

of material-informational, it is the 'materiality/information separation' that she wishes to 'contest.' (Hayles, 1999a: 12). Her argument is that for 'information to exist, it must always be instantiated in a medium' (Hayles, 1999a: 13). Information does not then exist apart from materiality, information is always-already material, it has material properties. The problem here is what she defines as the emergence of an information/matter duality, in which information, as a virtualised phenomenon is separated from materiality. As Hayles explains:

> 'The point is not only that abstracting information from a material base is an imaginary act but also, and more fundamentally, that conceiving of information as a thing separate from the medium instantiating it is a prior imaginary act that constructs a holistic phenomenon as an information/matter duality.'
> (Hayles, 1999a: 13)

In attempting to reconnect information with materiality, or with its material instantiation in the medium, Hayles is 'reaching out toward a complexity too unruly to fit into disembodied ones and zeros.' (Hayles, 1999a: 13). This is an image of digitalisation as complex and problematic, rather than compatible, consistent, and predictable. Where chaos and unpredictability paradoxically arises from the application of determinate and ordered binary codes.

The problem with disconnecting information from material instantiation, is, according to Hayles, that we overlook particular aspects of these digital processes. Hayles contends that:

> 'We lose the opportunity to understand the implications of these shifts if we mistake the dominance of pattern/randomness for the disappearance of the material world. In fact it is precisely because material interfaces have changed that pattern randomness can be perceived as dominant over presence and absence.'
> (Hayles, 1999a: 28)

In other words, a study of digital processes (as digitalisation) should not be focussed upon the detachment of information from materiality or the feigned disappearance of the material world. The problem, according to Hayles, with focusing upon the virtuality digitalisation as a detachment of materiality from information is that the material aspects may be overlooked and that the ways in which material interfaces, the devices with which we engage, MP3 players, software packages, file-sharing internet sites, etc, are engaged with in the routines of everyday life. It is how these information-material interfaces are present in the everyday that reveals particular outcomes, consequences, implications of ICTs. It is interfacing, as the site of material instantiation of information that is of particular importance, for it is here that the body and everyday spaces come into contact with information, or where information impinges upon these things. Rather than information being detached then from materiality, Hayles is arguing that 'information in fact derives its efficacy from the material infrastructures it appears to obscure.' (Hayles, 1999a: 28). Indeed, for Hayles it is the 'erasure' of the material world that 'should be the *subject* of inquiry, not a presupposition that inquiry takes for granted.' (Hayles, 1999a: 28)

This then draws the analysis toward the everyday, the moments in which interfaces are activated, the specifics of these 'boundary conditions' (Haraway, 1991) as sites of conflict, power play, chaos, and complexity. For Hayles, 'information, like humanity, cannot exist apart from the embodiment that brings it into being as a material entity in the world; and embodiment is always instantiated, local, and specific.' (Hayles, 1999a: 49). It is this embodiment, the localised material instantiation of information that is of central importance. Or as Lash claims:

> 'It only becomes information when meaning is attached to it. Information only happens at the interface of the sense-maker and his/her environment. Or at the interface of the environment on the one hand, and the interface of sense-maker and his/her attached information and communication machines on the other. If there is no meaning, then there is no information.'
> (Lash, 2002: 18)

Information is realised through interfacing, where meaning becomes attached, information is defined as such through the interface at the moment of localised material instantiation where the 'environment' intersects with 'sense-makers' and ICTs.

In Hayles' terms this may be understood as the study of informatics. As she explains in the following passage:

> 'Changes in bodies as they are represented within literary texts have deep connections with changes in textual bodies as they are encoded within information media, and both types of changes stand in complex relation to changes in the construction of human bodies as they interface with information technologies. The term I use to designate this network of relations is *informatics.*'
> (Hayles, 1999a: 29)

This study of informatics requires us to look at these moments of interfacing and instantiation in connection with, or as contextualised by, wider understandings and projections of information, interfaces, and embodiment. As Hayles, 'following Donna Haraway', suggests, this is to 'take informatics to mean the technologies of information as well as the biological, social, linguistic, and cultural changes that initiate, accompany, and complicate their development.' (Hayles, 1999a: 29). This is not a complete departure from Kittler's focus upon the capacities of particular technologies, similarities to which can also be found in Hayles suggestion that 'one way to think about these materialities is through functionality.' (Hayles, 1999a: 47) and that 'new media transform the environment' (Hayles, 1999a: 48). The difference here is that Hayles' clarification of the relations between information and materiality, thus defining more rigidly the focus of studies of informatics, appends two extra dimensions to the information materialist project. First, it requires the presupposition that the 'computer molds the human even as the human builds the computer.' (Hayles, 1999a: 47). Technologies, push and are pushed, enable and constrain, have affordances inscribed upon them. And, second, that describing interfaces, even within a rich genealogical context, has the effect of detaching information from its material instantiation. Rather we need also to study interfaces in action, to get at the localised material instantiation of information to focus upon 'the orders that inform interfaces – such as specific ecologies, cultures, languages, economies technologies' (Smith &

Jenks, 2005: 158). The question that the following section considers is how to proceed with this analysis, and how to proceed with descriptions of these interfaces and interfacing as localised instantiations of information.

6. Capturing affordances and the localised material instantiation of information: toward thick descriptions of everyday technosytems

If we base our approach to digitalisation upon the a theory of affordances and the localised moments of the materiality of information, then it is necessary to get at these affordances and localities. I will now focus upon techniques, strategies or approaches that may be useful in capturing technological affordance and the localised material instantiation of information. These then become a way forward, or model, used to inform Part II. These strategies aim to move from abstractions toward a more solid analytical or methodological framework. In doing so this aims to create possibilities for localised research that focuses in upon the specific aspects of the digitalisation of music and music culture embodied in particular spaces, agents, disourses and practices. The affordances and material instantiation of information then acts as an analytical focal point for the study of digitalisation – a focal point that, as Gibson defined, 'points…to the environment and to the observer.' (Gibson, 1979: 141). These then address the three central absences identified in Kittler's work, extending his information materialist project whilst preserving his central focus upon the material details of media and the genealogical conditions that led to its possibilites.

It would seem that, as Poster (1996) argued, it is the 'interface' and 'interfacing' that is of importance here, for these are the 'boundary conditions' (Haraway, 1991) where humans engage with information and where digitalisation is realised. It is possible that photographs, for example, may be used to take "snapshots" of these interfaces in action and (some of the) the material aspects of the technologies (Graham, 2003; Chaplin, 2005). These may then be fleshed out with interviews and other references to projections of use found in the discourse, or perhaps more accurately, rhetoric, that surrounds these technologies. What is important is that a study of information materialism in some way attempts to reconstitute the localised material instantiation of information, when meanings are attached at the interface, to use Lash's terminology, between the sense-maker, the environment, and ICTs.

6.1 Information materialism?

The overriding question that remains from Kittler's work is how do we get at the material details of technologies? How do we describe media? How do we create a rich and textured form of information materialism? Empirical case studies that adopt this approach may operate around the concept of affordances. Affordances, or functionalities-in-practice, opportune a focal point from which descriptions may be formulated. From here we can construct case studies based upon material and concrete details of the histories of technologies, the technologies themselves, and the technologies as projected and appropriated. Affordance can only be accessed in the everyday life of users and in the rhetoric and images, as projected affordances, that define appropriation.

Gane and Hansen-Magnusson argue in response to Kittler's work, 'what is needed is a tighter crossover between media history and media theory so that the history informs, or at least enhances, the opening theoretical assumptions.' (Gane & Hansen-Magnusson, forthcoming: 10). It is this crossover that I am attempting to achieve in Part II of this thesis. The history in chapter 5 and the empirical case studies, in chapters 6, 7 and 8, are an attempt to crossover between history and contemporary theoretical applications to reveal defining features of the digitalisation of music across this history and theoretically informed case studies. In other words, the defining themes outlined are intended not just as defining features of the contemporary state of digitalisation, but of digitalisation as historically connected, emergent, and ongoing set of related processes.

In line with my own criticisms of Kittler's approach, Gane & Hansen-Magnusson argue that what 'is missing is sustained analysis of the interpenetration of technologies and bodies and of the interfaces between them (a question that is raised...but not pursued in any theoretical detail).' (Gane & Hansen-Magnusson, forthcoming: 11). In this attempt to enrich Kittler's information materialist project it is this issue of interfacing that is of central importance. It is the interface at which bodies and technologies are interwoven, where we can move from information materialism as the description of the material properties of media to information materialism as the description of interfacing[24]. The question remains: how may we describe these interfaces and the ways in which they afford our situation?

6.2 Thick description by de-familiarising the technosystem

The interface may be thought of as the 'membrane' (Poster 1996), through which humans and technologies intersect. For Don Idhe this 'human-technology juncture displays a puzzling ambiguity.' (Idhe, 1990: 68). The question then is how to get at these relations and to unearth these ambiguities, what strategies may be used to describe these interfaces. Idhe suggests that the 'task of a phenomenology of human-technology relations is to discover the various structural features of those ambiguous relations.' (Idhe, 1990: 72). The concern here, as shared with Kittler's work, is: how do we illuminate the details of these technologies (and human-technology relations)? How do we get at these ambiguities? How do we proceed with these descriptions?

It is possible to begin here with digitalisation as embedded, situated, or framed, within everyday life (Beer, 2005b). Indeed Idhe has argued that 'What remains for...a phenomenology of human-technology relations, is to reinsert the role of technologies in all the dimensions of the lifeworld.' (Idhe, 1990: 41). For Idhe, no aspect of the lifeworld is outside of technologies or free from technologies, contemporary everyday life is technologically textured' (Idhe, 1990), and the purpose of a phenomenology of technologies is both to use this as a point of departure and to realise or articulate the infinitude of human-technology relations. Idhe's phenomenology of technologies is useful in extending the information materialist project in that it advocates the imagining of a point of comparison, a *conceptual non-technological space* which may be used as an *Other* to inform description. This Other space, free from media, ICTs, interfaces, etc, is of course, imaginary; it is merely conceptual, an illusion, a mirage, a phantasmagoria. It is the paradoxical claim that we are always-already engaged in human-technology relations whilst imagining a non-technological space of human existence, and associated tension, that is central to the construction of Idhe's

[24] It is possible that Haraway's image of the cyborg may be used here as a sensitising concept that to some degree captures, or represents, the complex interweaving of multidimensional interfaces, intersections, and interdependencies of human-technology relations in the digital or information age. In short, the image of the cyborg provides an angle for the socially and culturally embedded analysis of the 'interpenetration of technologies and bodies' (Gane & Hansen-Magnusson, forthcoming: 11).

phenomenology of technologies. The question is how may this be utilised in the construction of information materialist descriptions?

According to Idhe:

> 'simply because of its familiarity, we may overlook both the need for and the results to be obtained by a critical reflection upon our lives within this technologically textured ecosystem – perhaps better termed a *technosystem.* Indeed, the very familiarity might allow us to be taken aback were anyone to characterize this life as in any way peculiar.'
> (Idhe, 1990: 3)

The familiar, the technology embedded in everyday mundane routines, is invisible or concealed as a result of its normalisation (Galloway, 2004); therefore we need a way of making the familiar unfamiliar, without making it so unfamiliar that its understandings or interpretations become lost. On this point Idhe recommends that we seek the 'right amount of distance' so that 'the uniqueness and even peculiarity of our technological culture could be seen.' (Idhe, 1990: 9).

A phenomenology of technologies requires us to make the familiar a little peculiar so that we can see its form and peculiarities, the visions from which can then be used to thickly describe its material and relative properties or aspects. This then requires a balancing act between attachment and detachment, for 'that which is too close (the tip of your nose) and that which is too far (beyond the horizon) are simply not clearly discernible.' (Idhe, 1990: 9). To render the details of our technosystems 'clearly discernable' it is necessary to make them unfamiliar whilst not so unfamiliar that we cannot understand them. Idhe argues that 'serious reflection can only begin by gaining precisely enough distance from our mundane involvements that some sense of their uniqueness – even peculiarity – can be grasped.' (Idhe, 1990: 3). The mundanity and embeddedness of technologies in everyday life renders them invisible, or at least only partially visible, with the result of making their description as phenomena problematic or restricted. The task of Idhe's phenomenology of technologies, from which an information materialist approach may borrow, is the illumination from mundanity of elements of the technosytem. Or, as Lash suggests in his description of a technological phenomenology for the information age, phenomenological knowledge is 'an opening up and laying out of phenomena' (Lash, 2002: 165) for phenomenology is 'concerned with the 'what' and the 'how'.' (Lash, 2002: 167). The limitation of Kittler's approach is its insistence upon the 'what' at the almost complete expense of the 'how'.

In considering this process of defamiliarisation Idhe poses the question: 'Could humans live without technologies?' (Idhe, 1990: 11). He responds,

> 'Clearly, in any empirical or historical sense, they in fact do not. There are no known peoples, now or in historic or even prehistoric times, who have not possessed technologies in some minimal sense, yet we might still want to say that they could live so as an imaginative limit-possibility. An imaginative leap can be made to portray just such a form of life, a leap that will serve a recurring heuristic purpose.'
> (Idhe, 1990: 11)

The heuristic purpose of defamiliarisation is the construction of an imaginary point of comparison, a way of imagining the familiar as unfamiliar so as to allow it to be seen and described. This imagined-other allows us to fantasize about the everyday as peculiar so as to allow us to see its details, to illuminate the material details that are hidden within the habitual and the mundane. This may still be considered abstract and non-pragmatic, yet it provides a possible strategy for description, an analytical framework for extending this project, a way of addressing the ambiguity of description. Previously Kittler spoke of description as a means, this is to speak instead of defamiliarisation as the means and description as the end.

One possible direction for proceeding with information materialism, and its focus upon the material details of media, is to borrow Idhe's (1990) 'defamiliarisation of the technosystem' to inform 'thick descriptions' (Geertz, 1971 & 1973) of digitalisation and its implications. The term 'thick description' is essentially an anthropological term used for capturing the details of ethnographic observation – as exemplified in Geertz well known rich analysis of a Balinese Cockfight – yet it provides a useful concept for extending Kittler's project, in that it provides particular analytical objectives that may be used for describing ICTs and interfacing. It also provides opportunities for 'moving from local truths to general visions' (Geertz, 1973: 21), to move out from purely microscopic detail toward sociological implication or consequence. Indeed, Geertz claims that his 'aim is to draw large conclusions from small, but very textured facts' (Geertz, 1973: 28).

This then is *not* an attempt to re-articulate Kittler's information materialism as an anthropological or ethnographic project[25], although it is to introduce aspects of people's methods into the analysis. Rather it is to appropriate this terminology and to pragmatise Kittler's abstractions, or to reframe them in terms of a more methodological approach toward the study of digitalisation. If the information materialist project is understood as an attempt to capture affordances in action and localised material instantiations of information, then thickly describing these instantiations provides a focal point for such a project. That is simply to thickly describe particular technosystems as microcosms of social, cultural, and historical context.

What then is thick description? Geertz claims that:

> 'From one point of view, that of the textbook, doing ethnography is establishing rapport, selecting informants, transcribing texts, taking genealogies, mapping fields, keeping a diary, and so on. But it is not these things, techniques and received procedures, that define the enterprise. What defines it is the kind of intellectual effort it is: an elaborate venture in, to borrow a notion from Glibert Ryle, "thick description".'
> (Geertz, 1973: 6)

The product of these thick descriptions or 'what we call our data are really our own constructions of other people's constructions of what they and their compatriots are up to' (Geertz, 1973: 9). For Geertz the focal point of these thick descriptions, these attempts to reveal the embedded details of these observed peoples, is the illumination of culture. However, he argues that culture as 'internetworked systems of construable signs...is not a power, something to which social events, behaviours, institutions, or

[25] In the same way that I was not previously recasting information materialism as a truly phenomenological project in borrowing strategies from Idhe's work.

processes can be causally attributed; it is a context, something within which they can be intelligibly – that is thickly described.' (Geertz, 1973: 14). Thick descriptions may then be thought of as contextually embedded detailed descriptions of the 'microscopic' (Geertz, 1973: 21) aspects of particular phenomena, in this case the digitalisation of music and music culture. That is at least the ideal type of thick description.

Here I am suggesting that *borrowing*[26] from Idhe's phenomenological project and Geertz ethnographic project, we may attempt, on an abstract level, to *defamiliarise particular technosytems* so as to *thickly describe* the practices, discourses/rhetoric, and material artefacts that constitute them, and therefore, constitute digitalisation as a technical and cultural set of related processes, transformations, and phenomena. This, in certain respects, may also be thought of as resonating with the concerns and focus upon the minutia and ephemera of everyday time and space of Benjamin's well known topographical writings (Benjamin, 1978 & 2002; Jacobs, 1999) and Lefebvre's rhythmanalysis (1996).

6.3 Localising the study of materiality and information

It would seem that the focus upon the embeddedness of digital technologies (Sassen, 2005), in terms of the focus upon the material details of technologies, affordances, and the localised material instantiation, requires the kind of microscopic analysis described above. That is to construct thick descriptions of specified technosystems. These technosystems are necessarily localised sites of interfacing, We need then, of course, to get at these interfaces. This requires, physical and virtual (see Hine, 2000), localised case studies, which capture the particularities or peculiarities of these details to enable thick descriptions to be constructed. Therefore it is necessary to study technological practices as localised phenomena, to get the details of the localised material instantiation of information. For this reason the case studies in Part II, following the historical context constructed in chapter 5, focus upon specific localised appropriations of digital technologies or digitalisation-in-action in broader social and cultural contexts. Chapter 6 focuses upon the recording studio, chapter 7 upon the

[26] As opposed to reframing, redefining, or recasting information materialism under the heading of either of these projects.

mobile interface of the MP3 player, and chapter 8 upon the largely concealed interface between individual agents and music downloading via the internet. These localities are not fixed, and are not always concrete; rather these are mobile, unstable, and difficult to access. The case studies instead are designed to react to this mobility and lack of fixity, each combines a range of research strategies aimed to illuminate particular aspects of digitalisation. These triangulated methods, built centrally around interviews, textual analysis, and photographs aim to capture these localised appropriations as 'embedded' in a broader context (Sassen, 2005). The point here is to triangulate these methods to incorporate aspects of the constituent elements of digitalisation (practice, discourse/rhetoric, and material artefacts) thus creating an image of digitalisation as a complex interplay of these constituent elements. This also attempts to understand how these elements interact to constitute digitalisation. I will now briefly outline each of these localised and embedded case studies.

Chapter 6 focuses upon the recording studio as a digitalised music production technosystem. It draws upon detailed semi-structured interviews with three music technicians, photographic records from two visits to a recording studio, and the boxed packaging from a piece of recording studio software.

Chapter 7 focuses upon MP3 and the MP3 player as a mobile music reproduction interface. This study draws upon twelve structured interviews with MP3 users, photographic records of people with their mobile music reproduction devices, various adverts for MP3 players, as well as a range of newspaper and magazine articles.

Chapter 8 is less rooted in physical locality as it investigates internet based musical appropriation and the music downloading or music file-sharing phenomenon. This chapter is informed by the interviews conducted with MP3 users, the British Phonographic Industry's (BPI) report on music file-sharing, and a range of newspaper and magazine articles.

The aim of these case studies is to get at or illuminate the details of particular technosystems and interfaces and to reveal some the details and implications of digitalisation. This type of focus upon the specificities of particular localised technosytems is necessary if, as Gibson argued, the 'total environment is too vast for description…and we should select those that are perceptible' (Gibson, 1979: 36). This then aims to understand general features of digitalisation by focusing upon the specificities of digitalisation embodied in particular affordances and material instantiations of information. This is to triangulate, to compare and contrast the images of digitalisation constructed in these various sources, in order to understand the ways in which digitalisation is constituted by, and constitutes, everyday practices, discourse/rhetoric, and material artefacts in wider social, cultural and historical contexts.

7. Conclusion: schematising information materialism

The variant of Kittler's information materialism described here is based upon historically embedded thick descriptions of the material instantiation of information – as interplays of practices, discourse/rhetoric, material artefacts – in the context of everyday life[27]. The aim of this is to capture and reconstitute the details, the affordances and implications, of digitalisation in these everyday practices, discourses, and material artefacts, or what might be called everyday technosytems. It is here in these everyday technosystems that the implications of digitalisation play out, and conversely, in which digitalisation is constructed. It is through these that digitalisation, therefore, may be described.

Digitalisation brings with it a range of affordances around which agents operate, contest, resist, and activate interfaces in a social context of proliferating projected images of practices. The objective then is to capture affordances as constructed and realised in the everyday appropriation of technologies and to reconstitute the localised material instantiation of information, so as to unravel or work-out-toward sociological questions about the implications, consequences or outcomes of digitalisation as a social and cultural phenomena.

[27] To clarify, the appropriation of music technologies into everyday practice is implicated by rhetoric and the material properties of these digital artefacts. However, these rhetorical and material properties are open to interpretation, challenge, and indifferences, their implications for practice is, therefore, complex and chaotic. For this reason this thesis takes this complex interplay between practice, rhetoric (as a particular type of discourse) and material artefacts as its central focal point of analysis. This is digitalisation as affordance, as formed in the tension between structure and agency.

To summarise, listed below are what might be thought of as five defining characteristics of this reformulated version of an information materialist approach to the study of the digitalisation of music and music culture:

i. Digitalisation is a consequence of a vast and complex set of interrelated lines of genesis or conditions of possibility (see chapter 5). Therefore, it is necessary to embed these studies within a historical context.

ii. Technologies, and digitalisation, are a product of a complex interplay between practices, discourse, and material artefacts. Therefore, rather than focusing solely upon the material properties of ICTs, as Kittler recommends, this instead attempts to relate these material properties to practice and discourse/rhetoric. To understand digitalisation it is important to get at the material details of technologies but that these must be considered in relation to practice and discourse/rhetoric.

iii. That information cannot be separated from its localised moments of material instantiation. And, therefore, the objective is to capture, through thick description, photography, and interviews, these localised moments. Simply, we need to get into these locality's to capture particular 'boundary conditions' (Haraway, 1991) as 'interfaces' (Poster, 1996; Hayles, 1999a; Lash, 2002). It is in these moments of instantiation in which the affordances of digitalisation are realised at the intersection between practice, discourse/rhetoric, and material artefacts. Indeed, we may think of affordances as the material instantiation of information. In short, this approach aims to capture digitalisation as appropriation-in-action.

iv. This approach is based upon the premise that *media afford our situation*, and that these media, or interfaces, therefore require description. As such the objective of this approach is to describe affordances, what it is that digitalisation enables and what it constrains, as these relate to wider power structures and localised appropriations.

This requires a combined attempt to relate descriptions of individual use with wider social and cultural issues relating to ICTs.

v. Information materialism represents an attempt to contextualise ICTs, that is to study digitalisation and digital technologies in relation to their historical as well as social and cultural contexts. This requires the triangulation of analysis of a variety of sources, as Kittler (1999) demonstrates, including newspaper and magazine articles, advertising, internet sites, blogs, instruction manuals, packaging, user and buyer guides, industry reports etc[28]. The rhetorical projections of these technologies may then be cross-referenced with everyday practices in the interfaces between humans and material artefacts. Or as Hayles puts it, this is to 'triangulate between incorporation, inscription, and technological materiality to arrive at a fuller description' (Hayles, 1999a: 207).

This schema will now be applied to the study of the digitalisation of music and music culture in Part II.

[28] This direction is influenced by Benjamin's collections of ephemera contained in *The Arcades Project* (2002).

Part II: Aspects of the digitalisation of music and music culture: a history and exemplary case studies

Abstract

Part II, which is informed by the theoretical discussions in Part I, is concerned with the examination of particular aspects of the digitalisation of music and music culture. It begins, in chapter 5, with the historical context for these studies through the construction of a history of the digitalisation of music and music culture. This history draws on a range of technical and historical texts to develop a series of lines of genesis that reveal the technological and cultural transformations that afford or make possible the processes of digitalisation, drawing on the theoretical and structural model outlined in Part I, Chapters 6, 7, and 8 then examine particular aspects of the contemporary state of digitalisation. These chapters seek to explore the material details of particular technologies alongside the details of the rhetoric that surrounds these technologies and the ways in which they are appropriated into everyday routines. The 'case studies' draw upon a range of triangulated sources, including structured and semi-structured interviews, photographs, newspaper and magazine articles, advertising images, etc, to create montages of various aspects of digitalisation. Chapter 6 focuses upon the recording studio, chapter 7 examines the MP3 player, and chapter 8 interrogates the music downloading phenomenon. Each study attempts to draw on social and cultural theory to conceptualise these technological and cultural phenomenon. In line with the guiding aim of this thesis, to identify the defining features of digitalisation, the aim of Part II is to independently explore and conceptualise each of the outlined areas of investigation – regarding the production (chapter 6), reproduction (chapter 7) and appropriation (chapter 8) of music – with the purpose of illuminating defining features across these areas of inquiry (see Part III).

Chapter 5: Historical context: toward a history of the digitalisation of music and music culture

Chapter contents

Chapter abstract

Chapter 5, which draws on a range of historical texts, maps out the key technological innovations (and cultural movements) that can be understood to have facilitated or afforded the emergence of the digitalisation of music and music culture. The chapter is divided into three parts. The first introduces the approach toward the writing of history taken in this thesis by reflecting upon the problems encountered in its construction. The second part is concerned with the construction of a history of the digitalisation of music and music culture. In the final section I conclude by identifying key moments, innovations, and lines of genesis that in some way foreshadowed the digitalisation of music and music culture. The chapter is constructed around a central distinction between a first and second age of digitalisation.

1. Introduction

The history of the digitalisation of music is complex and extensive. By constructing snapshots of particular technological developments this chapter constructs a historical framework designed to inform the case studies that follow. The construction of this history is particularly salient if we understand digitalisation to be a transitory term, a term that indicates a mobile process or set of processes; a historical framework is required in order to give some sense of movement, development, and transformation. However, it is worth noting from the outset that this is not an attempt to create a linear history of the movement from an analogue age to a digital age. Rather it is a partial unravelling of a particular set of lines of genesis based upon functionality, possibilities, and interconnections.

The chapter is divided into three sections. The first section reflexively recounts the development of this chapter based upon the problems encountered in its construction. The second section focuses upon applying this approach and developing a history of the digitalisation of music and music culture. This section is constructed around specific technologies and lines of genesis that are followed as threads. As such this history is predominantly structured around particular technologies rather than eras or epochs. In the final section I conclude by outlining some key moments and innovations that have come to define the digitalisation of contemporary music and music culture. The intention of this chapter is to develop the exact technological and cultural conditions that have led to digitalisation so as to embed the contemporary case studies that follow within a more complete historical framework.

2. Histories?

As discussed in the previous chapter, this history was originally intended to draw upon the work of Kittler, allied with the writings of Sterne (2003) and Foucault (1991), to construct a genealogical approach toward the writing of histories of music technologies. Originally this chapter endorsed an ideal type genealogy based upon the weaving together of a range of sources to construct a detailed and non-linear history designed to capture the discontinuities and complexity of the history of digital music technologies. The problem here, in compiling this thesis, was one of clarity and the restrictions placed on time and scope. Collating the required materials to provide a rich enough account of the hidden histories of such a range of interrelated technologies proved to be too ambitious an objective for a project of this type. And, indeed, would have made a thesis in its own right. Identifying this problem facilitated a rethinking of the function of this chapter within the boundaries and objectives of this thesis. As such the chapter was transformed somewhat from its original forty-eight thousand word version, down to twenty-two thousand words, and then finally, on removing the necessity for what proved to be a counterproductive genealogical theory, was finally reduced into this "final" version. Despite these changes the two central objectives remained the same. First, the construction of an open ended history designed to contextualise the case studies that follow, and, second, the creation of a history that could be used or built upon in future research projects. In short, the specific requirements (and boundaries) of thesis writing as a specific type of document formation prevented the development of the type of history to which I intimated at in the previous chapter, and to which the ideal (and unrealisable) version of this thesis would have attended.

In place of a complex and discontinuous genealogical history I have instead, in the large part, dedicated this history to the dominant and most significant technologies across a range of eras. However, there are occasions where my original intentions remain apparent in this revamped and simplified history, these are embodied by the moments in which the discontinuous nature of the history remains most apparent. These remain here as they foreshadow some of the more important findings of this thesis (as described in chapter 9). I have attempted here to fit these genealogical moments within a structured, compact, and linear framework.

Finally, you will see that my concern with lines of genesis remains present in this history. When reconstructing this history into a more functional format, it remained clear that the objectives of the chapter required some sense of how particular technologies influenced, implicated, or led to the technologies that followed. Thinking in terms of lines of genesis allowed for this clarification to occur, and, for this reason, the notion of genesis remains present in this history.

The most significant omission form the early part of this history – which was also the part I found most difficult to delete and to which I had become most attached – was the discussion of the theory of the writing of genealogical histories based upon the writings of Kittler (1999), Sterne (2003), Wall (2003), and, most significantly, Foucault's (1991) reflections on Nietzsche. As the chapter no longer followed the schema constructed from the synthesis of these texts there was no longer a necessity to include the theoretical discussion that fore grounded their implementation. For this reason this theoretical introduction has been removed. This, I hope, will be preserved in my files and will resurface later when a construct a more complete, whilst also inevitably incomplete, genealogical history of digital music technologies. To summarise, in place of the preferred complexity and non-totality of genealogy – for which the vastness of the project became too great an obstacle – this thesis will instead rely upon a more conventional history.

3. A history of the digitalisation of music and music culture

> 'Many instruments have been invented in the course of history. Only a few are used today...Those instruments that communicate powerfully and facilely will survive; the rest will be forgotten.'
> (Mathews, 1985: x)

In light of the proliferation of digital music technologies and literature on digital music technologies the problem is how to construct parameters around a history of their development: where to start? Where to end? What to include? Indeed, digital music technology, like 'sound-reproduction technology is not necessarily a well-bounded historical object.' (Sterne, 2003: 19). We may begin this history by briefly drawing upon a technical definition of digitalisation to provide a purely technical categorisation from which to begin. Digitalisation, as a technical process, occurs at the moment when sound is converted 'into a series of zeros and ones to be reconstructed as sound at the moment of reproduction.' (Sterne, 2003: 218). With this definition in mind, in the following history I argue that there can be understood to be *two ages of the digitalisation of music*. This is not to say that these are discrete periods but rather that these are overlapping categories that are used here only as a model around which further understandings of, and distinctions between, technological transformations can be formulated.

The first age of the digitalisation of music can be understood to be the age of the physical digitalised musical instrument (the digital synthesizer, drum machine, etc) and the compact disk (CD). The 'second age' of the digitalisation can perhaps be understood to be represented by virtualised technologies such as the virtual music recording studio software package, digital compression, and the internet based music file-sharing phenomenon (see figure 5.1 below).

First age of digitalisation	**Second age of digitalisation**
Physical/real	Virtual
Hardware	Software
MIDI	MIDI
CD	MP3
Compatibility	Convergence
Cables/patches	Networks and plug-ins
Synthesizers/sequencers/samplers	Integrated packages

Figure 5.1: key aspects of the two ages of the digitalisation of music

This distinction between these two ages forms a structural backdrop for the following history.

In terms of sources the following history is constructed around collections of various technical and historical texts that deal directly with seminal, significant, and influential moments, events, and stages in the development of digital music technologies and the digitalisation of music. I will now proceed by exploring a number of these key moments, innovations, and events. The starting point for this historical context will not be the development and proliferation of digital technologies in the early 1980s. Rather I will begin my story about the digitalisation of music with the church organ in order to demonstrate the deeply engrained lines of genesis that mould and shape digital technological form, function, and interface.

3.1 The Barker lever: the electrification of primary production and the establishment of (the keyboard) interface

The question of the interface or controller is worth considering from the outset; of particular importance is the moment at which the interface or controller became detached from the sound production device.

To address this issue we first need to begin with the organ. Whitworth notes that:

> 'According to Dr Rimbault, it was towards the end of the eleventh century that the keyboard was invented. Quaint wood-cuts exist showing that the earliest organs had but few pipes, although several men were required to blow them. The early organ keys were sometimes several inches in width; in fact, Dom Bédos quotes instances of keys 5 ½ in. wide. These were struck down by the fist, sometimes to a considerable depth, from which arose the term *pulsator organorum* (organ beater).'
> (Whitworth, 1948: 6)

Since this point of origin the organ has come to be one of the prominent music technologies of recent history. Alternatively Edmund J. Bowles who, in his history of computer music, begins with the development of what he describes as 'Mechanically driven organs' which, he suggests, 'made their appearance around 1500, when an instrument with 150 pipes was referred to as one of the appurtenances of Schloss Hohensalzburg.' (Bowles, 1970: 5). This installation occurred as:

> 'The sumptuous parks of Renaissance princes, lay and ecclesiastic alike, encouraged the installation of hydraulically operated organs, along with all sorts of mechanical automata and water tricks. All these devices were activated by means of revolving drums programmed with appropriately placed cams.'
> (Bowles, 1970: 5-6)

This social and technical transition led to a vast number of fragmented developments.

In 1832 the first pneumatic organ lever was introduced. The Barker Lever, as it was known, was attributed to Charles Spackman Barker[1] (Whitworth, 1948: 9). The purpose of the lever was to reduce the pressure required on the key in order to play a note on the organ. Previous organs required a powerful impact upon the keys to pump air through the pipes. Returning to the imagery of the pulsator organorum, some of the organs prior to the pneumatic barker lever system were known to require the vigorous application of a fist in order to create sufficient air pressure through the pipes to facilitate audible sound. The Barker lever assisted in reducing the problems of air pressure, in that it meant that the air pressure required to activate the pipes was no longer generated by pressure placed on the key. However, this created a new set of problems for the organist. The pneumatic action was noisy and could clearly be heard over the sound of the organ. The same problem also occurred with the tubular-pneumatic lever that followed (Whitworth, 1948). Over the following years attempts were made to develop a quieter electric organ action and in 1864 Dr Albert Peschard developed an electro-pneumatic action. Peschard and Barker then worked on a collaborative electric controlled pneumatic lever that was completed in 1868 (Whitworth, 1948: 13). In terms of wider socio-technical transitions it is worth noting here that the development of these electro-pneumatic levers would not have been possible without William Sturgeon's 1826 invention of the electro magnet, which controlled the movement of the levers.

Figure 5.2: Charles Spackman Barker (www.nzorgan.com)

[1] Although there 'are two claimants for the credit of this invention, Mr David Hamilton of Edinburgh and Mr. Charles Spackman Barker of Bath (1806-1879). It is generally conceded to the later' (Whitworth, 1948: 9)

Peschard and Barker's electro-pneumatic lever operated in the space between the keyboard and the pipes, with an electric current from the keyboard activating the airflow through the corresponding pipe or pipes. This meant that these two elements could now be separated. Here lies a point of origin for the mobile and interchangeable interfaces that we see in contemporary digital music production technologies, where interfaces can be connected to control various sound production devices.

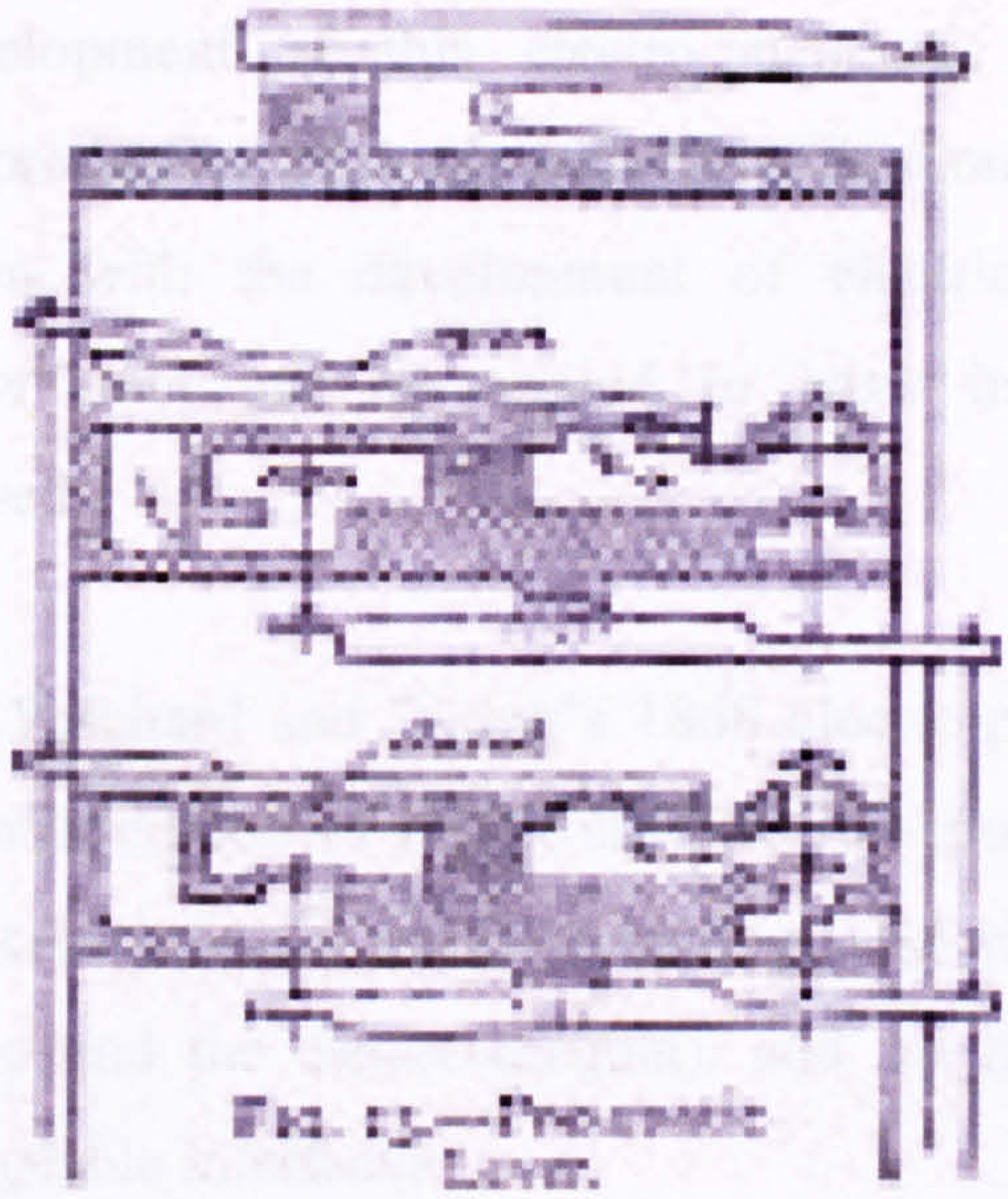

Figure 5.3: A diagram of the Barker Lever system (www.uh.edu)

The electric trigger that operated the pipes via Peschard and Barker's electro-pneumatic lever no longer had to originate from an integrated keyboard, indeed any device that created the correct electric signals could have been used to activate the leavers controlling sound production. Furthermore, the keyboard could now be moved around independently of the pipes. This mobility created many new opportunities for the creation of sound; it opened up new spaces, new areas, new buildings to the sound production device. As such, the keyboard (the interface) and the pipes (the sound production mechanism) were separated or detached, they were separate modules connected by electric wiring. The playing of the instrument no longer instigated an unmediated response in the sound production devices of these instruments. This separation then created the possibility for the development of the technologies that followed, echoes of this can be found in the digital interfacing between controllers and sound production devices that became possible with the advent of Musical Instrument Digital Interface (MIDI).

Mobility and variability of interface have both now become embedded in the design and function of music technologies. The development of the Barker lever and the electro-pneumatic Barker lever can be identified as a point of origin from which a number of lines of development proliferated outwards.

Furthermore, the development of this electro-pneumatic Barker lever directly associated the primary production of music with electrification. It is this association of musical instrumentation with the development of electric and electro-magnetic transectorial *innovation*[2] that can be argued to have instigated many of the technologies that followed.

It is possible then that Peschard and Barker's 1868 electro-pneumatic organ system carved the way for a proliferation of electr(on)ic instruments, the dominance of the keyboard interface, the connection of music technology and wider socio-technological transformations (electric and the electro-magnet), and the development of mobile, detached, and interchangeable interfaces.

3.2 The Theremin and electr(on)ic instruments: the creation of digital possibilities in the first half of the twentieth century

According to Ernst:

> 'The first electronic music studio was established in 1948 in Paris by Pierre Schaeffer, but it was preceded by a long line of discoveries and inventions dating back to the 14th century. One of the first of these was the CARILLON, which was first found in Belgium and the Netherlands. The carillon consisted of a series of pegs placed on a rotating drum, and as the

[2] These are innovations that are not specific to the field in which they are applied. So for example the electro-magnet was not developed for the intention of being used within an electro-pneumatic organ, therefore this is an example of a transectorial innovation. In this instance a technology that is perhaps a part of wider society that is adopted and utilised within music technology (see Théberge, 1997: 58-59).

drum turned the pegs struck some tuned bells. Since the bells were stationary, the position of the pegs determined which bells were struck.'

(Ernst, 1972: 6)

As this 'long line of discoveries' over some six hundred years would suggest, the history of electronic music instruments is diverse and complex. For this reason I will concentrate here on only a few key examples so as to give a foundation for the digital technologies that followed.

The early part of the twentieth century, which included the development of electric sound generation, can be understood to be a rich period of development in which a number of possibilities were forged that enabled, or perhaps shaped, the development of the digital music technologies that followed in the second half the century and into the new millennium.

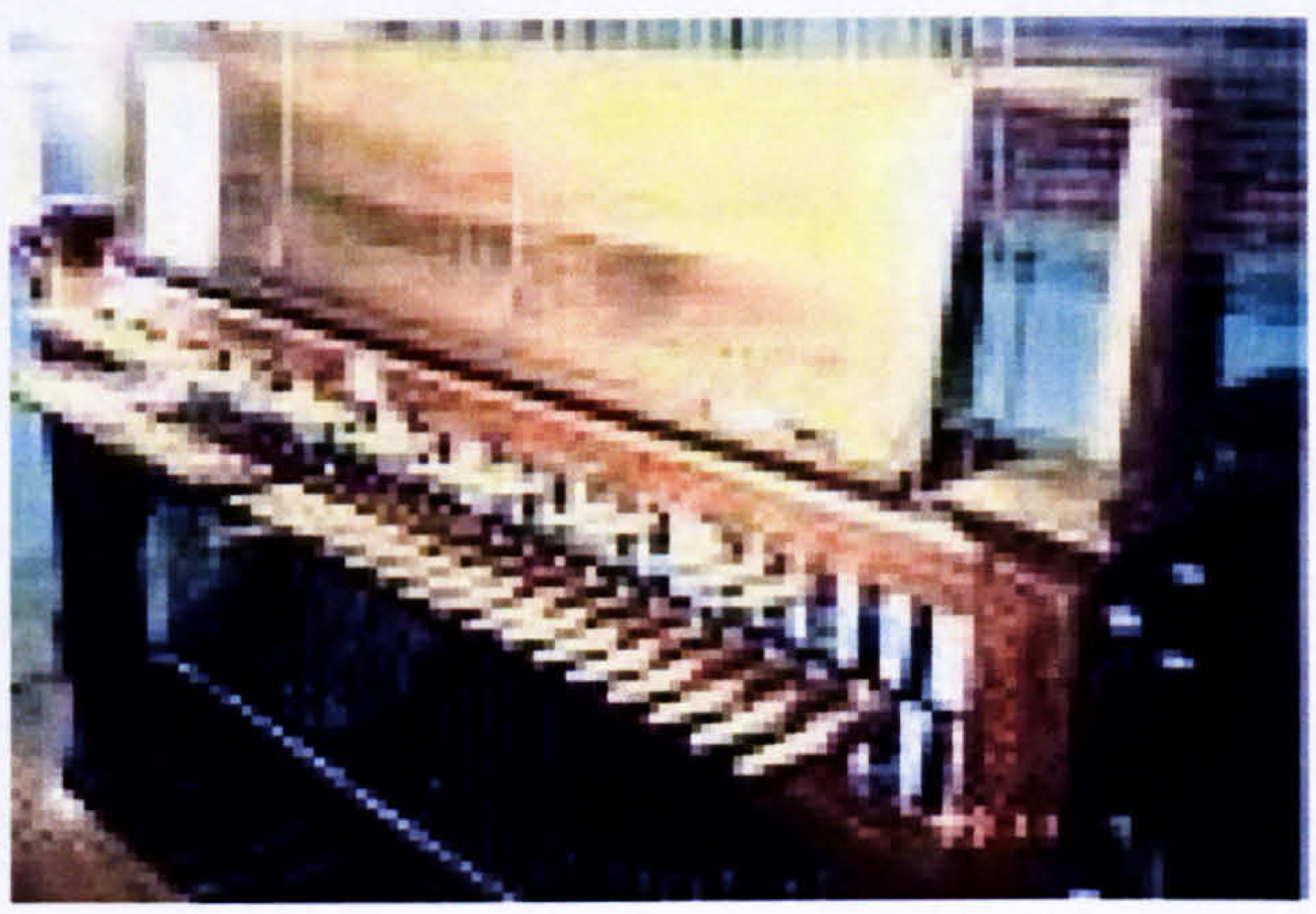

Figure 5.4: The Carillon (www.bmpc.org)

According to Kirk and Hunt (1999: 9) the first electronic music instrument came about as the result of an accidental discovery, when, in 1876, Elisha Gray at Bell's Telephone Systems noticed a circuit oscillating. He attached loudspeakers to amplify the vibration and a small keyboard to control the oscillations and in so doing developed the 'world's first electronic musical instrument.' (Kirk & Hunt, 1999: 9). As with a number of these early developments there are clear associations between music technologies and wider developments in communications technologies. For Kirk and Hunt, 'with the technological emphasis on the development of communication systems, it is no coincidence that the first large-scale electrical musical instrument was concerned with the transmission of music across the telephone network.' (Kirk & Hunt, 1999: 9).

However, prior to this the Pianola, one of the earliest and most well known mechanised and pre-programmable musical instruments, was developed and relatively widely distributed. It was this device that can be understood to not only foreshadow the development of a vast array of digital musical instruments, but also to further develop the notion of programmability which has become so dominant in the sequencing practices of the digital age.

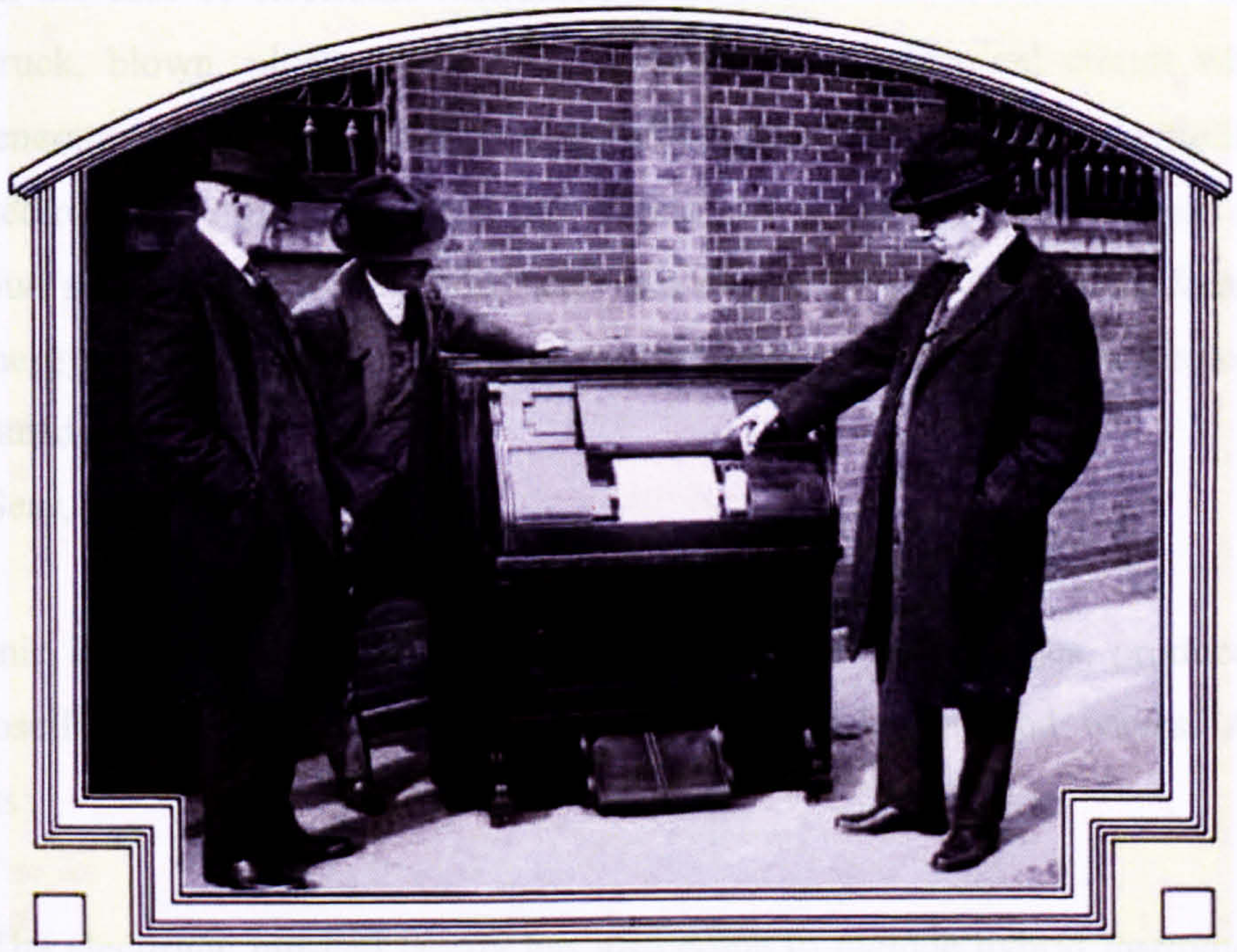

Figure 5.5: The Pianola (htttp://www.pianola.org/history.html)

Ernst describes the Pianola in the following terms:

> 'In 1897 Vortez developed the PIANOLA, which used a pre-punched roll of paper to activate a set of keys by use of air bellows. There were eighty-eight such keys (like a piano), and they were placed directly over a piano keyboard. The keys of the pianola struck the keys of the piano by the use of air pressure which was controlled by the paper roll.'
> (Ernst, 1972: 7)

The Pianola cannot feasibly be described as an electronic instrument yet it is often cited in terms of the lines of genesis leading to these instruments for it was mechanised and could effectively be programmed to generate sequences of sounds. The Pianola, however, was not a music production device, it did not use electricity to generate sound, but was rather a programmable controller operating the keys of a piano.

On this important distinction Sear provides the following definition:

> 'In the case of electronic instruments, the sound source, rather than being struck, blown, plucked or bowed, consists of an electrical circuit which generates an oscillating electrical current. This current, in turn, is amplified electronically, then converted into sound waves through the medium of a loud speaker. Since the loudspeaker is a device for converting one form of energy (electricity) into another (sound energy), we call this device a transducer.'
>
> (Sear, 1972: 1)

Electronic instruments, encompassing a wide range of technologies, produce sound using oscillators that are amplified and transformed into sound waves. As Sear suggests:

> 'The electronic musical family has also come to include hybrid instruments with a mechanical sound-producing element amplified by electronic rather than acoustical means. The electric guitar is probably the most common of these.'
>
> (Sear, 1972: 2)

The Pianola was followed by the development of numerous instruments that used electric to generate sound rather than to control existing instrumentation. In the third edition of *The Electric Organ*, published in 1948, the first edition of which was published in 1930, Reginald Whitworth makes the following claim:

'The last decade has seen the rise of a number of instruments in which the actual sound is produced by electrical means. The fact that they produce sustained tones, and in some measure imitate certain tones of the legitimate organ, has led to their being called organs in some quarters. A better name is electrone or electrotone.'

(Whitworth, 1948: 18)

Here we see the author understandably struggling to define this emerging phenomenon, namely musical instruments that use 'electrical means' to generate sound (as opposed to electrical means controlling pneumatic organ systems as had been seen earlier with the electro-magnetic leaver pipe controllers). He chooses to define these instruments as 'electrone' or 'electrotone', which he talks of in terms of their otherness to the 'legitimate organ'. In fact Schwartz paints an even more dystopian image by claiming that these instruments are the 'final victory of the Machine over Man, the Dehumanization of Art, the triumph of Noise over Music.' (Schwartz, 1973: 3).

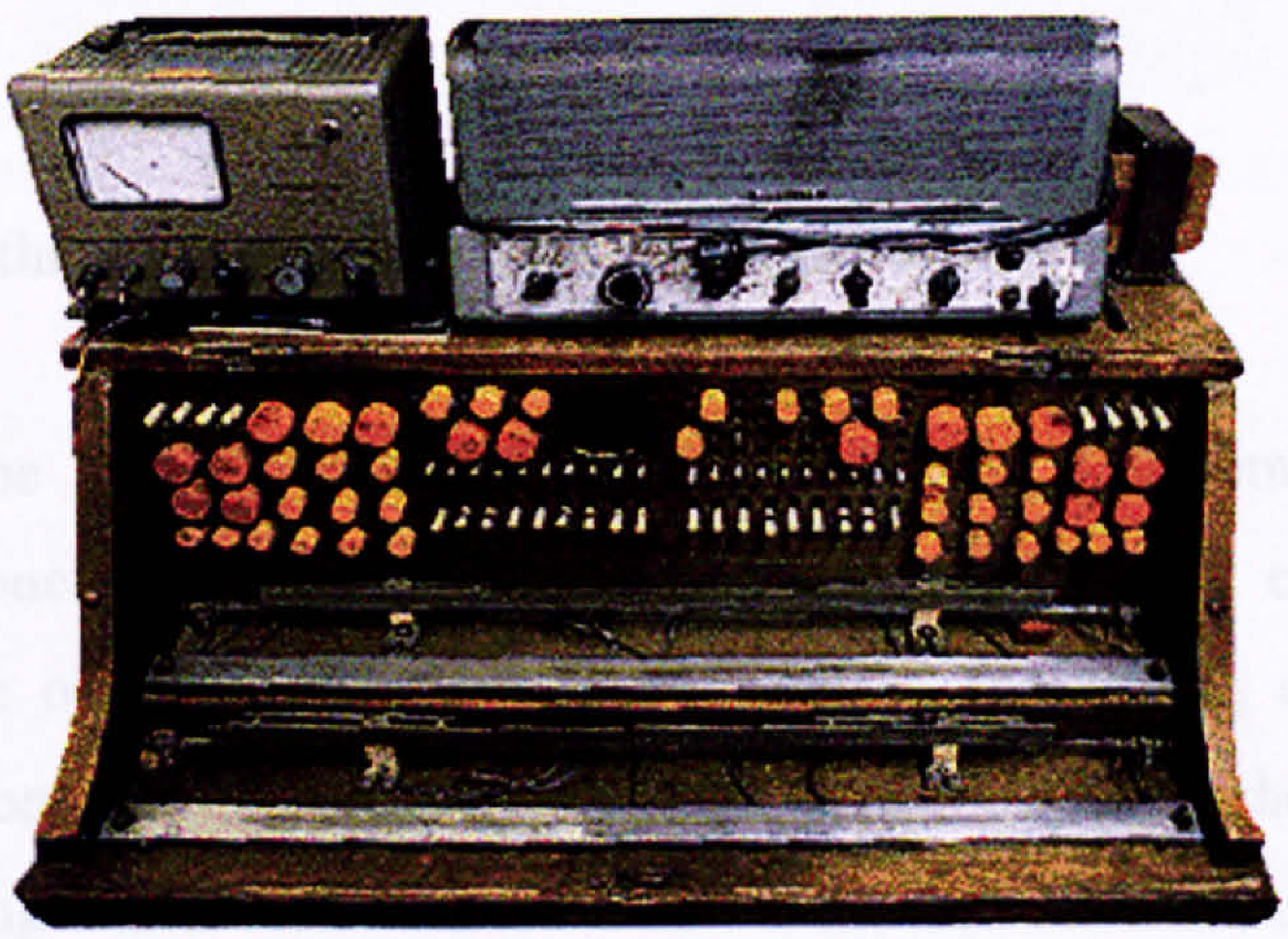

Figure 5.6: The Trautonium
(http://www.obsolete.com/120_years/machines/trautonium/)

Despite the competing dystopian and utopian view of emergent music technologies there are some areas of consensus. One of the most widely documented electric/electronic instruments of the early twentieth century was the Theremin. This device can be traced back to an explosion of such devices in the 1920s. Of which the:

> 'majority relied on an electronic method of sound generation, for example, the Thérémin (1924), the Sphärophon (1927), the Dynaphone (not to be confused with the Dyna*mo*phone) (1927-8), the Ondes Martenot (1928), and the Trautonium (1930). Most were keyboard-orientated, providing a single melodic output and an ancillary means of controlling volume, usually taking the form of a hand-operated lever or a foot-pedal.'
> (Manning, 2004: 4-5)

By this point the keyboard had already become the dominant system of control for these monophonic devices. However, the Theremin is a notable exception for its lack of keyboard.

The startling image of the musician hovering and waving their hands over the Theremin, and the appropriation of the Theremin by the Beach Boys during their *Pet Sounds* (1966) era repertoire[3], came to make the Theremin a relatively high profile electr(on)ic instrument. The physical form of the Theremin varied somewhat as different kits were made and individual musicians/engineers modelled their own Theremin.

Bowles describes the Theremin in the following passage:

> 'In 1924 the Russian Léon Theremin invented and demonstrated the "Aetherophone" (later simply called "Theremin") which employed two vacuum-tube oscillators to produce beat notes. Resembling an early radio set, it functioned as a capacitor, deriving musical sounds by the technique of "heterodyning" from oscillations which varied in pitch as the circuit (a wire-loop aerial and metal rod held in the operator's hand) was altered by changing the distance between these two elements.'
> (Bowles, 1970: 12)

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[3] Although there is some dispute as to whether this slider controlled instrument was in fact a Theremin.

The Theremin then became increasingly prominent. These electronic instruments 'flourished briefly during the interwar period.' (Manning, 2004: 5) when they were used for film soundtracks and occasionally by other composers.

Figure 5.7: an example of a Theremin (http://www.thereminworld.com/gal-pom-2k.asp)

Because of the popularity of the Theremin during this interwar period, Joseph Schillinger, a Russian composer and theorist, 'embarked on a collaborative venture with his countryman Thérémin, designing a domestic version of the Thérémin for commercial manufacture by RCA.' (Manning, 2004: 8). This then meant that the Theremin was relatively widely circulated before its commercial success was undermined by later technological developments.

Perhaps somewhat surprisingly, despite the relative success of the Theremin, during the 1920s and onwards through into the digital age, the piano-type keyboard was established 'as the standard control interface' for electronic instruments (Kirk & Hunt, 1999: 11).

To understand the continued dominance of the keyboard, it is worth refocusing on the period that preceded the Theremin. According to Bowles:

> 'In 1906 an engineer named Thaddeus Cahill introduced the "Teleharmonium," an instrument consisting of a series of alternating-current generators which produced pure tones of various frequencies and intensities. Switches permitted the synthesis of tones into any specific spectrum, and a volume control supplied dynamic variation. The device was intended to produce music capable of transmission over telephone lines to household subscribers, but unfortunately Cahill's system never passed beyond the demonstration stage.'
>
> (Bowles, 1970: 11)

This lack of commercial success is perhaps not surprising if we consider that the Teleharmonium weighed '200 tons and was 60 feet long' (Hugill, 2005). Despite this instrument never passing beyond the demonstration stage it still appears to have been understood as significant within the historical accounts of the development of music technologies. It is also worth noting that it was a very early keyboard based electronic instrument. So, perhaps, despite its early demise it was responsible for influencing and moulding some of the keyboard based electronic instruments that followed, and as a result it could be argued that a line of genesis exists here between the Teleharmonium, the electronic instruments of the 1920s and 1930s, the analogue and digital synthesizer. This is particularly evident if we consider electric or electronic sound generation as a prerequisite of digital sound generation.

Before closing this brief overview it is worth also exploring the post-Theremin development of electronic instruments. The Ondes Martenot, developed in France in 1928 by Maurice Martenot, is often described as being a significant electronic device of this period (Théberge, 1997: 44).

Four years after the invention of the Theremin:

> 'Maurice Martenot brought out his "Ondes Musicales" (again, later called the Ondes Martenot"), a similar, but more advanced electronic instrument.

Again, two radio frequency oscillators were heterodyned or beaten to produce complex wave-forms. Here, instead of a hand-held rod, a moveable electrode was used to produce the capacitance variations. Dutilleux, Honegger, Messiaen, Lihaud, and Varè all wrote music for the instrument at one time or another.'
(Bowles, 1970: 12-13)

The similarity between this and the Theremin demonstrates how influential the Theremin was in terms of shaping the electronic instruments that followed, with the apparent exclusion of the interface it utilised, which in most instances was replaced by a keyboard. For example, according to Bowles:

'Probably the most familiar electronic instrument in these categories is the "Electronic Organ" invented by Laurens Hammond. It employed a system of 91 rotary electromagnetic disc generators, driven by a synchronous motor with associated gears and tone wheels. These tone wheels were shaped so as to generate sinusoidal currents in their associated coils. The wave-form thus produced could be synthesized into complex tones. Control and programming were achieved through two 5-octave manuals and pedal board. In order to produce all the required fundamental tones and their harmonics, all 91 tone generators were used in various permutations and combinations.'
(Bowles, 1970: 13)

When considering the development of the synthesizer in the following sections it becomes clear that a line of genesis can be seen to exist somewhere between the Theremin, Teleharmonium, the Ondes Martenot, and the electronic organ, specifically the Hammond Organ (Théberge, 1997: 45).

Revealing a further level of complexity behind this genesis, Bowles argues that electronic music instruments were a 'by-product' of a number of experiments. He argues that:

'Their design was based upon the principle of vacuum tube (audion) oscillators, planned and controlled by the experimenter or performer, and

> combined with amplification and loudspeaker output. Some devices utilized electrical frequency generators, while others employed mechanical (rotary or vibrating) generators to produce the tones.'
> (Bowles, 1970: 12)

In light of these sound generation devices, as will become clear, the distinction between the electronic instruments of the 1920s onwards and the synthesizers of the post-second world war period is not entirely clear. Perhaps at this juncture it would be better to understand the notion of the electronic instrument as a part of the category of analogue synthesis.

3.3 MIDI protocol: compatibility, proliferation and the first age of the digitalisation of music

What becomes apparent in the historical mapping out of the development of music synthesis technologies to this point is the sheer number and range of devices. With this disparity in mind in order to understand the development of the synthesizer it is worth first considering MIDI in more detail. Jon F. Eiche, in *What's MIDI? Making Musical Instruments Work Together* (1990), suggests that:

> 'The important thing about MIDI is not the physical connectors or the electronics behind it; the important thing is what it allows you to do. For example, with MIDI you can...
> - Play two instruments from the keyboard of one.
> - Record your music for playback later
> - Synchronize the performance of such a recording with that of a drum machine.'
>
> (Eiche, 1990: 3)

For Eiche it is the possibilities of MIDI rather than the detailed understanding of the technical infrastructure that is important.

Similarly for Warner, at 'the simplest level, MIDI enables one keyboard to control another device: the musical information (pitches, rhythms, articulation, phrasing, sometimes called 'performance information') played on one keyboard is transmitted along MIDI cable to another device whose sound producing circuits respond without any physical contact with the player.' (Warner, 2003: 25). In some cases this transmitted information can be stored and manipulated using a computer program – the Atari St is particularly well-known as one of the first computers that provided this function – or a specialist device known as a MIDI sequencer (Warner, 2003: 25).

Similarly Eiche provides the following overview of MIDI:

> 'MIDI is a specification that was developed in the early 1980s to allow musical instruments of different brands to "talk" to one another. It was developed jointly by the major manufacturers of electronic musical instruments, and as such, represents a cooperative effort of impressive proportions. Moreover, that cooperation continues, for MIDI is not a formal standard that must be adhered to. Rather, it is a specification that is followed voluntarily by the individual manufacturers.'
> (Eiche, 1990: 4)

MIDI is a *voluntary* protocol that manufacturers use to enable 'communication' between digital instruments. Or, as Kirk and Hunt put it, MIDI is the implementation of 'a standard protocol for the interconnection of digital music devices.' (Kirk & Hunt, 1999: 28). MIDI enables digital music instruments made by different manufacturers to work together.

The central problem that MIDI resolved was the issue of compatibility between musical instruments that had been exacerbated by the emergence of digital music technologies. Analogue instruments, despite some problems of controllability were usually capable of some level of interaction and compatibility. Even analogue devices that were not essentially compatible could usually produce some level of interaction and sound production. The problem was that 'connecting unmatched voltage controlled devices together will usually produce some form of response...mismatch in a digital system will usually produce no response at all.' (Manning, 2004: 266). The significance of incompatibility increased with the onset of digital technologies because of this problem. Where analogue devices could have been patched together with variable and inconsistent results, digital technologies were entirely unresponsive.

As a result:

> 'The idea of establishing an industry-standard digital protocol for connecting synthesizers and associated peripherals together at the control level was first put forward informally at a meeting of the National Association of Music Merchants (NAMM) in the early summer of 1981.'
> (Manning, 2004: 266)

Following this informal agreement of the importance of standardising digital instrumentation a meeting was held by NAMM in January 1982 that was attended by the major digital instrument manufacturers. The development of MIDI then moved very rapidly, probably so as to ensure the maximisation of revenue streams that would be generated by the introduction of standardised digital musical devices. By September 1982 'the draft of a considerably expanded specification was complete' (Manning, 2004: 267). The development of MIDI, which occurred between 1981 and 1983 (Théberge, 1997: 85), then moved toward a final stage with its inclusion in new product lines. By the end of 1982 'both Sequential Circuits and Roland were producing synthesizers with MIDI-compatible interfaces' (Manning, 2004: 267).

MIDI was then finally established when the 'newly formed International MIDI Association published what was to become the definitive MIDI specification, Version 1.0, in the spring of 1983, and by the end of the year most synthesizer manufacturers had started to include a MIDI interface as a standard communications feature.' (Manning, 2004: 267; see also Théberge, 1997: 85). MIDI based digital music instruments then began to filter onto the market. Indeed, according to Théberge, it ' is now generally recognized that MIDI has been a major contributing factor in the growth of digital musical instruments to their current billion dollar levels worldwide.' (Théberge, 1997:86). The MIDI standard, despite its voluntary and unenforced nature, became almost universal in the years that followed. As Kirk and Hunt note, following these industry meetings the 'resulting 'V1.0 MIDI Protocol' was adopted by practically all major electronic musical instrument manufacturers and has had a profound influence on the world's electronic music making ever since.' (Kirk & Hunt, 1999: 28).

The development of MIDI was a decisive factor in the development of all future digital music technologies. Digital music instruments nearly always have built in MIDI sockets[4]. These sockets allow the instruments to be connected together in circuits. These circuits usually have a controlling sequencer at their centre. This sequencer can be programmed to send numerical messages to the instruments in the circuit. These groups of numbers trigger certain reactions from the instruments. The sequencer times these flows of information. The digital sequencer stores and sends MIDI information to the instruments through a master instrument. The sequencer records the MIDI information as played on the master instrument and this information is played back by the sequencer. This information then circulates or flows around the instruments in the circuit (see figures 5.8 and 5.9 below).

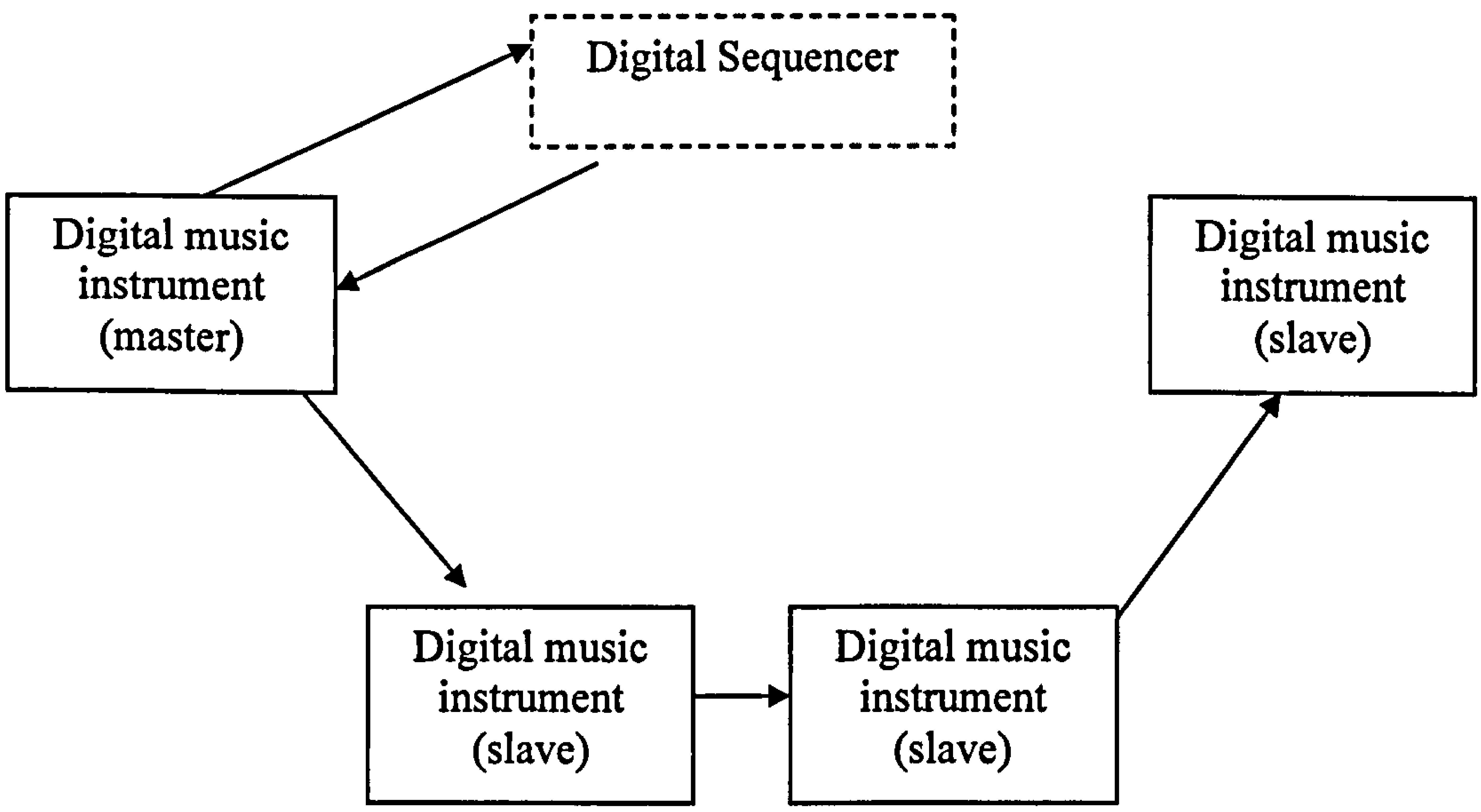

Figure 5.8: An example of a sequencer controlled MIDI set-up

However, a sequencer is not essential in this set-up. A more basic layering of two or more instruments can also be achieved. In this case one of the instruments becomes a

[4] MIDI sockets are small fittings on the reverse of digital music technologies that allow a MIDI cable to be attached to the instrument. The MIDI socket contains a series of holes which are filled by the MIDI cable to create a connection.

master and other(s) a slave(s). The selection of master and slave is determined by the use of the MIDI-In and MIDI-Out ports on the instruments.

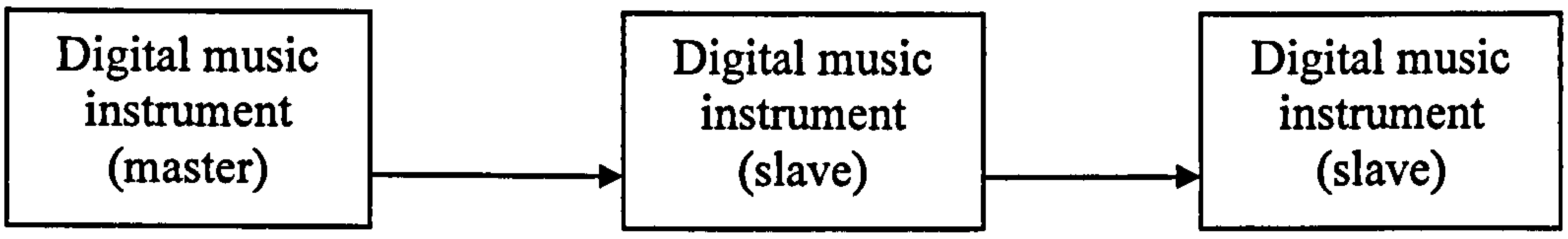

Figure 5.9: An example of a simple MIDI set-up

When the instruments are connected in the manner shown in figure 5.9 pressing a key (or whatever the form of control is) on the master instrument creates a simultaneous sound in the master and the two slave instruments. This means that sounds can be layered through simultaneous response to the controller (master). MIDI set-ups can be perfectly reproduced, unlike analogue set-ups of connected or patched devices or modules.

The advent of MIDI, and the overcoming of some of the more fundamental problems of digital compatibility, proved crucial in the development of digital synthesis technologies.

3.4 The synthesizer, the sampler, and the human/digital interface: toward the first age of the digitalisation of music and a library of voices

> 'In short, the synthesizer has opened up the possibilities of automation, as witnessed here in Babbitt's work of the early 1960's, and was a portent of developments that would come in the following years.'
> (Schwartz, 1973: 61)

The RCA synthesizer, which was developed between 1955 and 1956 (Kirk & Hunt, 1999: 19, Schwartz, 1973: 58, and Bowles, 1970: 13), is often understood to be the 'first synthesizer'. This was a distinctive and, according to Bowles (1970: 13), 'significant' development in terms of the synthesis of music. The RCA synthesizer moved music production from an interaction with an individual device toward the programmable control of numerous individual devices from a single controller, similar to the master and slave(s) of MIDI. This programmable function was limited in this early technology to strips of punched paper that were fed into the machine. As Schwartz describes:

> 'RCA demonstrated the Olson-Belar Sound Synthesizer, an elaborate device for the direct production of sounds…with all varieties of timbre and duration capable of being specified by means of a coded paper input tape.'
> (Schwartz, 1973: 58)

It is the establishment of this function of pre-programmability that is significant. Following such devices as the Pianola, it is perhaps this initial instance of pre-programming that became a seminal moment in the digitalisation of music. It is essential to acknowledge that although the RCA was an analogue technology, it was a point of development for functions that have become dominant in contemporary digital music technologies.

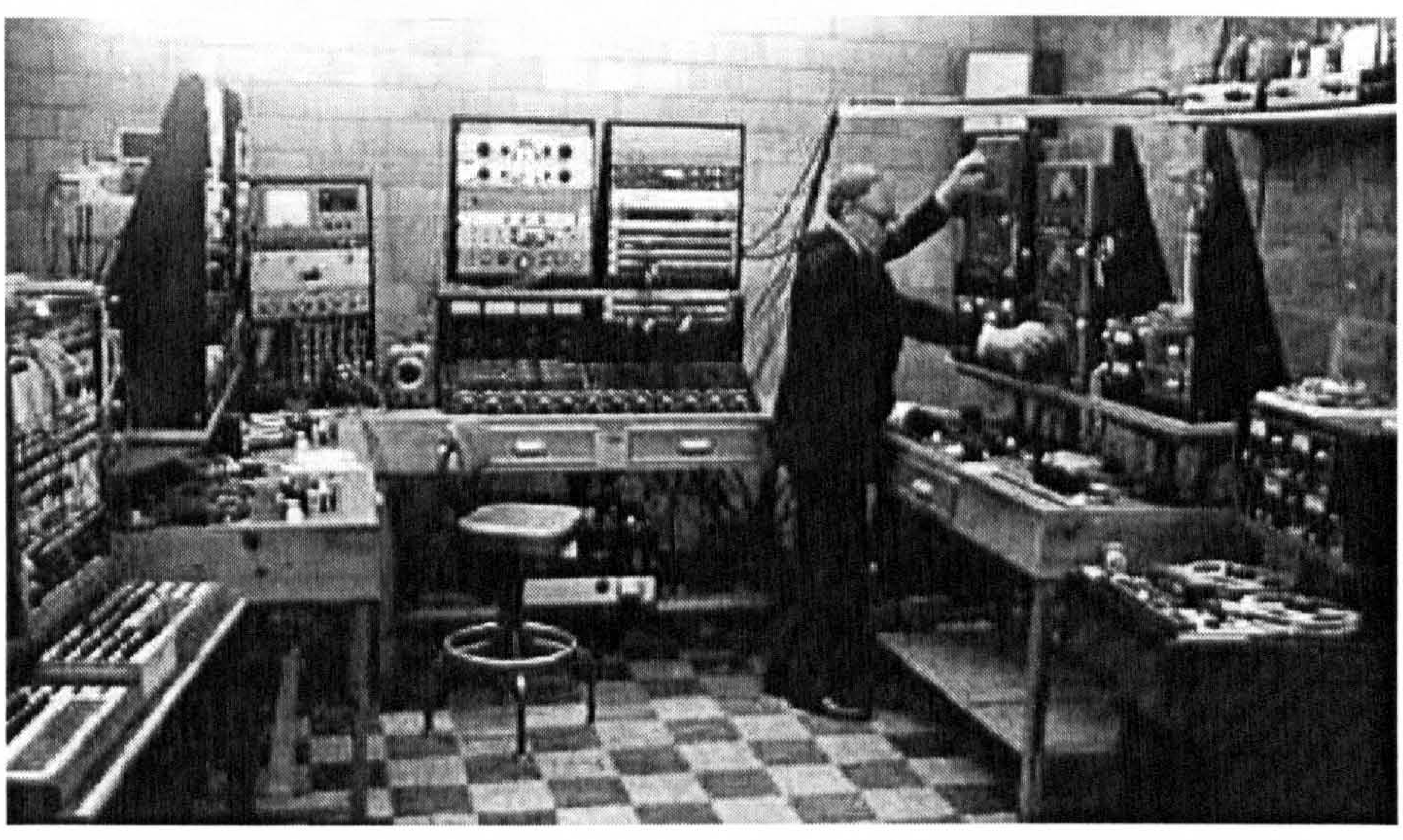

Figure 5.10: The RCA Mark I Synthesizer (http://www.obsolete.com/120_years/machines/rca/rca_image1.html)

The development of the RCA synthesizer at the Columbia/Princeton Centre in America continued (Schwartz, 1973: 59-61) and 'during the 1960s The RCA synthesizer Mark 2[5] proved highly attractive to the East Coast schools of composition' (Manning, 2004: 149). However, this was not a time of mass-cultural transformation; it was however a time in which significant esoteric developments were made that would have consequences for the development of the mass-produced digital synthesis technologies that followed. The RCA's functions of programmability, centralised module control, and electronic synthesis, have had ongoing influence.

We see, for example, the centralised module control layout of the RCA mirrored on a smaller scale in the Moog synthesizer. The Moog, developed by Robert Moog[6] during the 1960s, was one of the most famous and dominant synthesizers of the 1960s and 1970s[7]. The Moog prototype was completed in 1964 (Pinch & Trocco, 2002: 23-28). Robert Moog also created the smaller MiniMoog, which was developed in 1970 (Pinch & Trocco, 2002: 61).

Figure 5.11: Erik Siday with Moog synthesizer in home studio (Pinch & Trocco, 2002)

[5] The RCA synthesizer 'was soon replaced by an even more efficient model, dubbed the "Mark II." [Milton] Babbitt, with the help of reident engineers, had converted it to a tape, rather than disc, recording system.' (Schwartz, 1973: 60)

[6] Robert Moog started by manufacturing Theremin (Pinch & Trocco, 2002: 14)

[7] Most famously used by Wendy/Walter Carlos on the record *Switched-On Bach* (1968, Columbia Records), and by the same artist on the soundtrack to the film *A Clockwork Orange* (1972, Warner Bros.)

The Moog and the MiniMoog were analogue synthesizers that used voltage-controlled oscillators to generate sounds[8]. These voltages were usually controlled by a keyboard controller, although other controllers could be used with the Moog system. Pinch and Trocco (2002) develop a highly detailed cultural and technological history by demonstrating the ways in which it competed with the contemporaneous non-keyboard based Buchla Box. The Buchla Box was developed by Don Buchla in the early 1960s – the Buchla Box system 100 appeared in 1965 (Pinch & Trocco, 2002: 41) – and was less commercially successful than the Moog. The significant difference between the Moog and the Buchla Box was the means of control, the interface, the Buchla Box was controlled by touch sensitive pads, this overcame the limitations of the keyboard controller and, as a result, the Buchla Box became to be regarded as an electronic instrument for the avant-garde. It is also interesting that the Buchla Box, unlike the Moog, contained sequencing technology.

Figure 5.12: A Minimoog Model D (Pinch & Trocco, 2002)

Pinch and Trocco (2002: 47-50) argue that the audience for which these two synthesizers were developed had profound implications for their form and functions. The Moog was developed for the popular performer, and for live stage performance, the Buchla Box was designed to suit the experimental practices of the avant-garde performer. It was perhaps the profile and dominance of the Moog, and its keyboard interface, that maintained the dominance of the keyboard controller during this period.

[8] The Moog consisted of 'discrete modules...that could be wired together in a variety of ways and controlled by the output voltages of the devices themselves.' (Pinch & Trocco, 2002: 28).

Following these initial synthesis devices:

> '[in] 1973 Yamaha released its first analog synthesizer, known as the GX1...many of its more notable features were successfully reengineered in the CS80, released in 1977 and used extensively by a number of leading artists and groups, including Paul McCartney, the Electronic Light Orchestra, and Kraftwerk. Interest at the lower-cost end of the market was also stimulated by two compact and highly portable synthesizers, the SY1 and the SY2 (1976), which offered a more limited choice of analog sounds.' (Manning, 2004: 264)

It is interesting that despite the development of synthesis technologies as early as 1955 it wasn't until the mid to late 1970s that synthesis technology manufacturers began mass production expanding these technologies out into popular culture. Until this point synthesis technologies were largely the project of university based groups of engineers, composers, and well-off performers. The development of synthesis technologies by companies such as Yamaha led to wider appropriations of synthesis technologies across a greater variety of social groups. And, therefore, it can be concluded that it was during this period that what was labelled 'electronic' music moved into the sphere of popular culture and into music production and reproduction practices.

Not surprisingly Yamaha was not the only manufacturer to develop synthesizers during this period:

> 'The Roland Corporation, established in 1972, became the first manufacturer of analog keyboard synthesizers in Japan with the release of the SH-1000. Other models soon emerged from the production line, notably the SH-2000 (1973), the Jupiter-4 (1978), and the Jupiter 8 (1980), which found special favor with groups such as Duran Duran, Tangerine Dream, and Ultravox.' (Manning, 2004: 264)

A vast proliferation of analogue synthesizers were developed during this boom period[9] with consequences for popular music as well as avante-garde composition (see Théberge, 1997: 41-71).

Following this expansion of the synthesizer market, in America Dave Rossum and Scott Wedge (Théberge, 1997: 57-59) began a:

> 'series of pioneering developments based on the Zilog Z80 microprocessor...leading to their first digital synthesizer, the Emulator I in 1981. This product was an important precursor of the MIDI sampler...Early users included Stevie Wonder, David Bowie, Genesis, Herbie Hancock, and Philip Glass.'
> (Manning, 2004: 264-265)

This represents the shift from analogue to digital synthesizer manufacture.

The problem that arose during this proliferation of digital devices was one of compatibility. The problem of incompatibility had largely been unresolved in the case of analogue technologies, although analogue technologies in most instances could achieve some level of (often unpredictable) compatibility. It took the escalation of the problem to that of total incompatibility – that occurred when digital technologies arrived – to instigate resolution. The resolution occurred between 1981 and 1983 and became known as MIDI.

Around the same time as the New England Corporation's development of the Synclavier in 1976 (Manning, 2004) other laboratories developed a number of synthesizers based around digital technologies:

> 'In 1975, two Australians, Peter Vogel and Kim Ryrie, established a company called Fairlight in Rushcutters Bay, New South Wales...evolved...the design of a complete, all-digital synthesizer, to be

[9] Many of which are included in Manning's (2004) historical accounts of the period.

known as the Fairlight Computer Music Instrument, otherwise known as the Fairlight or the CMI.'
(Manning, 2004: 224)

The Fairlight – as used by Trevor Horn in producing Frankie Goes to Hollywood's single 'Relax' (Warner, 2003: 80) – like the Synclavier, is often understood to be an influential technology in the development of digital music technologies. Particularly as it utilized sampling technologies in sound production

A series of Fairlight's followed which included the Fairlight I and II. These

> 'are very similar in appearance. The user is provided with one or optionally a pair of six-octave keyboards, and interactive graphics unit using a light pen system, and an alphanumeric keyboard, with the further possibility of adding up to three foot-pedals as auxiliary performance aids.'
> (Manning, 2004: 225-226)

The Fairlight III followed in 1985[10].

At this stage of development digital music technologies were only accessible to a small number of performers and musicians. However:

> 'In 1981 the Japanese electronics manufacturer Casio launched a miniature all-digital synthesizer known as the VL-1, costing less than $100. This consists of a tiny keyboard of just over two octaves, a bank of five voices controlled by a set of pushbuttons, a one-hundred-note sequencer, and a rhythm unit offering a choice of ten different patterns.'
> (Manning, 2004: 280)

These technologies were dismissed initially as toys (Kirk & Hunt, 1999: 26-27), yet the relative low cost of these devices opened up the implications of a wider network of appropriations. Although these technologies were limited in functionality this

[10] This was built around a sixteen-bit Motorolla 68000 microprocessor.

reduction in price – to as low as £30 in the case of the Casio VL-tone (Kirk & Hunt, 1999: 26) – meant that these technologies moved into small recording studios and homes. This moment can be understood to be a significant one in the digitalisation of music. However, these lower cost technologies were extremely limited; they could only provide a small fraction of the possibilities of the higher range technologies like the Fairlight and the Synclavier.

Casio continued to be the forerunner in the development of lower cost synthesizers[11]. As a part of these developments they:

> 'launched the CT series of digital synthesizers early in 1982, starting with the CT-701. Although these products were still targeted specifically at the low-cost end of the market, the relative sophistication of their resources posed a serious challenge to traditional analog designs.'
> (Manning, 2004: 280)

The controller, or interface, used for operating these digital technologies also varied between technologies, although the keyboard remained dominant, other devices for reading scores or inscribed musical codes were widely incorporated into the synthesizers. Some of these features, such as the light pen, echoed the analog interfaces that had gone before, these would include the photo-electronic inscription operating system of the Russian ANS synthesizer (see Beer, 2006), and perhaps even the punched programming system from the RCA synthesizer.

Casio was not the only manufacturer attempting to access the increasing digital synthesizer market. Yamaha were also involved with the development of digital synthesizers:

> 'Yamaha's first steps into the digital arena were in 1981, with the launch of the GS1 and GS2 synthesizers. These were relatively expensive products (the GS1 cost as much as a small Synclavier), but they served as important

[11] The developments that were made over this period were mainly associated with the range of polyphonic sounds available, the number of notes that could be generated simultaneously as well as the variety of voices available, and the amount of memory that the device had for holding sequencing information and sampled sounds.

prototypes for the highly successful and influential DX series of all-digital MIDI synthesizers that were to follow.'
(Manning, 2004: 280)

Yamaha first developed technologies that were not of the lower cost category, yet these technologies appear to have played an essential part in the development of mass producible digital synthesizer technologies. The initial GS1 and GS2 carved a path for the manufacturer to develop lower cost technologies.

Further developments around this time also lead to manufacturers claiming ownership and unique rights to particular emergent technologies. These early attempt to claim territories or areas of digital technological development reflects a much wider problematisation of ownership that has occurred with the onset of the digital age (see chapter 2). According to Pinch and Trocco the 'patent on the form of synthesis used, known as frequency modulated (FM) synthesis, was for years among Stanford University's highest earning intellectual properties.' (Pinch & Trocco, 2002: 6). This was not, as the prevalent rhetoric of the midi age would suggest, a time of complete and unrestricted corporate cooperation and sharing.

The keyboard based Yamaha DX7 followed in 1983. This device was appropriated by a wide spectrum of composers/musicians/performers/engineers[12]. It is worth noting that 'during the entire decade of the 1970s, the Minimoog sold about 12,000 units, whereas Yamaha's DX7, released in 1983 sold over 200,000 units in just over three years.' (Théberge, 1997: 73-74). Furthermore, by the end of the 1980s Casio had sold 15 million instruments (Théberge, 1997: 74).

[12] Composers/musicians/performers/engineers were difficult to separate with regard to these music technologies and with the analogue systems that preceded them.

Figure 5.13: Yamaha DX7 (tamw.atari-users.net)

The Yamaha DX7 was not only an influence on the music of the period it also influenced the form of technologies to come. As Pinch and Trocco note, the 'sound cards in our computers use a technology that is directly descended from the first commercially successful digital synthesizer, the Yamaha DX7 produced in 1983.' (Pinch & Trocco, 2002: 6):

Yamaha continued to make further developments and the DX7 Mark II was launched in 1985. With this device the development of the pressure sensitive keyboard and the ability to produce more than one voice simultaneously from a single synthesizer were significant in that these became standard features of many of the digital music technologies that followed.

The ability to retrieve, manipulate and control this expanding *library of voices* forged new possibilities and adaptations in terms of interfacing such as computer keyboards and display screens. Illustrating the general concern with the expansion of the *library of voices*, the developments of the early 1980s began to move increasingly toward sampling technologies and systems of retrieval from these archives. The main obstacle with sampling technology in the early stages of its development was memory space and the storage of these sampled sounds.

In 1984 further developments were occurring at E-mu, who 'replaced the Emulator I with the Emulator II. This added facilities for MIDI control, expanded the memory to 512 kilobytes, and upgraded the capacity of the integral floppy disc drive to a full megabyte.' (Manning, 2004: 291). This representation of the development of the Emulator II followed what appear to have been the main concerns or agendas of the day: compatibility, memory, and computer convergence. These issues were all addressed to varying degrees in this updated model. In fact across the range of synthesizers being produced by different manufacturers at this time it is these three issues that are prominent in the differences between the models of synthesizers that were developed. New models of synthesizers inevitably offered some form of advantage – in the form of a problem solved – over previous models in these three areas.

In the mid-1980s further technologies followed such as the Ensoniq Mirage, developed in 1984-1985 (Théberge, 1997: 63-64) and, following Akai's S612 in 1985, 'Sequential Circuits responded with the Prophet 2000 (1985), a keyboard sampler offering an equivalent true twelve-bit resolution, but a much larger 256 kilobyte memory (expandable to 512 kilobytes).' (Manning, 2004: 292)[13]. When Ensoniq stopped producing the Mirage in 1988 they had sold thirty thousand units (Manning, 2004: 291).

Around this time Korg were also involved in developing synthesis and sampling technologies, in 1985 they 'introduced the DSS-1, a keyboard sampler. The DSS-1 was distinctive as it allowed the agent to 'sample external sounds, draw wave-shapes directly, or use additive synthesis to generate timbres with up to 128 individual harmonics.' (Manning, 2004: 292). The DSS-1 enabled the agent to draw on any sound for sampling creating the conditions for the *library of voices* to expand. Furthermore it enabled compositions to be scored in the form of wave-shapes (Beer, 2006), a process similar in many respects to the virtual inscription of compositions used in contemporary music software packages.

During the mid-1980s Casio continued to manufacture low cost synthesizers. They expanded their range to incorporate a series of low cost all-digital synthesizers. This CZ series included the CZ-101 in 1985, which cost under $500 (Théberge, 1997: 73) and its larger keyboard version the CZ-1000 in1985, the more expensive CZ-5000 in

[13] For more on the range of Prophet synthesizers see Théberge (1997: 87).

1985, and in 1986 the CZ-3000 and the CZ-1 (Manning, 2004: 298). Further technologies then enabled the combination of synthesized and sampled 'natural' sounds, which was possible with Kawai's (1986) K3 digital wave memory synthesizer.

Roland's D series (1987-1988) not only further enabled the combination of 'natural' and synthesized sounds, it also moved out into popular music culture (Théberge, 1997: 80). The Roland D series of synthesizers were used well into the 1990s by a wide variety high selling artists/performers including 'Eric Clapton, Vince Clarke, Enya, Fluke, Jean Michel Jarre, and Garry Numan.' (Manning, 2004: 303). On a broader level Kirk and Hunt note that between 1980 and 1982 'there was a flourishing use of synthesis in pop groups, very much at the expense of the electric guitar.' (Kirk & Hunt, 1999: 27). It is possible to identify this as a period when the (digital) synthesizer moved from the sphere of the avant-garde or the studio of the affluent pop star, and into a relatively dominant position in popular music culture.

Further developments occurred around the turn of the 1990s. These technological developments included Yamaha's YS-100 and YS-2000 FM synthesizers in 1989, which were similar to the DX series but with 'a simplified user' interface (Manning, 2004: 304), the all-digital SY22 and SY77 in 1990, and the SY99 in 1991, which had further facilities for importing sampled sounds (Théberge, 1997: 81; Manning, 2004: 305).

Here I have only been able to touch upon what is a complex history of the synthesizer. What is clear from this highly condensed history of the synthesizer is not only its complexity but also the mass proliferation of different synthesis technologies created by a variety of manufacturers as the possibilities of mass production emerged. This proliferation of technologies appears to have occurred following the adoption of the MIDI protocol by leading manufactures and the resolution of problems of compatibility.

Clearly there is a need here for greater detail, and to uncover some of the hidden details regarding lost technologies and the ways in which specific synthesizers were appropriated into the practices of musicians. An example of this type of project can be found in a piece I produced around the same time as this history which focuses upon the Russian light controlled ANS synthesizer, both in its material properties, its interface, and on the way it was used in the soundtrack to Tarkovsky's *Solaris* (see Beer, 2006). This piece is a case study, which draws on a range of sources to reconstitute the material details of the technology and its incorporation into practice, takes its inspiration from the type of details that are needed to develop this history further.

3.5 Analogue-to-digital converters: changing sounds (music) to numbers and back again

So far in this history a number of technologies have emerged that require the movement of sound between an analogue form and a digital form. It is worth now considering the technology that enabled this process, which may be understood as the central process behind digitalisation, possible.

In terms of the analogue and digital divide Joel Chadabe makes the following distinction:

> 'Analog electronic devices produce a voltage quantity that may be *measured...* Digital electronic devices are constructed of switches that are either open or closed and that may be *counted.* A quantity of three volts, for example, is counted as a certain number of closed switches. These switches, called bits, are arranged in rows called registers.'
> (Chadabe, 1975: 171)

This distinction between analogue and digital can also be found in the work of Schwartz:

> 'Simply stated, what is "digital" exists as a series of discrete states and can exist in only one state at a time; the most commonly used example is a light switch, which is either "on" or "off." An "analog" device exists as a continuous range and is adjustable within that range; an example is a radio dial.'

(Schwartz, 1973: 90)

Digitalisation is based on the conversion of sound into bits, into a series of 0s and 1s, into a pattern of *off* and *on* 'switches'.

Possibly the single most important development in the digitalisation of music was the dual innovation of the analogue-to-digital converter and the digital-to-analogue converter. Dodge and Jerse suggest that these converters 'can be simply thought of as devices that enable sound to be changed into a stream of numbers or vice versa.' (Dodge & Jerse, 1997: 12). This device made it possible for sounds, in the form of analogue signals, to be transformed into computerised codes. This, therefore, represents the moment, if a single moment can be identified here, when music became digitalised, or when the digitalisation of music became *possible*[14]. Music could then pass or be filtered through the sphere of the digital computer. This moment can be understood to have enabled the digital practices and processes that followed. Digital sampling, synthesis, recording, and reproduction, were enables by the development of the analogue-to-digital converter.

Music and the computer were separated by the problem of incompatibility prior to the development of the converter. The problem was simply that 'any sound, whether speech, "noise," or musical tone – is made up of vibrating waves...The average computer, though, can only accept or emit "digital" information' (Schwartz, 1973: 90).

Clearly the development of the analogue-to-digital converter was a crucial step in the digitalisation of music, without it music and the computer would have remained separate entities. For Rogers (1975) the converter created a 'fortunate' link between the 'real' and the 'digital':

[14] However, an exact date for this innovation appears to be absent from the historical literature. The writers tend to include a period rather than a specific date. This would suggest that these devices evolved over a period of time at Bell Laboratories.

'Fortunately for us, a linkage between the "real," analog world and the world of digital computers is often necessary today, and devices have been developed to perform this linkage.'
(Rogers, 1975: 197)

Schwartz talks of this movement of sounds between the analogue and digital spheres as an act or process of translation. He suggests that what 'is needed for this translation process is a machine called a converter, there are two types of converters: one for a-to-d (analog to digital) and the other for d-to-a (digital to analog).' (Schwartz, 1973: 90).

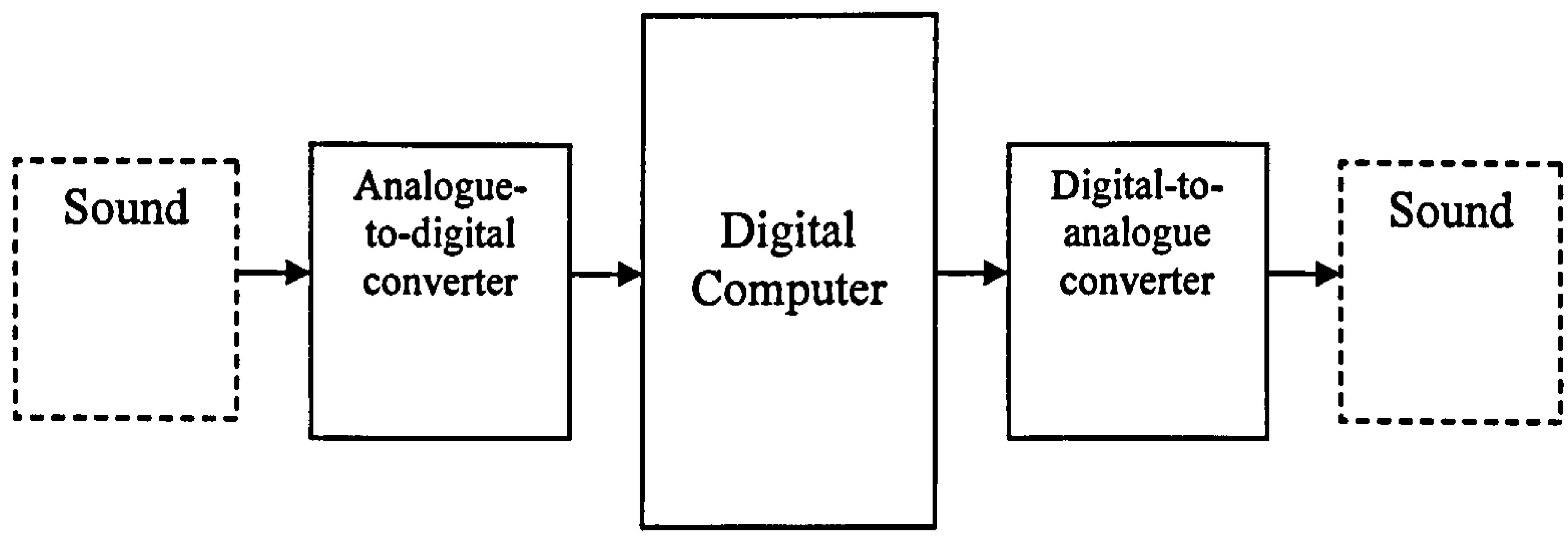

Figure 5.14: the movement of sound through the digital computer

According to Schwartz, again illustrating the interconnectivity of music technologies and wider socio-technical transformation, this 'technique of conversion was initially developed by Bell Telephone Systems at their research laboratories in New Jersey, for the purpose of greater automation in telephone service.' (Schwartz, 1973: 90). No specific date appears to accompany this development, yet it would seem that it occurred sometime during the 1960s in its earliest form. Yet it wasn't until the 1980s that the technology become widely available, and it wasn't until toward the end of the 1980s when these technologies really began to develop in terms of sophistication.

The analogue-to-digital and digital-to-analogue converter was followed by the development of computer programs that realised some of the potential possibilities of digitalised conversion. According to Schwartz:

'A computer program for sound generation was devised after intensive collaborative research; named MUSIC 4B, it was installed in the high-speed digital computer at Princeton. Similar Programs were being developed at MIT and the Argonne Laboratory and, by the mid-1960's, a number of educational institutions (the universities of Michigan, New Hampshire, and Virginia, and Oberlin College, to name but a few) were using programs for musical sound generation in their computers.'
(Schwartz, 1973: 91)

However, Dodge and Jerse present a slightly different version of this. They claim that the 'first general purpose program for sound synthesis was Music 3, created by Max V. Mathews at the Bell Telephone Laboratories in the early 1960's.' (Dodge & Jerse, 1997: 16). They appear to agree on the period and the location, yet the name of the version of the program is different. Schwartz also notes that Mathews collaborated with James Tenney (Schwartz, 1973: 91). Kirk and Hunt are more exact with the dating of the first computer program that could synthesize sound. They identify 1957 as the date of conception. They also identify Mathews as the inventor and Bell Laboratories[15] as the place, yet they title the technology Music I. Revealingly, Kirk and Hunt, note that several versions of this program followed, and it wasn't until Music IV that the technology was adopted by composers[16].

The analogue-to-digital was a prerequisite for the development of contemporary digital music technologies, digitalised music studios, and synthesis/recording software packages (Kirk & Hunt, 1999: 21; see chapter 6).

It is clear that the development of the analogue-to-digital and digital-to-analogue converter music is an integral and essential part of the process categorised here as digitalisation. The contemporary musical landscape of computer software packages, digital recording and reproduction, internet music downloading, etc, could not have occurred were it not for the process of conversion of translation. Therefore, it seems

[15] They were attempting to 'store sound as a stream of numbers, send it as a stream of pulses down a telephone cable, then reconstruct it at the far end.' (Kirk & Hunt, 1999: 21)
[16] These composers then went on to create their own programs for synthesis and composition. This presumably occurred as computers and the appropriation of computers increased, and tacit knowledge about these systems was accumulated in praxis.

that there is some credibility in arguing that these converters represent a highly significant moment in the digitalisation of contemporary music and contemporary music culture.

3.6 The microprocessor, the computer, and the primary production of music: opening the second age of the digitalisation of music

> 'The intelligent instruments that already exist promise a new age of communication in which the attention of musicians can be on their inner messages. Musicians need not worry as to whether the instruments will be powerful enough to represent the message. They need not worry whether they will be virtuosic enough to play the music. These concerns can be left to the instrument itself.'
> (Mathews, 1985: x)

If we consider the development of digital music instruments and the compact disk to be the first wave, or age, of digital music technologies, then we can perhaps conclude that the development of computer based music software and the development of technologies for moving and storing music as computer files (e.g. MP3 files) has created a *second age of the digitalisation of music.*

I do not have the space here to explore a complete history of the computer or of the microprocessor. I will therefore give only a brief overview of the most significant details where these computer technologies intersect with the history of music production and reproduction.

According to Bowles, the 'first monumental attempts to develop a large mechanical computer were made by Charles Babbage (1792-1871), a man who hated music, particularly the noise of barrel organs, which, he said interrupted his train of thought.' (Bowles, 1970: 3). Bowles suggests that it was around 1840 when Babbage's fellow mathematician, Ada Lovelace, began speculating about 'the musical possibilities of her colleague's machine' (Bowles, 1970: 4).

The important issue in these early developments of the computer was the issue of programming. Bowles notes that:

> 'The use of punched holes in cards for the digital storage of information had its origins some fifty years before Babbage in the mechanized weaving of patterns in cloth. Strings of these prepunched cards were used to control the proper lifting in various combinations of the hundreds and hundreds of silk warp threads of the draw-loom. In 1801, J. M. Jacquard, capitalizing on the principles applied by Bouchon, Falcon, and Vaucanson, developed the first fully successful automatic loom. It utilized a series of punched cards, held together like the links of a chain, which programmed the warp and thus the overall pattern of the tapestry being woven.'
> (Bowles, 1970: 5)

It is clear from this that lines of genesis exist between the early computer and the industrial machinery (the loom) of the preceding era. In fact Bowles identifies that these types of pre-digital programmable technologies can be traced even further back:

> 'the notion of the stored program can be extended even further backwards in time to mechanical musical instruments. The basis of these devices was either a barrel or cylinder programmed by means of a series of appropriately placed pegs or pins, or a punched paper tape, both of which performed certain mechanical actions when the barrel revolved by means of levers or jackwork. The earliest device of this sort was the carillon, apparently Chinese in origin, and brought to Europe during the middle ages.'
> (Bowles, 1970: 5)

The computer in this respect was influenced in its development by programmable mechanical music technologies such as the Carillon[17]. These programmable technologies come to acquire basic forms of *memory*, or storage and sequencing, that

[17] 'Mechanized chimes, depending for their operation upon a large revolving drum provided with pegs which activated the striking mechanism directly, date from the fourteenth century – principally the Netherlands – when they were installed in the belfreys of large cathedrals. For example, the carillon in the Abbey-Church of St Catherine, near Rouen, was programmed to play the Hymn *Conditor alme siderum*.' (Bowles, 1970: 5)

were appropriated and expanded upon by contemporary computer technologies. It is interesting to note that music technologies came to influence the development of the computer and more recently it is the computer that has come to influence the development of music technologies.

The concern with the programmability of musical instruments continued and, as I have already mentioned, in '1880 the first pneumatic self-playing piano appeared, taking advantage of a perforated sheet of paper which passed over a reed chamber and permitted air to pass through the holes "programmed" into it, thus activating the keys.' (Bowles, 1970: 7). Clearly this can be seen as foreshadowing the technology that would allow the previously described 1955 RCA synthesizer to be programmed by reels of punched paper. It also led to a proliferation of programmable music instruments. Bowles describes this proliferation and the subsequent unification of these technologies in the following passage:

> 'Numerous fragmented and isolated efforts such as these were finally brought to mechanical perfection in the "Pianola" invented by E. S. Votey in 1897. In this instrument, a prepunched, perforated paper roll moved over a capillary bridge. Whenever the holes in the roll coincided with the 88 openings in the board, air was transmitted into the mechanism, activating sets of bellows with their corresponding striking linkages. The Pianola was rolled up to a piano so that its fingers, or strikers, hovered directly over the keyboard, note for note.'
> (Bowles, 1970: 7)

Here again the Pianola's sequencing capabilities are refered to as a context for programming of sound patterns[18].

[18] It is necessary to point out that the objectives of this study prevent a detailed analysis of the computer's origin the development of systems for programming computers. For example further crucial developments may include the printing telegraph. In 1859 David E. Hughes developed a typewriting telegraph which was based on a 'piano like-keyboard'. With this device a 'paper tape, propelled by a weight-driven motor, recorded in punched form the coded signals sent over the telegraph line to a receiving station.' (Bowles, 1970: 9). Other significant developments may have been D. D. Parmelee's patent of 'the first key-driven adding machine in 1850.' (Bowles, 1970: 9). The first 'Literary piano' in 1867, which was to develop into the typewriter (Bowles, 1970: 9), and Dorr E. Felt's 1877 calculator based on key-driven ratchet wheels (Bowles, 1970: 9). It was following these developments that the typewriter and the calculator were unified to create computational devices.

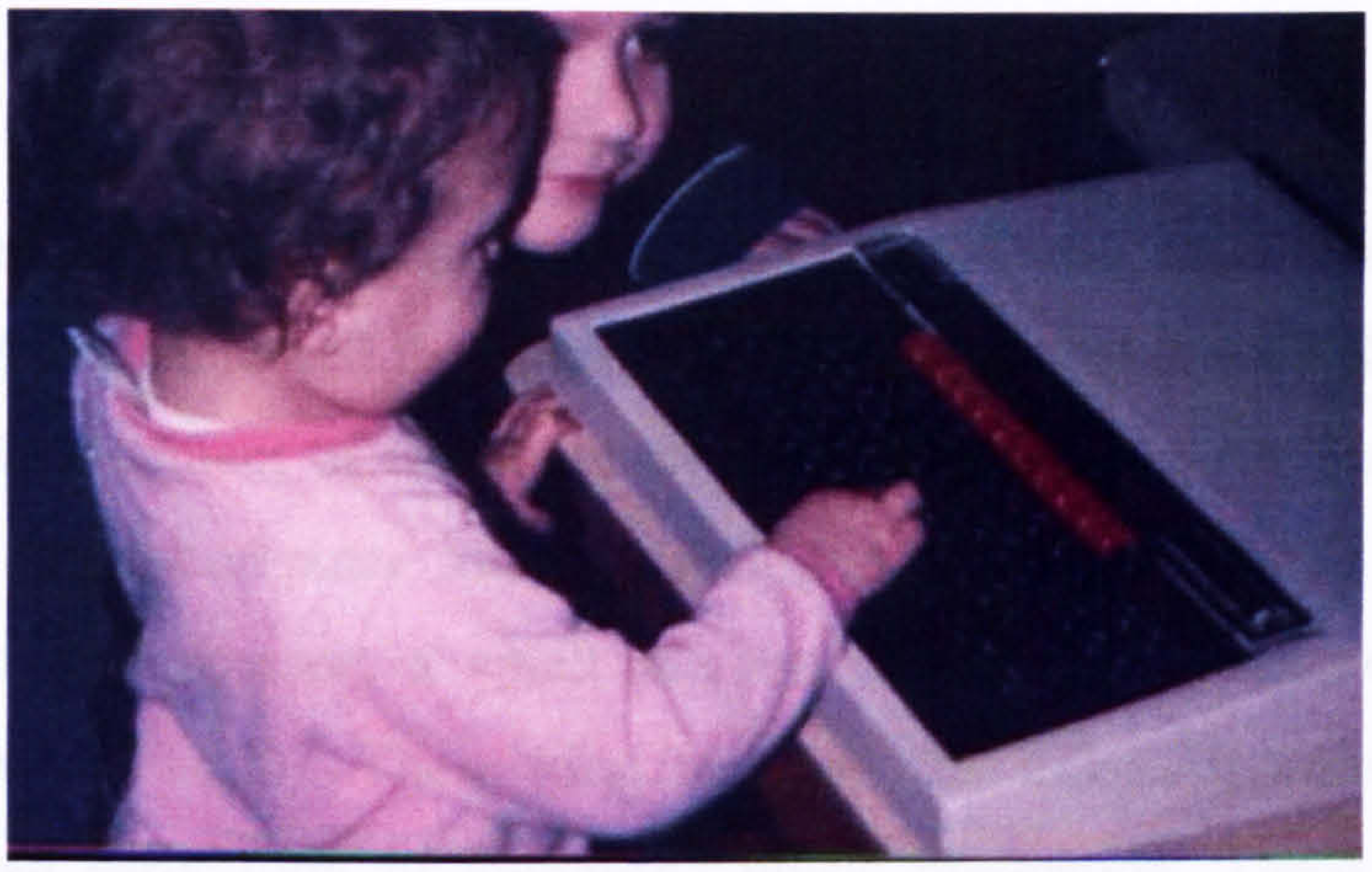

Figure 5.15: Me and my sister with our family BBC Micro computer in 1983.

This 1972 invention of the microprocessor is highly significant in the history of digital music technologies. As Kirk and Hunt suggest:

> 'By the early 1980s a revolution had occurred in the world of music technology. With microprocessors widely available and increasingly powerful, there was an explosion in the number of computer-based musical instruments and processing systems.'
>
> (Kirk & Hunt, 1999: 26)

The development of the microprocessor enabled the mass production of computer-based technologies and the result of this was a dramatic decrease in cost. This also led to further blurring between digital synthesizers and computer technologies as the microprocessor was at the centre of the development of both of these technologies.

It was during the mid 1980s that the Atari ST home computer was released onto the market with significant consequences. This computer had an integrated MIDI port which enabled it to be connected directly to MIDI devices. As a result the Atari ST became widely used as a MIDI sequencer which was able to control, store, and manipulate the performance information passed between connected MIDI devices (Warner, 2003: 25). This computer and others that followed, such as those manufactured by Apple, became the controlling devices or masters for networks of patched MIDI devices. The sequencing software installed on these computers, such as

Cubase and Notator, enabled this sequencing to occur (Warner, 2003: 25; see also chapter 6)

The development of numerous microprocessor technologies manufactured by Intel, Motorola and Zilog, increased the access and affordability of these technologies and, mirroring the development of electronic music instruments like the Theremin, led to 'do-it-yourself micro-computer kits, consisting of a single printed circuit board containing a microprocessor, a small memory bank, and a simple interface...' (Manning, 2004: 219-220). These kits then had the effect, it would appear, of democratising an early form of digitalised music production. These digital music technology kits were then appropriated into the production and performance practices of musicians.

It would then appear that this increasing commercial success and cultural appropriation of microprocessor boards demonstrated the existence of a market for computer systems. This then can be understood to be an opening point in the development of both home and commercial digital computer technologies, which, it would appear, led directly to the MIDI sequencing functions of the Atari.

This period in the history of the development of the digital computer is highly dense and complex. A vast number of technologies were being developed contemporaneously. Intel[19], Zilog[20], and Motorola[21] were all involved in developing increasingly powerful sixteen-bit microprocessors (Théberge, 1997: 59). Then in 1981 IBM entered the market with the IBM PC based on a sixteen-bit 8088 microprocessor (Manning, 2004: 221). This then can be understood to be one of the first mass-produced personal computers.

According to Risset, Max Mathews, who developed the first digital synthesis computer programs, developed the Music V programme in order to perform direct digital synthesis operations:

[19] The 8086 in 1978.
[20] The Z-8000 in 1978.
[21] The 68000 in 1979.

> '*Direct digital synthesis*, developed by Max Mathews in 1958, involves a computer directly controlling a loudspeaker through a digital-to-analog converter (DAC). Direct digital synthesis by computer is the most general sound synthesis process available.'
> (Risset, 1985: 116)

This then is perhaps the first example of computer-generated music or what is often referred to as 'computer music' in the literature of the 1970s and 1980s (see for example Risset, 1985; Ernst, 1972; Schwartz, 1973; and Bowles, 1970). Direct digital synthesis produces entirely digitalised forms of music and was a forerunner for the music software packages and virtual synthesis that are now widely available.

Revealing the relatively rapid transformation of the act of computer based music composition and programming from slow to rapid (or real time), and the general acceleration of cultural production in general, Schwartz describes the laboured process of computer composition in the early 1970s. The composer:

> 'selects "instruments" and dictates, note by note, timbre by timbre, the entire course of musical events as specifically as he can, by punching cards. Then, in all probability, he waits, perhaps for hours, perhaps for days, until his program is run off, until the finished digital tape (representing a series of numbers) is brought to the d-to-a converter, and until he has a magnetic recording tape (analog) in his hands for audio playback. At this point, he may very well discover that he's made a number of crucial errors in programming. These are probably not logical errors (the computer would have rejected that category during the run), but the wrong choice of timbre, perhaps, or an articulation that's not what he really wanted. So he must then change the information on a few selected cards and run the program through once more, resulting in a further wait. It is a time consuming process, but well worth it for those who desire the control offered by the medium. Remember, too, that the computer is being used here for "performance." Shouldn't a letter-perfect performance entail at least a few "rehearsals"? And, besides, waiting is a supremely relative affair. The few days that may elapse between the initial programming and the moment you hear your

> passage through loud-speakers (while interminable in comparison to the instant response of the synthesizer or the classic studio) is a trivial moment in time compared with the months and even years that go by before a live performance of your symphony or string quartet might take place.'
> (Schwartz, 1973: 93)

This passage is a useful point of comparison that demonstrates the level of transformation that has occurred between the slow and cumbersome practices of computer composition of these early models (in the first part of the 1970s) and the rapid, instant, real-time composition of contemporary music computer software packages (see chapter 6). Here the programmable synthesizer (such as the RCA synthesizer or the ANS synthesizer[22]) and the recording studio software package share a line of genesis that may be traced back to the 'programmable' Pianola.

In terms of cultural appropriations, as Roads has noted, this process of the primary production of music through computers, even in its early stages, does not entirely exclude live performance:

> 'The use of computers, computer controlled synthesizers, and digital hardware in live performance – pioneered in the early 1970s by Peter Zinovieff, Edward Kobrin, Salvatore Martirano, and Donald Buchla – has greatly increased in the 1980s. Digital processing in the performance of recent instrumental works by Morton Subotnick, Pierre Boulez, and Luciano Berio builds on earlier analog practices, but goes beyond these techniques to offer numeric and symbolic manipulations possible only in the digital domain'.
> (Roads, 1985: xiii)

Here we find an image of digital computer technologies 'building' on analogue technologies and practices. On this point Roads suggests that the 'ability of computers to listen and respond to *music*, and not just to *sound*, represents a qualitative change from previous analog electronic music possibilities.' (Roads, 1985: xiii).

[22] For a description and history of the photo-electric composition devices of the ANS synthesizer see Beer (2006).

On this point Roads makes a number of further distinctions between the digital technologies of the time (1985) and the analogue technologies that preceded them. According to Roads:

> 'Digital techniques offer the following advantages:
>
> - Precise and rehersable splicing and crossfading
> - Noise-free mixing, looping, and dubbing
> - Independent pitch and duration changing
> - Replication of one sound into a chorus
> - Highly selective echo and reverberation effects
> - Precise control of spatial location
> - Cross-synthesis, i.e., using the characteristics of one sound to shape the spectrum of another
> - Continuous timbral interpolation from one sound to another'
>
> (Roads, 1985: xii)

These possibilities have, of course, proliferated and expanded in more recent years, yet this digital analogue distinction from 1985 reveals the way in which the digital is defined in terms of its possibilities by its juxtaposition against the possibilities of the past. Indeed, the case studies in the following chapters reveal that these early distinctions remain central in contemporary understandings and practices associated with digital technologies[23].

---

[23] Recent developments in computer software have enabled many, if not all, of the possibilities and functions of the music-recording studio listed above to be transposed into the domestic space. These domestic studios are usually structured around pieces of home studio computer software (see chapter 6). It is now even possible to buy music recording studio packages for games consoles. Recording studios are now also dominated by computer software packages. This is a direct outcome of the increased digital technology of the studio instigated in 1976 with the first digital tape recording in professional studios following Stockham's development of the first digital multi-track recorder in Santa Fe (*The Observer Music Monthly*, No.22, 22nd of May, 2005). In more recent years the software package has become central to the practices of both the commercial and the domestic recording studio space. It is now possible, Mewton argues, to 'bring entire orchestras of recorded sound into your music.' (Mewton, 2001: 64). This suggests first that a significant transformation has occurred in terms of the access to different sounds, to expand further the library of voices. And, second, that music has been somehow democratised. Mewton identifies DJ Shadow's mid 1990s 'landmark Endtroducing album' created 'using just a sampler, a PC and few outboard effects' (Mewton, 2001: 64), as a key example of this apparently democratised use of computer based sampling technologies.

3.7 From the phonograph, to CD, to MP3: inscription and reproduction in the second age of the digitalisation of music

> 'The phonograph is yet another musical device embodying both the stored program concept and its retrieval. In 1877 Thomas A. Edison worked on a telegraph repeater which embossed the Morse code dots and dashes into a paper tape and later replayed the message any number of times, thus providing an electromechanical instrument for transmitting messages automatically from one station to another. When the punched tape raced through the device at high speed, the indented combinations of dots and dashes actuating the end of a steel spring giving off what Edison described as a "light musical, rhythmic sound resembling human talk heard indistinctly."'
> (Bowles, 1970: 7-8)

As Sterne (2003) has identified, when discussing the reproduction of sound, it is often Thomas Edison's 1877 (Bowles, 1970; Sterne, 2003) or 1878 (Kittler, 1999) invention of the phonograph, and its ability to record and playback sound, that is identified as the seminal moment in music reproduction history[24]. This is regarded as the first moment when sound could be recorded and reproduced.

More recently, following periods of dominance for the vinyl record and the audio-tape, the Compact Disc (CD) can perhaps be understood to be the dominant format for music reproduction of the first age of the digitalisation of music. Indeed, it was in 1988 when CD sales exceeded LP sales for the first time (*The Observer Music Monthly*, No.22, 22nd of May, 2005). During the 1980s and 1990s the CD was central in the appropriation of musical forms.

The development of the CD in 1981 can be understood to be a seminal moment in the digitalisation of music. It was at this point that a mass-marketable digital music reproduction format became available. However, elsewhere it is noted that it was in 1980 that the Philips/Sony compact disc standard was finalised after development

[24] Kittler (1999) goes on to develop far greater depth to this story of the phonograph.

began in 1969 (*The Observer Music Monthly*, No.22, 22nd of May, 2005). Whether developed in 1980 or 1981 it was over the years that followed, and particularly during the 1990s, that the inscription of music as a cultural form was digitalised with the wide scale use of the CD. With the CD, a digital format, even musical artefacts produced prior to the digital age were increasingly being digitalised: digitally remastered and re-issued[25].

More recently the new millennium has seen the rise of MP3. This is a phenomenon that is often understood to have redefined the appropriation of music (Mewton, 2001). This, along with other music compression technologies, can be understood to be the defining music reproduction technology of the second age of the digitalisation of music.

In his book *All you need to know about Music and the Internet Revolution* (2001) Mewton poses the question 'What is MP3?', he answers:

> 'In techno-speak, MP3 stands for Motion Picture Experts Group One, Audio Layer Three – a reference to its origins as an inter-standard compression program when it was invented in 1991 by a German research firm, initially for broadcast use. Of more interest to the world's music fans, the MP3 compression program operates as an open file format, allowing users to convert the masses of data that make up audio files into much smaller, near CD-quality MP3 files.'
> (Mewton, 2001: 25)

Work on MP3 began at the Fraunhofer institute in Germany in 1987, this project was 'code-named' the Eureka project EU147 (*The Observer Music Monthly*, No.22, 22nd of May, 2005). A patent was received for this work in 1989 (*The Observer Music Monthly*, No.22, 22nd of May, 2005), which was followed in 1996 by the US patent (*The Observer Music Monthly*, No.22, 22nd of May, 2005). These patents resulted in

[25] Even a cursory glance around a record store reveals the vast quantities of 'classic' albums by bands such as The Beach Boys, The Kinks, The Clash, etc, that have been digitally remastered and are now available on CD format.

'all developers of MP3 encoders players having to pay a licence fee to Fraunhofer' (*The Observer Music Monthly*, No.22, 22nd of May, 2005).

In terms of functionality:

> 'MP3 works by compressing packages of digital information – such as computer programs, video clips and songs – to approximately one twelfth of the size of a normal audio CD file (in the case of songs) while losing only negligible audio-quality fidelity. The files are decompressed on arrival at the end user's computer and can be played back on an MP3 player, which can be downloaded for free from web sites such as http://www.mp3.com.'
> (Mewton, 2001: 25-26)

MP3[26] reduces the size of music files so as to increase the possibilities of mobility (transfer) and storage. However, this compression of music has implications. As Mewton identifies, 'One of the biggest myths about MP3 is that, because it is a digital music format, it sounds exactly the same as any other digital format, such as CD.' (Mewton, 2001: 26). The MP3, despite the utopian images of perfect digital reproducibility without deterioration, is not a perfect reproduction, although the difference is minimal. This is because compression 'works by sifting through and deleting selected sound frequencies in order to enable the transmission of only the key frequency elements present in the music.' (Mewton, 2001: 26). The MP3 file then contains the key elements of the music and removes the peripheral characteristics or elements of the piece. Therefore, when listening to an MP3 version of a piece of music we are hearing only a selection of 'key' elements, a simplified version.

MP3 players originated in 1988, and are now manufactured by a wide range of companies including Sony, Creative, and Alba, along with the dominant Apple iPod. The Apple iPod itself wasn't launched until 2001 (*The Observer Music Monthly*, No.22, 22nd of May, 2005). These mobile MP3 players, that enable the storage, retrieval, and reproduction of large quantities of music, are examined in further detail in chapter 7. However, in terms of genesis, the MP3 and the MP3 player can be seen

[26] 'To create MP3 files, you need to use a program known as an *encoder*' (Mewton, 2001: 38)

to descend from the various mobile music reproduction technologies of the recent past such as the personal stereo based upon the tape, and more recently the digital CD and MiniDisk.

3.8 The first piece of electronic music! The first piece of digital music?

> 'there are many composers today, surrounded by the most sophisticated of synthesizers and computers, who genuinely prefer tape-splicing, the use of loops and snippets of tape (fitting these together in mosaic fashion), and the alteration of natural sounds. They enjoy "building" tape patterns with their hands, the feel of the razor blade and the splicing block, the excitement of improvising with filters and mixing equipment in the studio, the happy accidents of juxtaposition that occur when unrelated channels are combined.'
> (Schwartz, 1973: 57)

Electronic music was celebrated and distinctive, surprisingly digital music has not received anything close to equal cultural acknowledgment. Indeed it is not clear what represents digital music, or what, in fact, can be described as the first piece of digital music. Unlike the *electronic music* that preceded it, *digital or digitalised music* has not become a genre or type of music in everyday discourse. Indeed, certain types of digitally produced music that take on particular 'stylistic signifiers' (Sandywell & Beer, 2005) are sometimes even referred to as Electronica or Electronic rather than Digital, Digitalised, or Digitalia.

In terms of categorisation, illustrating the blurring between electronic and digital, Ernst identifies 'three main types of electronic music: musique concrète; music by synthesizers; and computer music.' (Ernst, 1972: 3). In this final section of this brief history I will look at these in turn.

According to Ernst:

> 'The first electronic music studio to be established was founded by Pierre Schaeffer in Paris in 1948. Schaeffer, working for the Radiodiffusion-

Television Francaise (R.T.F.) as a broadcaster, began his studio with the facilities at the R.T.F. – variable-speed tape recorders and phonographs, microphones, and sound-effects records. The first electronic music, therefore, was composed solely with this equipment, and it has since been termed musique concrète – transformation of natural sounds by tape manipulations.'

(Ernst, 1972: 10)

Musique concrète, established by Pierre Schaeffer, is often understood to be one of the first forms of electronic music due to its use of recorded sounds in its compositions. These were generally recordings of everyday sounds, such as steam engines, which were cut into orchestrated music. Clearly this can be understood to be a forerunner for sampling, a practice which proliferated in the 1980s onwards largely as a result of the popularity of hip-hop music. It is for this reason that Ernst describes the 1935 invention of the tape recorder[27] as being one 'of the most valuable inventions to the field of electronic music...Without this instrument electronic music would have virtually been non-existent.' (Ernst, 1972: 7). The problem until this time was that 'Records were an inappropriate medium for editing, but tape could be chopped up, rearranged, copied to another tape, looped and sections removed, thus providing a completely new way of organising and transforming musical sounds.' (Kirk & Hunt, 1999: 14). Therefore, the development of tape enabled sounds edited, chopped up, looped, etc, in the construction of new musical forms. These developments can perhaps be understood to represent a line of genesis in terms of the development of sampling (see chapter 6).

[27] By Allgemeine Elektizitts Gesellschaft (Ernst, 1972: 7)

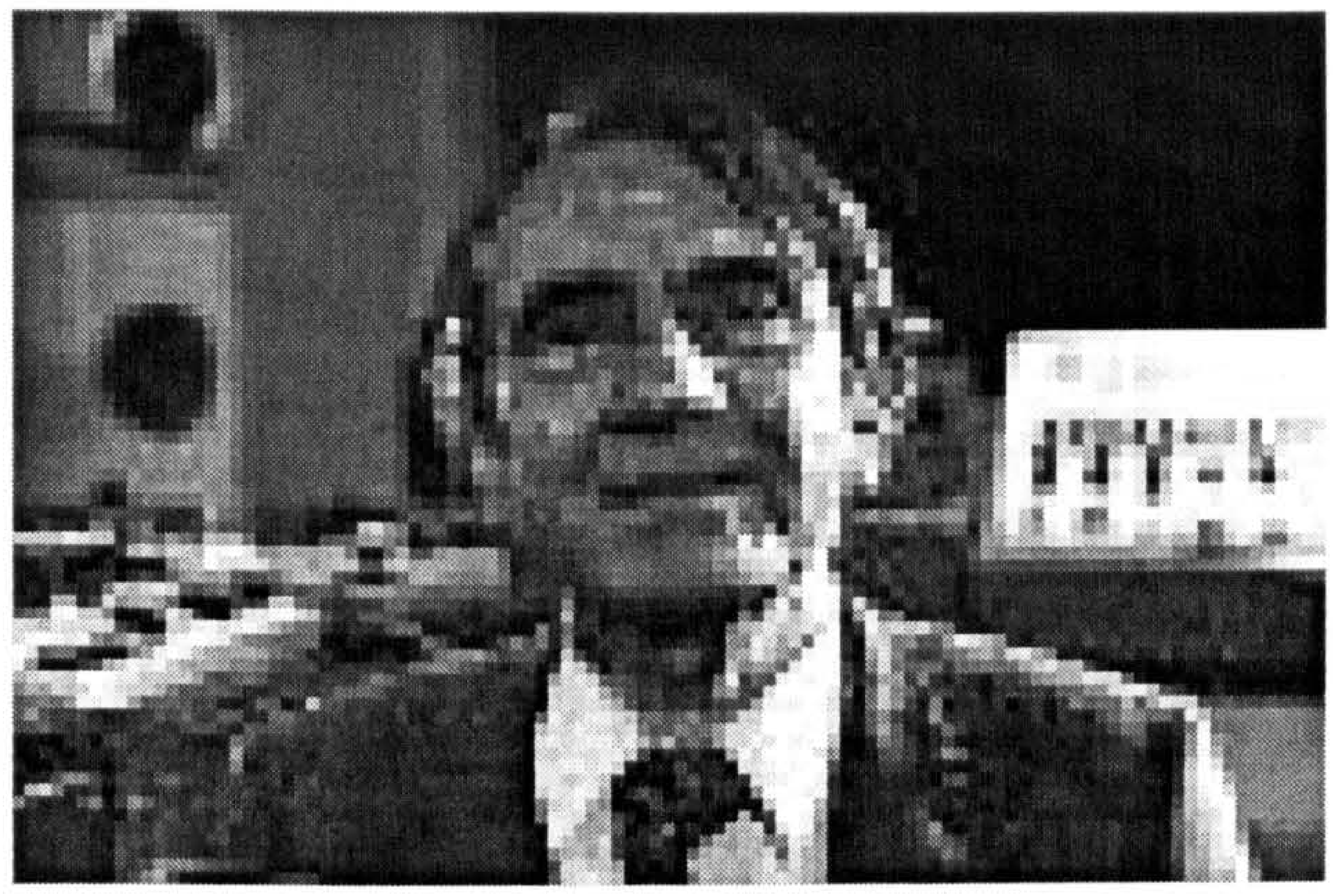

Figure 5.16: Pierre Schaeffer (csunix1.lvc.edu)

Significantly, for Hayles, like 'the phonograph, audiotape was a technology of inscription, but with the crucial difference that it permitted erasure and rewriting.' (Hayles, 1999: 209). This function along with the possibilities of splicing and looping afforded the sampling practices of Musique concrète, for 'whereas the phonograph produced objects that could be consumed only in their manufactured form, magnetic tape allowed the consumer to be a producer as well.' (Hayles, 1999: 10). It was the very flexibility of the medium that enabled recorded sounds to be re-appropriated into production practices. As such we see here the technical origins of the increased blurring of production and reproduction (see chapter 3). In terms of historical development, according to Hayles, as 'early as 1888, Oberlin Smith...proposed that sound could be recorded by magnetizing iron particles that adhered to a carrier.' (Hayles, 1999: 209), however, 'only in 1948 was the first American patent issued for a magnetic recording machine using film tape and a ring head.' (Hayles, 1999: 210).

The 'splicing' or 'sampling' practices of Musique concrète only became possible with the development of this magnetic audiotape. Ernst notes that:

> 'Schaeffer's first compositions were completed in 1948, and the earliest ones were very short in length. Five works from this period are: ETUDE AUX CHEMINS DE FER (CONCERT OF LOCOMOTIVES), which was based on sound-effects recordings of locomotives; ETUFE AUX TURNIQUETS, in which Schaeffer used a xylophone, bells, toy whistling tops, and variable-speed phonographs as his sound sources; ETUDE AU PIANO I and ETUDE AU PIANO II, which were based on a series of chords played on a piano and

then transformed by means of tape manipulations; ETUDE AUX CASSEROLES, which used spinning covers from pans, canal boats, spoken and sung sounds, harmonicas, and a piano.'
(Ernst, 1972: 10)

Indeed, Schaeffer's compositions were often named after the samples of sounds that were contained within them.

This technology and practice then opened up the possibility for the inclusion of pre-recorded sounds in music production and as such carved a path for the introduction of sampling and sampling technologies. As Ernst argues:

> 'The choice of sounds that Schaeffer employed in these early works shows not only a great imagination, but an increased awareness for all types of sounds. Composers were now beginning to think in terms of 'pure' sounds, and they were no longer restricted to using only the standard orchestral instruments.'
> (Ernst, 1972: 10)

Schaeffer's experiments in electronic music, based upon the reproduction of recorded sounds, suggested the possibility of incorporating wide varieties of sounds into musical forms, sounds that were understood in distinction to traditional musical timbre.

Musique concrète developed rapidly as a cultural movement in the years that followed. In '1949 Schaffer was joined by another French composer, Pierre Henry, and the following year they collaborated to compose the SYMPHONIE POUR UN HOMME SEUL (SYMPHONY FOR A MAN ALONE).' (Ernst, 1972: 11). This was then followed by a number of collaborations and the further expansions of the Musique concrète movement. Details of this movement, the techniques developed, and the influence of their practices can be found across a variety of music history texts (for example see Ernst 1972 & 1977, Schwartz, 1973, and Kirk & Hunt, 1999).

It wasn't until after the development of musique concrète that electronic music moved beyond this embryonic stage of spliced loops. For Ernst:

> 'Pure electronic music was born in Germany in the early 1950s. It differs from musique concrète in that it employs electronic sound generators and modifiers rather than "natural" sounds in compositions.'
> (Ernst, 1977: 26)

Ernst's notion of a 'pure electronic music' is based upon electronic sound generation rather than the sampling/editing of recorded sounds. This, for Ernst, was 'born' in Germany in the 1950s. He details this development in the following passage:

> 'In 1948, the same year that witnessed the first musique concrète compositions of Pierre Schaeffer in Paris, Homer Dudley of Bell Telephone Laboratories introduced the "vocoder" to Werner Meyer-Eppler, a Physicist and the director of the Institute of Phonetics at Bonn University. The vocoder was a device capable both of analysing sound and simulating speech. It provided the basis of Meyer-Eppler's lecture "Developmental Possibilities of Sound," which he presented the following year. Meyer-Eppler and Robert Beyer delivered additional lectures on electronic music in 1950 at Darmstadt. At that time, Beyer was working at the North-west German Radio (WDR) in Cologne. In 1951 Meyer-Eppler succeeded in synthesizing sound electronically by using the Melochord. Developed by the German engineer Harald Bode in 1949, the Melochord employed oscillators for the production of tones. By 1952 the Cologne studio was in operation at the WDR, and the following year Beyer collaborated with Herbert Eimert to produce the first purely electronic compositions; excerpts of some of these works are included in an album of recorded lectures, *Elektronische Musik*, by Eimert.'
> (Ernst, 1977: 26-27)

Kirk and Hunt also identify Eimert's *Elektronische Musik* in 1952 as being one of the first pieces of music to use only 'synthesized' sounds (Kirk & Hunt, 1999: 15). Eimert's pieces were followed by a combination of synthesized and sampled sounds in the work of Karlheinz Stockhausen in 1953, and in his 1956 composition *Gesang der jünglinger*. Stockhausen's work, following Schaeffer and Eimert, is clearly a forerunner for the contemporary sampling phenomenon, in which small sections of music are *cut and pasted* into new musical forms. This has become particularly prominent in the repertoires of contemporary hip-hop musicians/performers such as Public Enemy, N.W.A, Skinnyman, P Diddy, Jay Z, 50 Cent, Dizzee Rascal, and Eminem.

In 1948, revealing the reception of electric sound generation technologies, Reginald Whitworth wrote the following:

> 'When the first edition of this work appeared [in 1930], the production of sound by purely electrical means was in its early infancy; since when it has developed until the electronic child (like some human children) can be charming, useful, or annoying according to circumstances.'
> (Whitworth, 1948: 204)

Again we see here a separation of these new forms of organ and other electronic instruments from traditional forms of instrument by describing one as 'electrotone' and the other as 'legitimate'. For Whitworth, Electrotone has its 'place' but it cannot substitute the sounds of legitimate forms of music. This offers an interesting insight into the possible reactions of musicians and instrument builders with regard to the acceptance and perceived significance of electronic musical instruments. What is clear is that Whitworth was struggling to find a summerative term to define these phenomena, a problem that we now see facing the study of emergent digital technologies and ICTs (see chapter 1 and chapter 2).

I will now conclude by focusing first upon what was often referred to in the 1970s and 1980s as computer music. Again, when attempting to historicize 'computer music' the problems of categorisation become apparent. As Schwartz identified as far back as 1973:

> 'If the term "electronic music" causes confusion, "computer music" has proven an even more ambiguous phrase and a frequently misinterpreted one.

When people speak of "computer music," they may, in fact, be referring to any one of three totally different kinds of operation: (1) the use of the computer to control various settings of synthesizer modules, (2) music actually composed by the computer itself, or (3) the computer used for "performance" of preconceived ideas, generating information that can be transformed into sound.'

(Schwartz, 1973: 87)

Computer music then can be understood to encapsulate these three central practices. Although a number of emergent contemporary practices, such as computer based sampling, the alteration of recorded sounds through effects technologies, the transfer of music files, internet based composition and collaboration, amongst other practices, now need to be added to this list.

In terms of the origins of this computer generated or controlled music, Bowles claims that:

'Starting in 1955, Lejaren A Hiller, Jr., and Leonard M. Isaacson at the University of Illinois began a series of experiments to evaluate a broad spectrum of compositional techniques in terms of their suitability to computer programming. They demonstrated that the machine could either generate musical scores by conventional means or produce an output governed by probability distributions. One Major result was the now-famous *Illiac Suite for String Quartet.*'

(Bowles, 1970: 14)

The computer and the synthesis program, in this instance, perform the role of composer generating musical scores. This was then followed by the development of computer generated music when 'Max Mathews and his associates at the Bell Laboratories began generating music by computer in 1958' (Bowles, 1970: 15). These early forms of computer music generated by Mathews[28] using the Music V

[28] 'These experiments answered two major difficulties facing composers of conventional electronic music, namely, the generation of complex wave-forms and the precise assembly of noise-free, multiple sounds. The computer produced and variety of these by sampling given wave-forms at regular and

programme can perhaps be understood to be the first forms of digitalised music, which, in this instance, can be defined as music generated by digital technologies.

Early computer music and computer music programs opened up the possibilities for contemporary music studio software packages. However, the exact material similarities are not possible to unravel without accessing these original devices and programs[29]. What can be concluded is that digital music is fragmented and diverse, and that even from its inception what was known as computer music represented a broad range of music types, technologies, and practices.

4. Conclusion: the key lines of genesis

For Foucault it 'is wrong to search for descent in an uninterrupted continuity, we should avoid thinking of emergence as the final term of a historical development.' (Foucault, 1991: 83). Emergence is complex and unpredictable, it is a product of interconnectivity and unforeseen consequence, as are its developments, implications and outcomes (see Urry, 2003). Even from this relatively brief history it becomes clear that the digitalisation of music and music culture, and indeed the history of digital music technologies in general, is far from a clearly defined transition between eras or bounded sets of socio-technological phenomena[30]. So, although it is possible to identify a first and second age of digitalisation, the technical and cultural relations between these eras are complex and deeply interwoven. Indeed, digitalisation has a complex history of interconnected phenomena woven intricately into musical practices and specific cultural forms. This history, which only touches the surface, illustrates that digitalisation may be thought of as a complex term standing in for a vast set of mobile, interdependent and interconnected phenomena, the boundaries of which are *technically and culturally slippery.*

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frequent intervals (...), producing thereby series of numbers which approximated the sounds. In the reverse process, digital-to-acoustic conversion, these numerical approximations of the original sound waves were put on magnetic tape, converted into pulses, the amplitudes of which were proportional to the numbers, smoothed out by filtering, and fed to a loud speaker. Work on computer and sound production, originated at Bell laboratories, has been continued and extended at Princeton University, where the entire original program has been rewritten by Godfrey Winham and Hubert Howe.' (Bowles, 1970: 15)

[29] The interfaces, control mechanisms, and possibilities of these early forms of computer music program, such as Mathews Music V, are not made clear in the literature.

[30] This chapter then is only a partial answer to Sterne's question regarding 'what happened to the sonic and the digital that led to their mutual entanglement.' (Sterne, 2003: 337)

However, having said this it is possible to identify some key moments and lines of genesis that may be opened up for further questioning and critical analysis. These then are not definitive statements on the order of development, nor are they complete workings of these complex interconnections. Rather they are sets of connections offered as a point of departure.

An inventory of these key moments, innovations, and lines of genesis that represent the establishment of the possibilities of the contemporary state of digitalisation would include the following: the barker leaver (1832) and the separation of the interface/controller from the sound production device[31]; MIDI (1981-983) and the resolution of the issues of digital compatibility; the analogue-to-digital and the digital-to-analogue converter (exact date unknown) that brought together the previously detached spheres of music and the digital computer, and in so doing opened music up to the possibilities of computer software; and, finally, the development of the CD (1980-1981) and MP3 (1991) which digitalised the everyday appropriation of music. Of course this is by no means an exhaustive list, for example I have excluded here the significance of the cultural impact in the 1960s and 1970s of the Moog synthesizer, the Pianola's early form of programmable sequencing, the development of the first synthesizer (the RCA in 1955), or even the development of early electrical sound generation based music instruments (1920s) such as the Theremin. Indeed, these all carry significance and should not be overlooked.

In addition to these, and to situate this history in broader social structures and transformations, we see in this history the significance of 'transectorial innovation' (Théberge, 1997). As discussed in chapter 3, transectorial innovation occurs where 'innovations developed to meet the needs of a specific industrial sector come to play an important role in the creation of new innovations and commodities in formerly unrelated industries.' (Théberge, 1997: 58). Clearly there are a number of innovations from outside of the sphere of music technologies that have in some way contributed to or maintained certain possibilities from which the digitalisation of music has been formed. Take for instance the significance of the electro magnet, magnetic audiotape,

[31] It is also worth considering how the telephone contributed toward this separation on a broader scale.

the microprocessor, the home computer, telephone systems, fibre-optic cable, ISDN, etc. MP3 (1991) could also be thought of as transectorial as it was originally designed as a broadcast medium. In addition to these technical innovations we may also add the cultural innovations that created markets and provided manufacturers with feedback loops informing particular developments. Here we may list Musique concrète, Walter/Wendy Carlos' Moog synthesizer based reworkings of classical music in the 1970s, the electronic music of the 1980s as exemplified by Kraftwerk and New Order, Hip Hop's appropriation of sampling technologies and practices in the 1980s onwards, amongst innumerable others. Within this the influence that music technologies had upon wider socio-technological developments is perhaps an area that requires further exploration.

Having said this, there are, however, some underlying themes emerging from this history, and these lines of genesis and transectorial innovations, that may contribute toward the historical grounding of the defining features of the digitalisation of music and music culture. Taking some of the emergent themes outlined in the prior literature review (see chapter 3), we see here evidence of boundary shifting between production and reproduction, with the development of pre-programmable sounds and sampling technologies, as well as the blurring of the boundary between music technology and the computer, with the analogue to digital converter and the computer music technologies that followed. We also find accounts in this history of digitalisation as a processes of democratisation in the rapid reduction in cost resulting in the opening up of access to digital music technologies, alongside the dramatic expansions in possibilities of these devices and the removal of problems acting to constrain creativity. However, the most significant issues that emerge across this history concern the pursuit of memory and the ongoing miniaturisation or shrinking of these technologies.

The technologies described tend to pursue greater memory or storage capacities. The unifying aim across these innovations appears to be the expansion of what is labelled here as the *library of sounds*. The 'problem' these technologies aim to 'resolve' is the limitation of storage. These lines of genesis reveal attempts to open up the possibilities afforded by the ability to recall sounds rapidly from musical archives. This library of sounds may then be called upon, as demonstrated by the practices of the musique concrete movement for example, in the processes of music production, reproduction and appropriation. Yet it is not only sound that becomes more storable and mobile through the ongoing processes of digitalisation, so do the music technologies themselves. Indeed, this history, and its accounts of music technologies getting smaller and more mobile, illuminates the miniaturisation of music technologies as a defining theme of digitalisation. From the bulky RCA synthesizer in 1955 through to the Moog and MiniMoog to contemporary virtual synthesizers, or from the phonograph to the CD to MP3, miniaturisation is perhaps the central defining theme that emerges from this brief history.

These are merely a few of the 'numberless beginnings, whose faint traces and hints of color are readily seen by a historical eye.' (Foucault, 1991: 81). As such this is intended only as an opening, a foundation, a point of departure designed to inform and contextualise the following case studies which deal with the specifics of the contemporary state of the digitalisation of music by focusing centrally upon the recording studio, MP3 and the MP3 player, and the music downloading phenomenon.

Chapter 6: Acoustic environments: the digitalisation of the recording studio and the interconnected zones of music production

Chapter contents

Chapter abstract

The digitalisation of the recording studio affords a series of functional transformations, particularly with regard to sound editing and processing. However, perhaps the most significant transformation is the emergence of home recording studio software packages that enable domestic spaces to be reconfigured as near professional recording studios. Extending the functions of the home 4-track studio, these software based digital home recording studios are almost identical, in terms of functionality, with the professional studio. Drawing on theories of zones and zoning, in addition to a series of semi-structured interviews with music technicians, this chapter argues that the increased accessibility of the home recording studio has forged what might be called two zones of music production: the professional recording studio and the home recording studio. Following a brief introduction the chapter begins with the material and functional details of the general movement from analogue to digitalised recording studios. Then in the third section it conceptualises the recording studio in terms of zoning theory and in so doing identifies these two zones of music production. I then look at these two zones in turn in sections four and five. In section six I argue that in light of these illustrations it is necessary to develop a theory of interconnected zones. I then conclude by identifying the properties that demarcate the zones of music production as complex and interconnected technosystems.

1. Introduction

This chapter, which draws on ethnographic observations and a series of semi-structured interviews with music technicians, addresses two central questions: What are the key transitions, if any, in the shift between analogue and digital recording studio spaces and practices? And, second, considering the rise of recording studio software, what are the key differences in function and practice between professional and home recording studios?

Following this introduction the chapter is divided into six sections. The first deals directly with the functional aspects of the movement from the analogue to the digitalised recording studio. The second section, drawing on recent theories of zones and zoning, considers how these transformations have facilitated the emergence of a virtual home recording studio that shares functional parity with the professional studio. As such the home recording studio software package, extending the functional possibilities and availability of the audiotape based 4-track home recording studio, has created two separate recording studio spaces or 'zones': the professional recording studio and the home recording studio. In the third and fourth sections I focus briefly on each of these zones. In these sections I consider the implications of digitalisation in terms of the practices and processes that occur within these zones. In the fifth section I compare these two zones to understand how they are distinct and/or interconnected in the practices of digitalised music production and reproduction. I then conclude by identifying some of the key aspects of the digitalisation of the recording studio.

The central argument of the piece is that, amongst a series of technological transformations associated with the appropriation of digital music technologies in the practices of music production, digitalisation has demarcated two distinct yet interrelated 'zones' of primary production: the professional recording studio and the home recording studio. These are both complex technosystems that are distinguishable in terms of their *environmental properties* rather than their *functionality*. Within this I argue that Lash's theory of zones may be recast to incorporate the interconnectivity of these zones as *official* and *unofficial* zones of cultural production.

Before exploring the specifics of these zones in detail, to set the scene, I will begin with the general transformations that have occurred in the movement from the analogue to the digitalised recording studio[1].

2. From analogue to digitalised recording studios

> 'I can feel her country soul in every digitally encoded bit.'
> (Lisa Simpson on *The Simpsons*, Channel 4)

> 'I think that's very important that the technology is creating this access, that we're getting away from this elitism, and anyone from any walk of life can really get to make a film. Even with now, with the programmes available now to edit: people are making music, they're cutting films, they're doing their own graphic design, they're creating marketing companies from their very bedrooms. This is happening, this is the future. And I think we have to move with that.'
> ('Filmmaker' Greg hall, in *Times Online*, 30th of October 2005)

From the outset it is worth considering some of the general transformations that have occurred as the recording studio has been digitalised. This can be reduced to three prominent transformations: non-destructive and non-linear editing, effects and plugins, and increased accessibility. To add a fourth category we may also consider here the emergence of new problems with inconsistency and incompatibility that are associated with this process of digitalisation. I will open by focusing very briefly upon each of these.

2.1 Non-destructive and non-linear editing

Some of the most significant transformations in the functionality of the recording studio are associated with editing[2]. According to one interviewee, the practice of editing:

[1] Notice here that I distinguish between a digitalised studio and a digital studio. The digital studio is entirely digital whereas the digitalised studio combines analogue and digital technologies in various formations. As such the digitalised studio is not distinct from the analogue studio, but is rather a technological extension of the functionalities of the analogue space.

'which is what you would have done in the past with a tape machine and a razor blade, you can now do that on a computer. And you can do what's known as non-destructive editing, i.e. you are not actually cutting something you are basically telling the computer which bits of audio to play when. So that's been a phenomenally important you could do things in computer editing that you couldn't possibly ever have done with an analogue tape machine.'
(Technician B)

The shift here is from the manual splicing of tape, the destruction of the original, to the manipulation of the order in which the computer reproduces selected excerpts of the original, the non-destruction of the original. This then opens up a range of new editing possibilities. Technician C describes the non-linearity of this editing, as well as the infinite number of audio tracks, as being the significant transformation:

'There's non-linear editing, the fact that you can cut and paste as easily as you can with a word document, has changed the way that people will write and produce music. The fact that you have effectively these days got an unlimited number of audio tracks, so you don't have to get everything onto eight tracks as you used to.'
(Technician C)

The non-destructive editing of the original described here is a non-linear process in that the original is constructed through the layering of 'tracks' that may be individually accessed, moved and altered. This non-linear editing practice is comparable with cutting and pasting of text around a document using word processor software[3]. Sections of musical texts may be selected, relocated, copied, deleted, altered, etc. This non-linear technology has largely replaced the linear tape-on-spool technology based upon the reproduction of a linear line from start to finish (or backwards from finish to start). Digital editing need not follow this single line but

[2] Technicians A, B and C all identified this as a key or significant area of development that had greatest implications for their own practices and the music itself.
[3] The linearity of analogue tape could be compared here with the tape of the typewriter. Both have been superseded by non-linear form of editing.

may be built upon, imbricated with 'infinite' other tracks, sections may be copied, duplicated, removed, replaced.

2.2 Effects and plugins

The second significant technological transformation in the move to the digitalised studio concerns sound 'processing'. This, according to the interviewees, is perhaps the area of most radical transformation as the digital music software package has created a vast range of new possibilities[4]. Technician B described processing in the following terms:

> 'applying different effects to sounds. In particular the advent of software plug-ins, for these large pieces of software, which means that anyone with a basic knowledge of C++ and audio processing can write a plug-in which can then be used in any of these big packages like Nuendo or Cubase. And people can use it just as they would do a real time studio effects processor, so that's been a huge thing as well.'
> (Technician B)

Software plugins, obtained either as internet downloads (Technician A) or self-programmed (Technician B), enable additional functions to be added to music studio software packages. These take the form of effects that may be used to manipulate or mutate stored sounds into new forms[5]. All three technicians interviewed identified the plugin as a particular significant development. These plugins can be written in programming language, downloaded for free from various internet sites, or purchased:

> 'I write plug-ins as well and I make them available free of charge... You write them in C++ or C...there are some good ones you can get for free, and there are also plenty that you can buy as well which are very good quality.'
> (Technician B)

[4] For example it is now possible for 'Whole orchestrations [to] be produced by a single person.' (Technician A)

[5] As one interviewee claimed: 'Once sound is digitised it is malleable, transportable and storable without degrading sound quality...Digitization allows us to study sound in greater depth, get inside the sound and tweak parameters with greater accuracy than ever before. This has had a massive impact on the way in which we compose and listen to music.' (Technician A)

The plugin then, as the name indicates, is a virtual enhancement of the digitalised recording studio. The digitalised software based recording studio can be built upon, the studio may then be developed as an ongoing and reflexive project. The functionalities of these spaces then is not fixed or limited but is open to reformulation and adaptation.

In terms of technological genesis, the plugin originally replaced:

> 'the kind of effects that you would see in an outboard rack in a studio. In a hardware analogue studio you would have an analogue mixing console and you would have a number of different effects processes which you would patch into the mixing desk and you would use those. And initially plug-ins really gave you that kind of functionality, reverberation, delay, chorus, flanging, those kind of things. But now as the processing power of computers has increased they've become much more esoteric and they do many many more different kinds of things, and they also do the kinds of things that you only use to be able to…in research institutions...So they started off by replacing what was in the rack and they've gone on to become a vast array of weird and wonderful tools some of them quite good, some of them really good, the majority of them probably pretty awful.
> (Technician B)

The plugin then began, in a similar way to the mixing facilities of recording studio software (Technician B), by replicating particular analogue studio technology. However, in the case of sound processing and the plugin these initial imitations of analogue technologies were superseded by digital possibilities as the plugin expanded out to create new unpredicted functions as institutions and individual programmers explored possible applications. The plugin began by offering conventional effects, achieved in the analogue studio by connecting effects devices via cables to the mixing desk, but moved beyond these material restrictions expanding the affordances of the studio beyond its analogue boundaries[6].

These plugins have mutated in innumerable directions, a number of which offer quite radical effects. For example:

> 'There's one called madshifter which is a sort of pitch shifting plug-in, there are many which are just designed to mangle your audio in as unexpected ways as possible. Which kind of ties in with the current aesthetic in electronic music which is this sort of post-digital aesthetics of failure and that kind of thing.'
> (Technician B)

These types of radical plugin transform music in unexpected and unpredictable ways. These devices create mutations of the original that may be uncontrollable with results that are unrecognisable from the original. It would seem that this unpredictability or *simulated inaccuracy* has now emerged as a type of cultural or creative movement in the musical arts, the movement toward *post-digital aesthetics*. In this sense *post-*digital aesthetics are an attempt to capture some of the *pre*-digital aesthetics of inaccuracy and unpredictability:

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[6] Furthermore, these digital recording studio technologies are now widely used to manipulate and transform recordings. This can be understood to have consequences not only for the musical form but also for the way that we consume historical events. One of the most recent and culturally significant instances of this relates to the recent global Live 8 phenomena in which a series of concerts were held on the 2nd of January 2005 to correspond with the G8 political summit. At this megaevent a series of popular music performers performed 'live' versions of two or three songs from their repertoire or covers of other artists music. A recent report in *The Sunday Times* (21st of August 2005) has suggested that the DVD of this live event has been manipulated using *Auto-Tune*, a piece of software used to isolate and tune-in parts of a music track, so for example the vocal performances of the recording are in tune. The televised broadcast of the event did not use this technology, so as a result the experience of being at the event or even watching the televised footage, despite both being simulations, will be significantly different from the DVD (Digital Versatile Disk) of the event. In a truly cyborgian discursive formulation this process is described in the article as '"Botox for the vocally challenged"' (*The Sunday Times*, 21st of August 2005). This article makes reference to an interview with a studio technician who suggests that by 'cutting up and reassembling notes it [Auto-Tune] can erase the wrinkles and bum notes and make a karaoke drunk sound like Frank Sinatra.' (*The Sunday Times*, 21st of August 2005). Live 8 can perhaps be understood to be an example of a hyperreal globalised cultural event. Interestingly, reflecting notions of the collapse of historical knowledge and the plurality of truth, according to the executive in charge of production. the DVD 'will be different to the live broadcast and it will be better but in terms of rewriting history, we aren't doing that, We are cleaning up history.' (*The Sunday Times*, 21st of August 2005). Exactly how music history has or will be *cleaned up* by the onset of digitalisation is currently unclear due to its emergent state. However, this is certainly a question that will require future attention.

> 'There are many software versions of old classic analogue synths on the market and their advantages are many fold. However, due to the accuracy of digitised sound there is no room for error, which does tend to loose some of the charm of analogue sounds. Initially, every one jumped on digital technology for all of its advantages...and now it seems the pendulum is swinging back in favour of analogue sound production.'
> (Technician A)

Perhaps this digital simulation of the analogue era's qualities of randomness, inaccuracy, and unpredictability, has occurred in resistance to the accuracy, control, and predictability of the digital age that has removed the perceived 'warmth' (Technician A) of the analogue (Evens, 2002; Sandywell & Beer, 2005). It would seem from this that creative practices rely upon a level of unpredictability, accidents, and unforeseen outcomes. This type of extreme plugin is perhaps an attempt to reintroduce this unpredictability into digital practices and cultural products. Where the analogue was always-already unpredictable and variable dependent upon its environment – take for example the heat of the environment affecting the tuning of the Moog synthesizer (Pinch and Trocco, 2002) – digital technology is now programmed to *simulate* (Baudrillard, 1983) unpredictability[7].

The software plugin may also utilise the distinctly visual aspects of the virtualised digital studio. For example,

> 'if you want to move a sound around a three dimensional space, its quite hard to do that on a mixing desk with knobs and that kind of think. If you've got a three dimensional representation on a computer screen, you've got a

[7] This pursuit of analogue warmth and unpredictability is not solely limited to acts of simulation. The analogue devices that are still located in various types of recording studio are also interfaced with digital technologies to capture their distinctive sound qualities. Technician A claimed that

> 'recent trends have been to pass digital equipment through analogue equipment to achieve 'warmth'.
> (Technician A)

This practice of passing digital-through-analogue indicates just some of the complex mixing of analogue and digital that occurs in the digitalised recording studio.

ball that you can move around there, then of course that's a much better visualisation that you are able to control that you are able to get with a mouse and a screen.'

(Technician B)

Here the visualisation of the spatial aspects of the projected space of production and reproduction may be used to *move music* from one place to another. Clearly this type of practice is reliant upon the simulation possibilities of the digital recording studio (alongside the development of surround sound systems).

2.3 Increased accessibility

These functional transformations, in combination with the availability and relatively "low cost" of these digital music technologies[8], are often understood to have democratised the primary production of music (see Théberge, 1997; Warner, 2003). Digitalisation is understood in this sense as accessible and democratic in that anybody wishing to can create music through these technologies with little training or finance[9]. Indeed, the music technicians interviewed identified the financial aspects as key in this opening up of access to the recording studio. We can see in these accounts that access, which is perhaps synonymous with democratisation in the digital age (Rifkin, 2000), is understood in terms of two forms of capital: knowledge and finance. Digitalisation is commonly understood to have reduced the amount of both of these forms of capital required to gain access to the recording studio.

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[8] See also the ranges of recording studio software available from online stores such as Amazon (www.amazon.co.uk), these start from around £30 upwards. Indeed some home computers now come with recording studio software installed and are also now available for use with games consoles.

[9] An example of this level of accessibility to the recording studio arose in a recent music competition that was held during December 2005 on the Channel 4 television show 'Richard & Judy'. The competition 'pop song for Christmas' invited viewers to send in their own recordings, the "best" efforts were then broadcast on various programmes during the Christmas period. This type or level of interactive competition could not have been imagined on the same scale in the pre-digital era, where access to the necessary technologies would have limited the scope of such a televisual event. This competition and the music submitted in response to it were clearly afforded, to significant extent, by digital music technologies. This illustrates two key issues. First that digital music technologies are widely available and that the practices of music production and reprodcution represents a common set of interlaced practices and technologies. And, second, that digital technologies have to some extent democratised, or at least rendered accessible, music production processes and functionalities. The 'Richard and Judy' television competition, although apparently insignificant, reveals to us a concealed and complex world of the engagement with the digitalised recording studio.

If we consider knowledge first, Technician A suggests that:

> 'home computing, synthesis, and the proliferation of software designed for producing music has enabled people with no musical training of any description to participate in music making and production on a grand scale.'
> (Technician A)

The primary production of music, with the rise of home recording studio software and the general familiarity of the computer as an everyday interface, is opening up to those with little *technical* knowledge about music production. Music making is no longer restricted to those with the knowledge to operate musical instruments, analogue mixing desks, or amplification systems, or with knowledge of how to connect or 'patch' MIDI systems together.

Further to this the cost of purchasing digitalised music technologies is relatively low in comparison to many of the studio technologies that preceded them. This is particularly true of music studio software packages that integrate a number of technologies into one package. These convergent music production technologies would previously have cost significant sums of money to accumulate, and would also have required significant space to store. In terms of this increased accessibility Technicians B and C focus centrally upon the significance these financial aspects:

> 'The technology has got ridiculously cheap; this laptop for example is capable of making a better recording than a 24-track analogue tape machine... The cost of recording in that respect has come right down so that people can afford to have it in their own home. But the cost of building an acoustically nice sounding studio has gone up dramatically.'
> (Technician B)

Again the significance of the availability not only of the music technology but also of mobile and personal computer systems is evident here. Technician C frames this in terms of buying entry into these spaces:

> 'in terms of the packages there is obviously an entrance cost you have to pay and depending on the budget you will get a variety of different flavours, but certainly these days you are buying into professional quality software.'
> (Technician C)

The budget available can be understood to dictate the functionality or affordances of the devices purchased with implications for practice. We see here a correlation in this response between access to functionality and access to financial capital.

This is not, however, an entirely utopian image of digitalisation. From this apparent increase in access to these technologies new problems arise around the accessibility of these spaces. For example, Technician C claims that:

> 'If you've got infinite possibilities and infinite flexibility then where do you start. So just because you've got an infinite number of tracks doesn't mean that's always a good thing, but it is technically, technologically it offers massive creativity. And then the third thing is the use of plugins, which has changed the way that people make music massively both in terms of instruments and effects.'
> (Technician C)

This would suggest that rather than the knowledge required to operate these systems from being reduced – a perspective that might be termed *a user-friendly understanding of digitalisation* – rather the complexity of these devices escalates[10]. Instead of being confronted with the standard 4 or 8 tracks of the basic studio, or even the home 4 track recording studio, the user is often faced with an infinite number of virtualised tracks. This then allows for particular creative freedoms, in that a greater range of sounds can be combined together and individually manipulated. However,

[10] As one respondent claimed: 'They've certainly removed money from the equation, or they've made money less of a factor in the equation. It used to be that if you wanted to make, a piece of professional sounding electronic music or pop music, or whatever, that you needed to have access to the kind of money that only record companies have access to. So now you can do that and there are plenty of examples of people who, you know, using a laptop or whatever, made a name for themselves. However, there is at the other end of the scale there is this bamboozlement and bafflement that once you have all of these creative choices you feel that in order to function properly as an artist you need to involve yourself fully in every single choice, and there are just simply too many.' (Technician B)

this also has implications for practice in that it removes the structures and simple frameworks around which previous recording practices operated[11].

In addition to this, as described above, we may add the infinite possibilities of the software plugin. The extension of function offered by the plugin creates new functional possibilities for creativity to operate within whilst also requiring levels of tacit knowledge about how to create or locate plugins, what they do, how to operate them, which to purchase, how to store and retrieve them, etc.

We see here a tension between user-friendly-ness and the increasing possibilities of the digitalised studio. Increasing the complexity of these systems increases the knowledge required for engagement. Rather than remove the need for 'musical training' and specialised 'musical knowledge', the digitalised studio has merely replaced this knowledge with new forms of specialised technical knowledge[12]. For this reason, we should approach the notion of unconstrained access, utopian imagery, democratisation of music production, and the liberation of creativity with some caution. In relation to this we may consider further the problems that digitalisation creates.

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[11] Technician C identified the production of The Beatles 'Sergeant Peppers...' in an 8-track studio as being a particularly significant case in question. Here the respondent suggests that the affordances of the technologies stimulated creative practices in the musicians and producers.

[12] Indeed, it would seem that the user-friendly-ness of the home computer and music studio software has liberated the individual from the restrictions of traditional 'musical knowledge' and the slow accumulation of skill-in-practice (such as the training required to operate a musical instrument). The emergence of

> 'home computing, synthesis, and the proliferation of software designed for producing music has enabled people with no musical training of any description to participate in music making and production on a grand scale.'
> (Technician A)

However, it is possible to conclude that this type of conventional, traditional, or authentic(ated) 'musical training' has perhaps now been superseded by *new forms of musical knowledge* based upon the accumulation of tacit knowledge formed in the unstructured realms of praxis, a lay-technical knowledge built up through routine engagements with new digital technologies.

2.4 Digital problematics

All of the Technicians interviewed identified problems or glitches with operating digital recording studio systems. These particularly focused upon the unfamiliarity of systems setups, the incompatibility of software, and the inconsistency of hardware.

Indeed, in some instances the digitalised recording studio is understood as *always-already inconsistent* and problematic:

> 'with a digital audio workstation, which is a computer system with some recording software on it, there isn't one outlet that works 100% properly, they've got bugs. And, basically they are extremely complex things and you can end up with one piece of equipment that won't communicate properly with another piece of equipment. You can end up with clicks all over your otherwise pristine digital recording because the speed of one machine doesn't know the speed that the other machine is working at. If you have experience of working with a particular set up, I use that laptop with that audio card with that DAT machine, you know it works, that means it will work.'
>
> (Technician B)

Similarly Technician A claims that:

> 'nothing is 100% efficient at its job and there are compromises that have to be made'
>
> (Technician A)

These inconsistencies, or 'bugs', are found to be inevitable in that 'digital audio workstations' have inbuilt incompatibilities and inconsistencies. Technician B claims that these problems are connected to the increase in complexity of these systems with the inevitable effect that parts of these expanding systems will not operate or communicate together.

According to Technician B, rather than increasing compatibility, an ideal type assertion associated with the MIDI protocol (developed in 1981-1983; see chapter 5), digitalisation in practice has the opposite effect. It creates further compatibility problems as the types, conventions, and standards of music technologies proliferate. This becomes particularly apparent when compared to analogue technologies. For example:

> 'tape machines used to be a quarter inch or half inch, you would take the tape from one tape machine and you could take it to another studio and you could play it on another tape machine. You can't take a computer disk from Nuendo on your PC and play it on Logic on a Mac. There have been numerous attempts such as the open media file exchange format to sort all that out. But I know from personal experience when I used to work in technical support for a company that used to do this type of thing, it works about 60% of the time the other 40% of the time it leaves you literally crawling up the wall with frustration... It has overcomplicated things, which means that things are less reliable.'
> (Technician B)

The comparatively uncomplicated systems of the tape machine had little that could go wrong and had standards built into them that ensured compatibility between manufacturers. The digitalised audio file is both more complex, and has more possibilities for failure, whilst also being less compatible across devices manufactured by different manufacturers. For Technician B it is the complication – which he describes as over-complication – of music studio systems that has created a greater range of irresolvable problems resulting in a decrease in reliability between analogue and digitalised recording studios.

3. The two zones of primary production: conceptualising the recording studio

With the rise of home recording studio software it would seem that 'the culture-machines have come to invade the home.' (Lash, 2002: 137). Indeed, these digital transformations have forged a separation between two distinct recording studio spaces or 'zones' (see Lessig, 1996; Lash, 2002; Burrows and Ellison, 2004; and Beer, 2006). On the one hand we find the professional studio space, a dedicated and purposely-designed space that is used to generate capital (access is timed and invoiced or obtained through the payment of course fees), as such this is a commodified space, access is paid-for. On the other hand we find the home recording studio space, the functions of which have been immeasurably extended by the development and availability of relatively powerful domestic recording studio software packages and home computers[13]. The home recording studio does not, in most instances[14], generate capital[15], nor is access invoiced in correlation to time spent in the space[16].

It is possible here to think of these two spaces as 'zones' of music production. Calling on Lash's theory of zones the recording studio may be conceptualised in terms of the four zone types that Lash identifies (Lash, 2002; Burrows & Ellison, 2004). For Lash zones are combinations of 'live' or 'dead' and 'tame' or 'wild'. This creates four zone types: live/tame, live/wild, dead/tame and dead/wild. The separation between 'live' and 'dead' zones is economically grounded and relates to the informational properties of the zone. For example, we may think of *both* professional and home recording studios as 'live zones' (Lash, 2002: 28-29). The flows of information in both these zones are 'heavy', they are 'thick environments' (Sassen in Gane, 2004) with

[13] I say 'extended' here as digitalisation is not responsible for the 'invention' of the home recording studio. The tape recorder and the 4-track home studio system performed this function. Rather it is to argue that the home recording studio software package has created an accessible way of creating a recording studio in the home that is functionally comparable with the professional recording studio space.

[14] Although we now see increasing number of well-known recording artists creating albums using home recording studio software and releasing these through the usual channels. A recent Channel 4 documentary following Madonna's recent 'Tales from the Dancefloor album' (2005) showed her recording in the producers home. She indicated that she was more comfortable in this space due to the removal of time restrictions. The Prodigy, The Streets (Mike Skinner), Mel B, Robbie Williams, and Daniel Beddingfield are all internationally renowned recording artists who have produced albums within a domestic context. Mel B in her kitchen, Williams, Beddingfield, and Mike Skinner in their bedrooms, and Liam Howlett of the Prodigy on his mobile laptop computer. Perhaps the most important entry in this growing list, and one of the earliest of these bedroom produced albums, was released under the pseudonym *White Town*. In 1997 *White Town*, an individual musician named Jyoti Mishra, achieved the position of number one in the weekly sales charts with the single 'Your Woman'.

[15] Just because the home studio in most circumstances is not used to generate capital does not mean that it is not a commodified space. The purchasing of the software, the engagement with the manufacturer website through registration and troubleshooting activities, and the accessing of plug-in sites, etc, all contribute toward the commodification of these home studios. Particularly if we consider the advertising that the user is exposed to in relation to these activities (see Poster, 2004).

[16] Indeed, the success of internet sites such as www.garageband.com, which enable amateur home studio users to upload there own music for others to disseminate, may be considered evidence of the large scale appropriation of the recording studio software package and the rise of the amateur technician and the home recording studio.

information passing between, as well as being stored and manipulated by, complex systems or networks of interfaced devices. Both of these zones host significant information flows and may therefore be thought of as 'live'. Although of course it is possible that studios may suffer from a reduction in flows of information and may become 'dead' zones. Take for example the recent closure of New York's celebrated Hit Factory recording studio[17] as an example of a recording studio moving from an informationally thick 'live' zone to an informationally poor 'dead' zone.

In terms of the music studio the important point of differentiation between zones relates to Lash's second level of distinction and specifically what he refers to as 'identity spaces'. If 'live' and 'dead' zones concern the economic, technological and information properties of a zone, then this second level of distinction is based upon what 'social actors' do with these flows (Lash, 2002: 29). Lash distinguishes here between what he calls 'wild' and 'tame' zones. 'Tame' zones are the sites of 'relatively stable' 'identities' (Lash, 2002: 29), whereas 'wild' zones are less stable but are more unpredictable and as such 'identity-formation is far less stable' (Lash, 2002: 29). As a point of departure for this chapter, by way of an opening distinction between these two zones of music production, we may think of the professional studio as a 'live' and 'tame' zone and the home recording studio as a 'live' and 'wild' zone.

The 'live' and 'tame' zone of the professional recording studio is organised around labelled roles and distinguishable performance objectives, the producer, the composer, the musician, the owner, the sound technician, the product, etc. Job titles, job descriptions, working hours, etc, demarcate these live/tame zones[18]. These are clearly defined and stable spaces and identities.

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[17] The transposition of the recording studio space onto the domestic setting has had reported consequences for music studios themselves. An example of information technologies having concrete and tangible implications. The closure of New York's famous Hit Factory studio is one such example. This studio, in which John Lennon, Stevie Wonder, Paul Simon, and Bruce Springsteen recorded music, had, according to 'music industry insiders...become a victim to falling production costs elsewhere' for 'the rise of inexpensive digital equipment has allowed high-quality recordings to be achieved almost anywhere by amateurs.' (*The Independent*, 7th of February 2005). If somewhat anecdotal this example suggests evidence that these software technologies have direct implications for recording practices and recording spaces.

[18] Of course, in some instances one individual may perform a combination of these roles, yet they are aware of the boundaries and objectives around which these hybridised roles operate.

In the 'live' and 'wild' zone of the home recording studio 'the flows – and especially the ideas and images – are more fleeting, contingent, unpredictable' (Lash, 2002: 29). These spaces may not be as rich in information flows as the 'live' and 'tame' zone of the professional recording studio, yet the practices and identity formations of the 'wild' zone are less rigid and fixed, and are more open to reformulation, experimentation, and mobility. Here we see individuals forming hybrid identities as they combine the previously specialised roles of sound technician, producer, musician, composer, editor, etc.

Clearly this formulation is a little rigid and inflexible; it does not for example take account of the professionalism and tameness of the home studio or the wildness of some smaller and experimental professional studios. It is worth considering the boundaries around these zones as movable, as overlapping, and in states of flux. We must then consider how these zones are distinct and also how they interconnect in the practices of individual agents.

If, as Lessig (1996) contends, we think of zones as being *demarcated*, or even created, by 'boundaries' rather than 'borders', then what are the boundaries that demarcate the professional and home recording studio space? How do these zones differ in terms of functionality and practice? How do they operate together, is there any level interconnectivity between these zones?

I will now focus upon each of the two zones of music production in turn.

4. ZONE I: inside the professional recording studio

> '...in the course of a single experimental procedure they [Bell and Blake] coupled technology with physiology, steel with flesh, a phonautograph with body parts. Wherever phones are ringing, a ghost resides in the receiver.'
> (Kittler, 1999: 75)

> 'As a trained composer and musician I produce music using equipment that requires me to be a technician in order to use it.'
> (Technician A)

Figure 6.1: Professional recording studio entrance

4.1 Entering the studio

The professional recording studio space, according to Warner, has undergone profound transformations in recent years. He claims that:

> 'In the past 40 years the resources and working practices of pop musicians have changed considerably. Stereo analogue tape recorders have been replaced by digital multitrack machines with far superior audio specifications, operational characteristics and editing facilities. The four- and eight-channel, valve driven mixing desks of the 1960s have been superseded by 48- or 68-channel mixers with highly resourceful equalization controls, extremely flexible signal routing and 'total recall' automation. With the growing numbers of digital mixing desks the modern studio is often entirely digital, reserving analogue signals purely for the initial and final points in the recording chain (that is, microphones, amplifiers and loudspeakers).'
>
> (Warner, 2003: 20)

In the professional recording studio rather than new technologies superseding older technologies, as exemplified by Warner's utopian image of the studio space, we instead find accumulations or archives of technologies mixing digital and analogue technologies. Inscribed on the studio space are complex practices that resist the utopian image of pure digital domination. Recording studios are complex, heterogeneous and hybridised spaces.

The following tour of a professional recording studio navigates around the rooms of the recording studio located within the Department of Electronics at the University of York. The studio in question is constituted by a suite of five rooms: two audio studios, a live studio and two PC studios.

Figure 6.2: Audio Studio 1

4.2 The Audio Studios

Warner suggests 'that Multitrack recording, signal processing, MIDI sequencing, and sound synthesis and sampling are the four essential techniques which dominate the creative processes involved in the production of pop music.' (Warner, 2003: 22), and that the 'impact of these techniques is evident both in how pop music is made and in what it actually sounds like.' (Warner, 2003: 22). I would like to add to this list by suggesting that the importance of these four practices is also evident in the material spaces of the recording studio.

For example, Audio studio 1 (see figures 6.2 and 6.3) contains an analogue mixing desk, a Mackie 24.8.2. B.Bus Mixing Console, a computer, on which the studio software package Nuendo 2 is installed, and a Evolution MK-46K keyboard.

Figure 6.3: Evolution MK-46K keyboard in Audio Studio 1

Audio Studio 1 could be defined as the "analogue room", it is where the analogue mixing desk is housed. It also incorporates a digital keyboard and computer system. This illustrates the routine intertwining of digital and analogue technologies in these spaces. The presence of this desk is particularly interesting when we consider that the computer software package Nuendo 2, which is installed on the computer system, provides the same functions as the mixing desk. Yet, both this room and in Audio Studio 2 (See figure 6.4 and 6.5), or the digital room containing a Mackie D8B digital mixing desk[19], contain the facility for hands-on mixing through a physical mixing desk. Both Audio studios also contain software based, or virtual, mixing desks. This

[19] 56 input 72 channel digital mixer.

suggests that the feel of the analogue mixing desk has not been abandoned in favour of virtual mixing desks. Indeed, across these two rooms three different mixing desks are ‘present’: the analogue mixing desk, the physical digital mixing desk, and the virtual digital mixing desk (Nuendo 2).

Figure 6.4: Audio studio 2 with digital mixing desk and integrated computer system

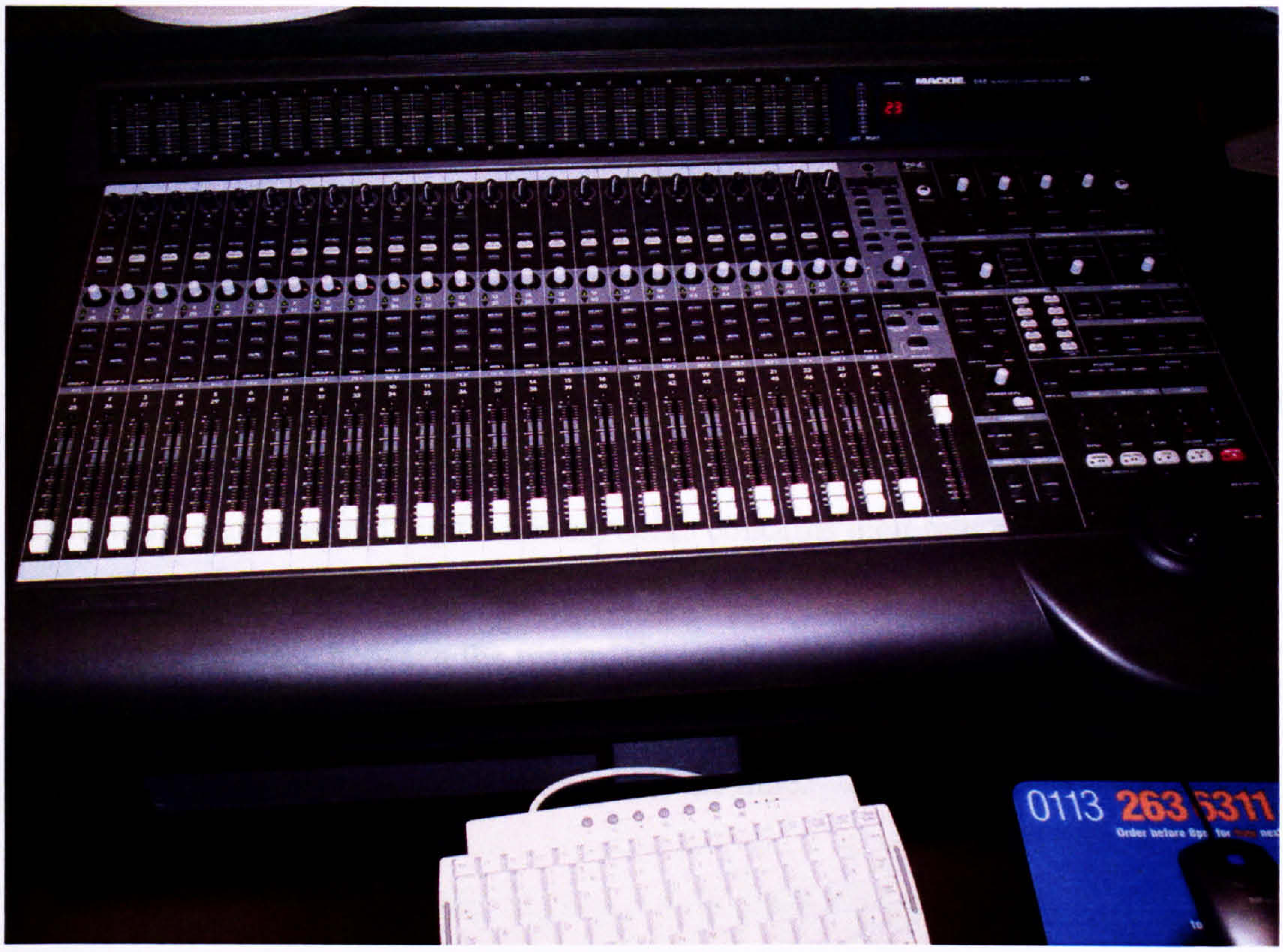

Figure 6.5: Close up of Mackie D8B digital mixing desk in Audio Studio 2

In terms of the analogue and digital mixing desks, one interviewee claimed that:

> 'The main difference is all the hardware effects that are built into the Mackie Digital 8 Bus that are not in the analogue 8 Bus... most of the basic processing you would want is built into the mixing desk. In our analogue studio we've got that basic processing, every channel on the mixing desk comes with good analogue EQ on it, we've got reverb unit, we've got compressor s and gates but you've actually got to plug them in using cables, real cables. And, because its more expensive to buy hardware than software, that we haven't got as extensive a range of compression and effects options as you would get in the digital D8B. But other than that they do exactly the same job. Its called the D8B because its based on being a digital version of the analogue 8 Bus.'
>
> (Technician C)

In addition to this:

'the D8B is it comes with direct d to a and a to d conversion built into it. With the analogue 8 Bus we've got to run all the connections into Nuendo via external converters, whereas its all done directly in the D8B'
(Technician C)

For Techncian C the significant difference is the expansion of functionality provided by the digital mixing desk. Whereas for Technician B the most significant difference between the analogue and digital mixing desks concerns their reliability:

'The difference between the two mixing desks over there is that the analogue one doesn't have as many features but works and the digital one has loads of features and doesn't work properly half the time.'
(Technician B)

These problems with the digital mixing desk include:

'Anything from the desk just not booting up properly, it has a computer system which it can't work without, and you have to restart it a few times, then you'll have just digital noise on some of the channels, it won't lock properly to the recording system that we use so you get these clicks that I was talking about.'
(Technician B)

When asked to describe this *digital click*, the material embodiment of digital inconsistency, Technician B responded:

'Just a sort of tiny little [makes a click sound], the kind of thing that you would hear if you had a bit of dirt on your CD. Not a jump but a sort of tick. I have to say that not all digital consoles are as unreliable as that one. One of the difficulties is that the technology moves so quickly that its four or five years old now that console, the manufacturers moved on, and so getting spares to repair it is extremely difficult. So, when it works that digital console is infinitely better, its got more channels, its got more facilities, its

> got better sound quality than the analogue one, but the analogue console is ten times as reliable.'
> (Technician B)

In this response we see that for this interviewee the functionality of the digitalised studio has increased substantially but with this complexity has come a greater level of inconsistency and unreliability.

There is also a sense here that digitalisation has slowed down, or made more awkward, certain aspects of music production:

> 'I'm not sure if ergonomics is exactly the right word to use, because I think that ergonomics is to do with reducing operator error, but certainly if ergonomics is about having a thought such as the guitar part is bright, is too bright, I need to go to the EQ and turn it down I can just do that, whereas here I've got to find the guitar part ok which menus that, you know. And also if you've got a fader you can throw that distance and I've you've got a mouse you've got to push it backward and forwards to get exactly what you want, its just not the same.'
> (Technician B)

Here Technician B suggests that not only has the complexity of these digital systems created greater levels of inconsistency but that the virtualised mixing desk also prevents rapid manipulation of the different tracks or components that constitute the musical forms. The selection and manipulation of parts of the music, the guitar track for example, has altered from the simple and direct manipulation of a slider on the mixing desk to selecting from menus and moving virtual knobs and controllers with the mouse. This is perhaps one possible explanation for the continued presence of a physical digital mixing desk operating alongside the virtual mixing desk. Both are operated by software packages but the physical digital mixing desk (see figure 6.4) is controlled directly with knobs and sliders giving that direct hands-on control that is absent from the virtual desk[20].

It can be concluded that the mixing desk, in its conventional and physical form, has continued to populate these studio spaces for a number of possible reasons. Perhaps most importantly it defines the space or *demarcates the zone* as 'recording studio'. The mixing desk fulfils expectations. As one respondent who co-ordinates such a recording studio revealed:

> 'from a marketing point of view people like to see mixing desks in studios. And there is something in a nice clean room with lots of monitors and a keyboard and a mouse, but you can't beat going into a studio and seeing your own mixing desk.'
> (Technician C)

In addition to this marketing and satisfaction of expectation, the physical mixing desk, analogue or digital, enables the continuation of the tactile and perhaps nostalgic practice of the direct *hands-on-control* of music. The possibilities of hands-on-practice and the definition of these spaces would both be problematised if professional studios like this were to shift toward *entirely* software based virtual mixing desks[21].

Finally, as a third possible explanation for the continuation of the presence of the physical mixing desk, Technician C indicates that the virtual mixing desk mirrors the appearance and functionality of the analogue mixing desk:

> 'I think it is very important in that if you want to understand how a mixing desk works, be it analogue, digital, virtual like in Cubase or whatever, they're all based on an analogue mixing desk design and an analogue signal flow path...even though the technologies leapt ahead its still based on solid

---

[20] Software based mixing desks are miniaturized and mobilised versions of the heavy structures of the analogue mixing desk in comparison to the light virtual mixing desk of the digital music software package. The shift between heavy, rigid and fixed technologies toward light, flexible and mobile technologies compares with Bauman's distinction between 'solid' and 'liquid' forms of modernity (see Bauman, 2003).

[21] This is an example of an environmental or spatial separation between the professional and the home studio.

basic analogue recording techniques. So the virtual mixer in Cubase or Nuendo is...all based on those first analogue desks.'
(Technician C)

The physical mixing desks, both analogue and digital, are used as a frame of reference for understanding the form and functions of the virtual software based recording studio. Here we see practitioners reflexively using lines of technical genesis to inform practice.

The professional recording studio, as these pictures reveal, is a complex technosystem of 'patched'[22] technologies. Analogue technologies clearly have developmental influence on the form and design of the virtualised and convergent professional music studio software package[23], the controllers for which are often virtual representations of analogue systems. One interviewee indicated that:

> 'the majority of them are still based around the concept of an analogue mixing console and an analogue tape machine. If you look at something like Cubase at the bottom of the screen you've got a play button a stop button and a fast-forward button. And its got a line that goes vertically down the screen, the position of that line represent that position of the tape, the tape against the head of the tape machine, and if you then flip to the other screen which is where you mix down the sounds that you've got on your tape, although its computer disk, then you've got something that looks very much like a hardware mixer, you've got drawings of faders that you can pull up or down, you've got drawings of knobs that you move from one side to the other.'
> (Technician B)

[22] Connected together by cabling known as patches.
[23] One respondent claimed that 'all the big packages are based on the same basic design idea that's been around for 10, 15, 20 years, and is all tied in very much to the idea of a multitrack and a mixing desk.' (Technician C)

Figure 6.6: The Live Studio, technician adjusting the soundproofing.

4.3 The live studio

Located between Audio Studio 1 (the analogue room) and Audio Studio 2 (the digital room) is the Live Studio (See figures 6.7, 6.8, and 6.9). This is the room in which music is performed or created using 'live' instruments to feed into the mixing facilities either in Audio Studio 1 or Audio Studio 2. The live studio sits between the analogue (audio studio 1) and digital (audio studio 2) studios as a membrane, a space of primary production and sound generation. The walls separating Audio Studio 1 and Audio Studio 2 from the Live Studio both contain windows, so that it is possible to look into the Live Studio from the Audio Studios. This may be understood as a key environmental or spatial difference between the professional and the home studio. It is this separation of music production or creation spaces and mixing spaces that is most difficult or expensive (Technician B) to recreate in the home studio.

Figure 6.7: The Live Studio

The Live Studio contained a Pearl Drum kit and Roland HPI800E Keyboard (see figure 6.6), a Marshall Valvestate 2000 guitar amplifier and a Marshall Bass State B65 bass guitar amplifier (see figure 6.7). In addition to these the Live Studio also contained a number of devices for limiting the escape of sound through the walls and preventing any unwanted noise, or 'noise pollution' (Technician B), from entering the studio. This sound proofing technology took the form of free standing mobile soundproofing (see figure 6.6) and wall-mounted soundproofing materials (see figure 6.8).

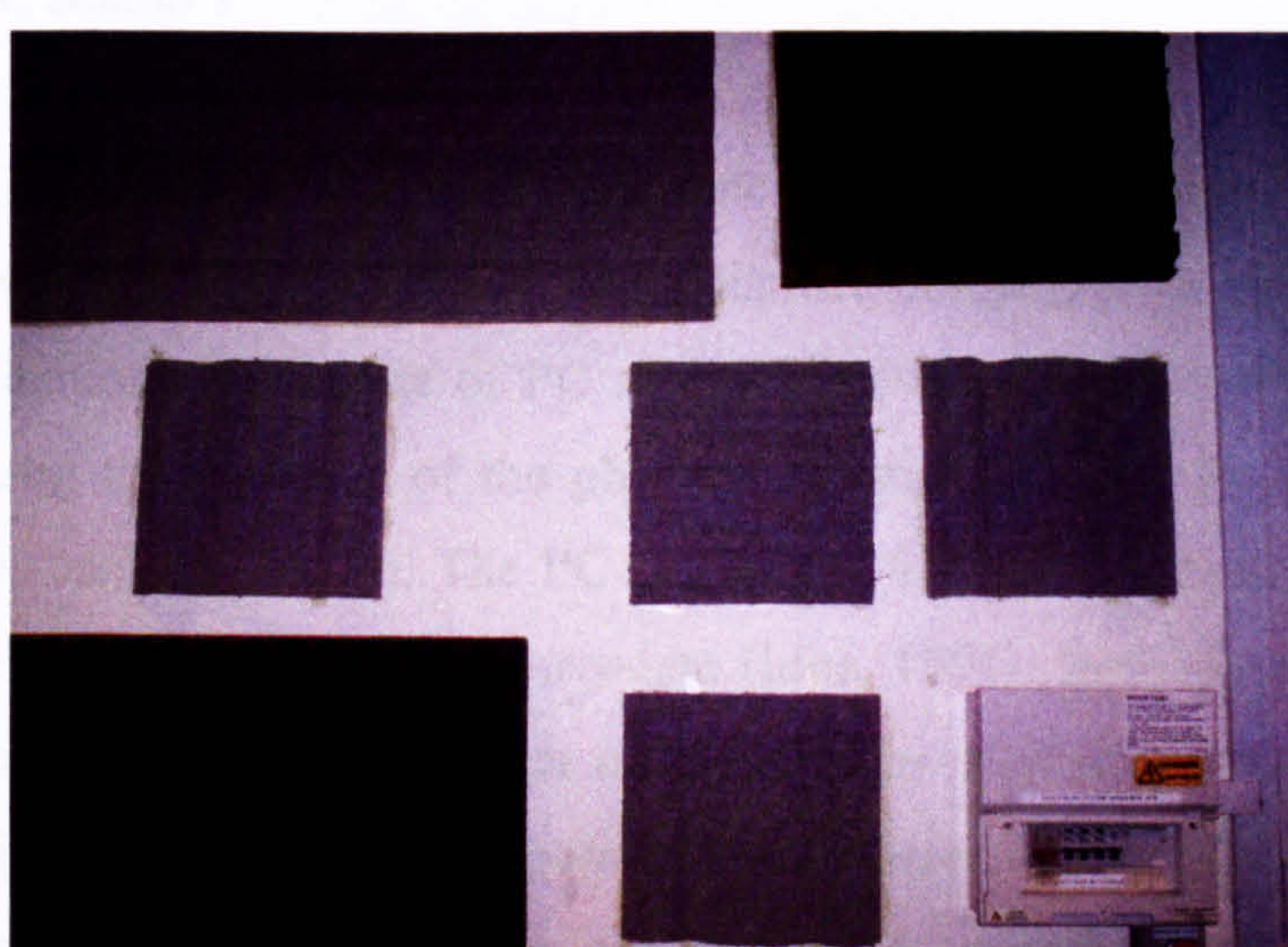

Figure 6.8: Wall mounted soundproofing in the Live Studio

4.4 The PC studio

Finally, contained within this collection of rooms there were also two identical 'PC Studios', PC Studio 1 (see figure 6.9) and PC Studio 2. Each contained a computer with Nuendo 2 installed and an Evolution MK-46K keyboard, the same instrument to that found in Audio Studio 1.

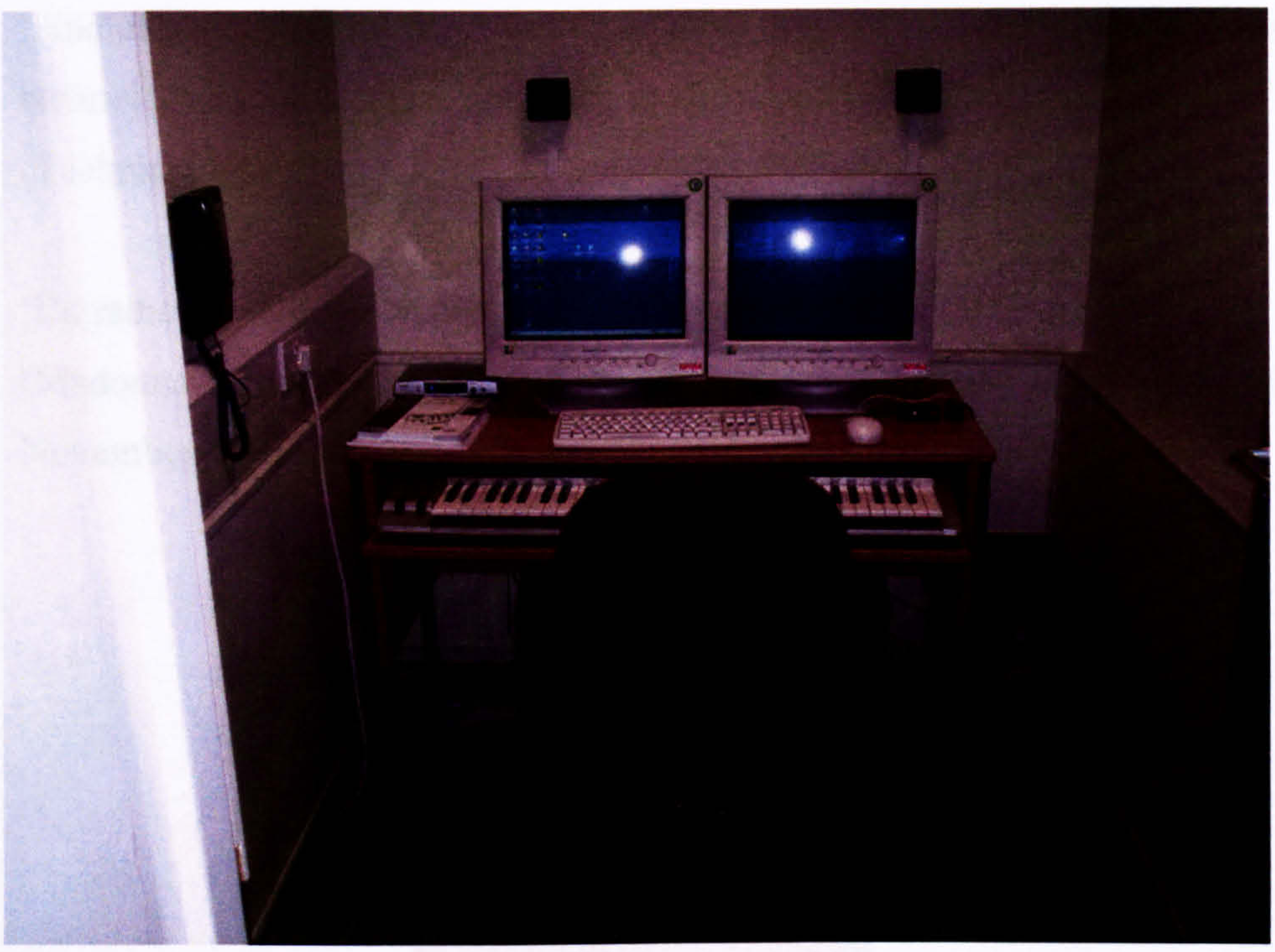

Figure 6.9: PC Studio 1

Essentially PC Studio 1 performs the same functions as Audio Studios 1 and 2, yet, as can be seen from the image, the space is not distinct, defined, or demarcated as a zone of music production. The image of PC studio 2 provides a useful illustration of the point concerning the presence of the physical mixing desk and the expectations of visitors to the recording studio. The PC studio provides an alternative vision for re-imagining the recording studio technosystem (Idhe, 1991). Here we see that without the mixing desk the room is no longer *demarcated as professional recording studio.* Despite the similarity in functional possibilities between the rooms we begin to see here the importance of constructing particular environmental properties – soundproofing, the separation of music generation and mixing spaces, and the expected presence of particular material technologies – in these spaces that define or demarcate them as professional recording studios: the material process of zoning, or demarcating zonal boundaries[24]. This is exemplified by the sound proofing materials, the physical mixing desks, the amplifiers, the drum kit, and the other technologies that populate the professional recording studio.

5. ZONE II: inside the home recording studio

> 'And of course, if you don't have a creative bone in your body all the music technology in the world is not going to allow you to produce a masterpiece.' (Technician A)

> 'I'd rather be in a prison cell with Pro Tools.'
> (Madonna talking about expensive studio spaces, *Observer Music Monthly*, November 2005: 34)

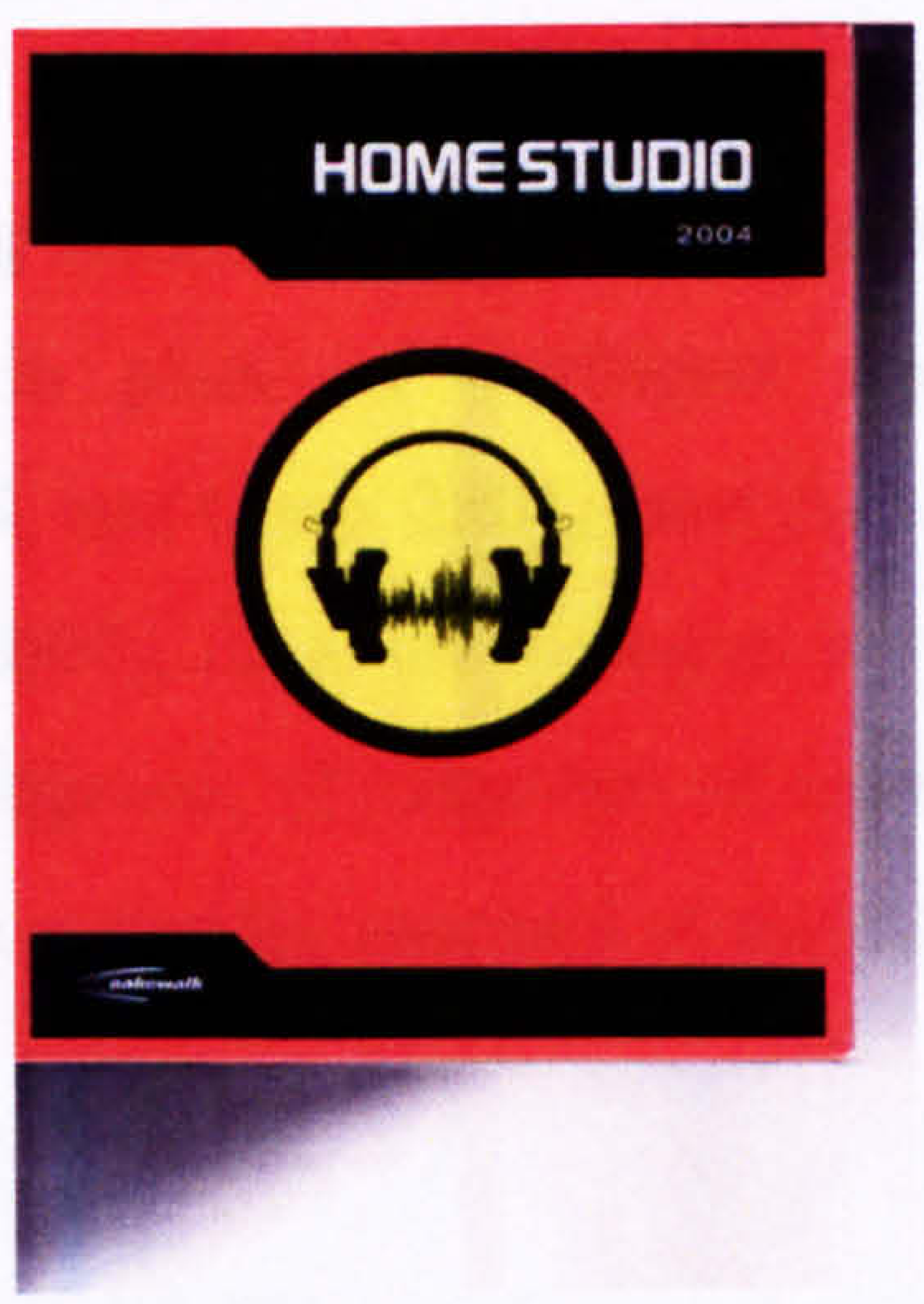

Figure 6.10: Cakewalk Home Studio 2004 boxed packaging (front)

[24] Furthermore, in addition to the rooms used directly for music production and reproduction this professional recording studio contains a further room in which technologies that are no longer or infrequently required are stored. This is a kind of hidden archive or lay museum of technologies that operates concealed behind the studio space. Examples of the technologies stored here are the *Spirit Powerstation 1200 Soundcraft*, which is a mobile mixing desk, a scaled down version of the mixing desks in Audio Studio 1, this desk is used for an annual live concert. Also stored here are a selection of music synthesis and controller technologies such as the Roland JV 35, the Roland A-30, the Roland A-33, and the Roland Sound Canvass SC88. All of which can be considered to be first-age digital music technologies (see chapter 5).

5.1 Projecting the home studio

I will now focus upon the second zone of music production, the home recording studio. To open I will briefly describe the way in which home recording studio software, in this case Cakewalk Home Studio 2004[25] (see figure 6.10), is projected by the rhetoric and images of its boxed packaging. This rhetoric constructs a kind of ideal-type image of the home recording studio that may then be reformulated when contrasted against accounts of appropriation.

In the text inscribed on the Cakewalk Home Studio 2004's cardboard packaging a particular kind of utopian imagery is played out. In this language we find descriptions of *power* and *control* over the musical form. This is concretised in a number of 'instrumental' metaphors (Heidegger, 2004), Cakewalk home studio is defined as 'tool' that enables the user to draw on 'libraries' of sounds in order to 'paint' a 'canvas' and 'achieve' a 'creative vision'.

There are however some interesting divergences from the purely instrumental projection of home recording studio software. In line with notions of the increasingly 'inert' nature of humans in place of intelligent autonomous technologies (see Haraway, 1991, Kittler, 1999, and Gane, 2005), and the use of biological metaphors in software discourse (Thrift, 2004), these technologies are presented here as 'intuitive'. This suggests a level of intelligence, of judgment, of reaction, of learned and predicted preferences, all of which are generally ascribed to the category of *living* or *intelligent* (Thrift, 2004).

[25] It is worth noting that this is just one music studio software package amongst many on the market. Cakewalk alone offer a wide range of products in this area at various prices and with various focus such as remixing, recording live instruments, or combinations of features. Apple also offer this type of music studio software, see for example the Apple Logic Pro 7 available from www.apple.com/uk, which is promoted as a professional standard studio. This is in addition to the software packages from Cubase (www.cubase.net), Nuendo (www.nuendo.co.uk), and Protools (www.protools.com). A search on www.amazon.co.uk , for example, reveals vast numbers of software packages in this area.

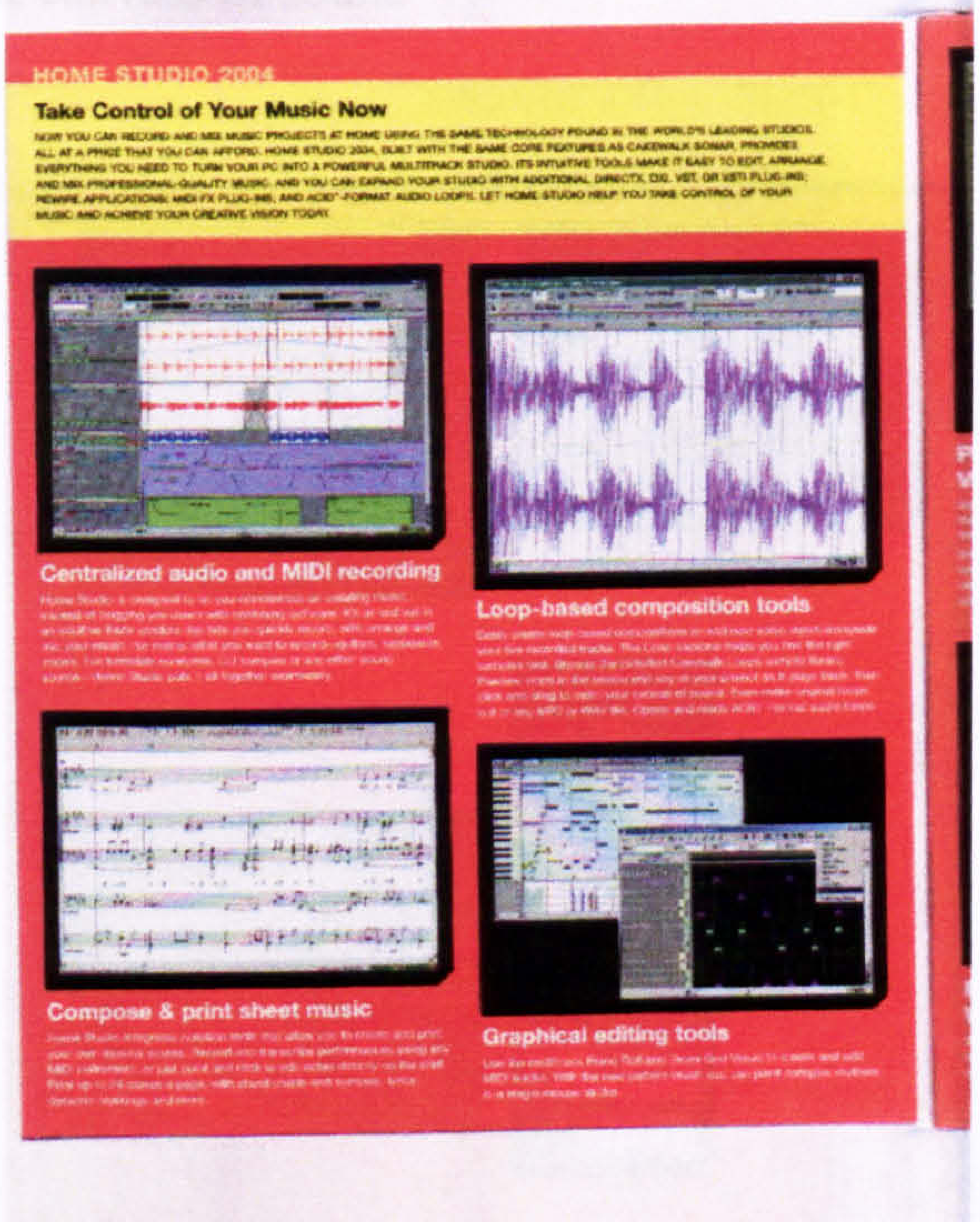

Figure 6.11: The left hand side of the Cakewalk Home Studio 2004 gatefold sleeve packaging

According to the packaging the 'Track window…lets you quickly record edit, arrange and mix your music' enabling you to 'concentrate on creating music' (Cakewalk Home Studio 2004). The Cakewalk Home Studio 2004 is not, it proclaims, 'bogging you down with confusing software' and is entirely flexible in terms of music genres and instrumentation:

> 'No matter what you want to record – guitars, keyboards, vocals, live turntable scratches, CD samples or any other sound source – Home Studio puts it all together seamlessly.'
>
> (Cakewalk Home Studio 2004 packaging information)

The message is one of compatibility, flexibility, and ease of use. Take for example the description of the process of looping,'easily create loop based compositions or add sonic layers alongside your live recorded tracks', retrieval of sounds, 'you find the right samples fast' as you 'browse' the 'sample library', 'preview loops', 'make original loops', and the editing of samples into the a complete piece of music, 'click and drag to paint your canvass of sound'[26].

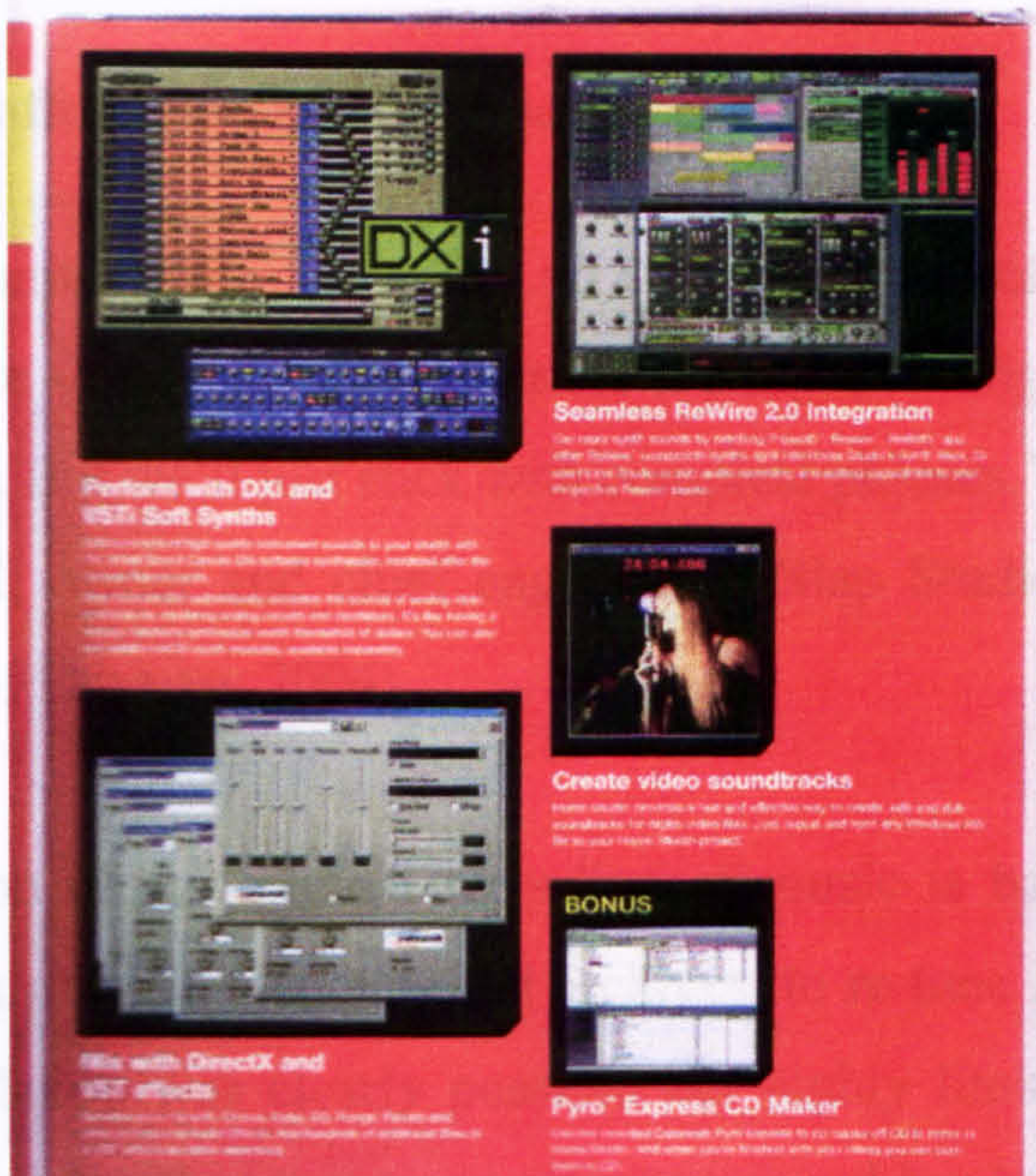

Figure 6.13: The right hand of the Cakewalk Home Studio 2004 gatefold packaging

The question then must be, to use Haraway's (1991) terminology: how is this ideal type *myth* or utopian imagery (the digital rhetoric of marketing) reflected in the appropriation of the *tool* (the technology in everyday routines and practices)?

5.2 Practice and the home recording studio

[26] This software is also capable of simulating the analogue synthesizer, an example that continues the theme of recreating the qualities of the analogue age through digital simulation:

> 'Dreamstation Dxi authentically recreates the sounds of the analog-style synthesizers, modelling analog circuits and oscillators. Its like having a vintage hardware synthesizer worth thousands of dollars. You can also add additional Dxi synth modules, available separately.'
> (Cakewalk Home Studio 2004, boxed packaging)

This recreation of analogue sounds is described as a simulation of the material properties of 'circuits', 'oscillators', and 'vintage hardware'.

To understand the practices of the home studio, as distinguishable from the projected practices, I will now focus in detail upon specific ways in which these home recording studio technologies are appropriated in everyday life practices.

The issue of creative affordances is salient here:

> 'If we had unlimited time, we could go through the whole song adjusting each wonky note – lowering those that are too high, and tightening up those that are too low. But we'll just stick with complete phrases.'
> (Rory O'Farrell, owner and chief engineer of Slap Studios, in *Telegraph Weekend*, 14th of February 2004)

This type of alteration of the original recording of music is based upon the digital potential to transform musical elements and archives, to re-tune it, to add effects, etc. This type of manipulation was clearly possible but highly limited in the pre-digital home recording studio. As Warner suggests 'Once a sound has been digitally recorded it can be manipulated in a wide variety of ways within a digital editing programme, and these manipulations are non-destructive' (Warner, 2003: 21), that is they don't damage the original from which they mutate. According to Kittler, 'Storing, erasing, sampling, fast-forwarding, rewinding, editing – inserting tapes into the signal path leading from the microphone to the master disc made manipulation itself possible.' (Kittler, 1999: 108). These possibilities have now come to be magnified by the proliferation of integrated software programmes and the non-destructive digital original.

Digitalised information can be transmitted, stored, returned to and re-manipulated infinite times without deterioration in both the home and professional recording studio. Warner links this with a liberation of creative practices, for, he argues, 'pop musicians can extensively explore the musical potential of recorded sounds without ever losing the original recording.' (Warner, 2003: 21). For Warner, this appears to remove any limitation from creativity, and a such it is 'the creative imagination of the pop musician that becomes the determining factor in pop music production, rather than physical limitations.' (Warner, 2003: 21). However, I would suggest that it is important that we do not abandon notions of access or of technological affordances in the face of this seductive image of the boundaryless horizons of digitalised creativity.

Familiarity appears to be particular significant in these creative practices. These digital systems are depicted by these Technicians as flexible and adaptable in that they may be designed, configured, or 'set-up' to suite their production preferences and practices. In this instance the Technicians interviewed were concerned with creating collections of sounds that could be used in composition. In this sense, and returning to the library of voices discussed in chapter 5, we see attempts to accumulate archives of sounds. These sounds are obtained from two distinct sources. The first source is the sampling of sounds from various recordings:

> 'I'd have samples... I go around charity shops getting old recordings, sort of anything... I like to sort of collecting sounds and then thinking that would go well with that or that would go well with that, and just trying different things out. I like experimenting, and the fact is that I can do that, there is no time constraints, no one sitting over my shoulder saying that's not very good can we try something else.'
> (Technician B)

The second source is the recorded 'natural' sounds captured on location using recording equipment and microphones:

> 'most of the source material I use these days comes from naturally recorded sounds, so I go out and record the world and use those as a starting point for everything else... I have to edit down all the source material and then I start going through the process of sort of putting it into a library and pulling out bits of it that I want.'
> (Technician C)

Both of these describe an accumulation of sampled sounds from varying sources that may be drawn upon and embedded into musical compositions. Or as Technician B puts it, 'I am really interested in taking pre-recorded sounds and fiddling with them.' (Technician B). The significant difference here is that Technician B wants to 'get away from...microphones' (Techncian B), whereas Technician C uses microphones to accumulate these sounds for editing and reproduction.

Despite the difference in the sound sources used both are concerned with creating libraries of sound to support their music recording practices. This is then distinct from generating sound through instrumentation.

This process of cutting and pasting sampled sounds together creates what Technican B refers to as 'hybridised sounds':

> 'I'm particularly interested in sound hybridisation, so I'm interested in taking say the sound of a choir and hybridising that with the sound of a drum loop or something like that... its quite a sort of meandering process but generally it starts off with experimentation or just a really strong idea'
> (Techncian B)

He explains that this process of sampling or hybridising music is not something unique to the digital age, but that it has been made 'easier' and more rapid by recording studio software packages. When asked about this improvement this he responded:

> 'Definitely, definitely. I mean if you imagine Stockhausen sort of forty or fifty years ago cutting up tiny slivers of tape and then doing what we can do with control c, and then control v, control v, control v, just to cut out one piece of audio and repeat it, its so much easier.'
> (Technician B)

Again the significance of non-linear editing is reiterated. This is a process that, unlike tape splicing, may be undone or reworked:

> 'Hugely powerful at the time but as I say the amount of physical effort that you've got to go into to cut something out there and put it down there, if you put it in the wrong place you're screwed, whereas here you've got control z to undo it.'

(Technician B)

Therefore, this digital composition practice – drawing samples from the library of sounds and working them into compositions or simply moving sections of the music around within the composition – is an open and flexible process of composition and re-composition.

5.3 Intuitive software or tacit knowledge formation and familiarity

The projected image of (home) recording studio software as intuitive may be contrasted with the practical appropriation of these software technologies. When asked about the intuitiveness of this software Technician B responded:

> 'you could expect to go into an analogue recording studio and use it with very little difficulty. I don't think that as a recording engineer you could expect to walk into a studio with just an arbitrary piece of software and expect to be able to sit down and learn how it works just like that. So they've all got their little foibles, they've all got their little preferences that need to be set, and that kind of thing...So they are intuitive but they're not as straight forward as using a tape machine and a mixing console if that's how you've been trained. That's the important thing, how you've been trained.'
> (Technician B)

This suggests that what may be understood as 'intuition' on the part of the software package is in actual fact increased understanding, familiarity, and knowledge of the technology on the part of the technician. This also emerged in the interview with Technician C:

> 'I think they're intuitive but then again I've been using them for you know, the days on the Atari. And a lot of the design functionality of these systems is very much in-built.'
> (Technician C)

For these technicians, for whom these technologies have become routinised and mundane, identifying levels of intuition in the software is problematic. Thus they find it hard to distinguish their own intuition, know-how, learning, from that of the technology[27]. Indeed, it would seem that rather than these software packages being responsive and intuitive they appear to afford or have some transformative effect on the routine practices of the technician. The home recording studio is a space of established familiarity and tacit knowledge accumulation. Rather than the software learning the tastes and preferences of the user, rather we see the user building up knowledge about the software.

It would seem that the agent may shape and adapt the technology in accordance with these practices. This is not a process involving the technology learning and predicting tastes and preferences but rather the technician appropriating and adapting the technology to their own preferences:

> 'you can put your own shortcuts into it, you can configure it to look and operate in ways that you're most happy with...so again I think most of them allow extensive configurations'
> (Technician C)

The technicians revealed that this is not just a process of understanding what the technology is able to do but also what it is not able to do:

> Yeah, because I know the equipment, and any bits which didn't work out well together I've chucked them out. So yes its kind of grown up over time and if something didn't work I would get rid of it. That said I mean I've got a digital desk, in fact I've got the digital desk that used to be in the department I bought it off them second hand. That works really well, as far as I can tell so far, although I have been warned about some features of it

[27] In some cases it is even claimed that music makers come to sound like the technology they use: 'a common accusation directed at people making music with computers and the software running on them is that they begin to sound like their equipment. Each piece of software has its own way of going about its functions. One sequencer will contain the same functions as another but they will both go about the job in a different manner. As people tend to stick to their trusted software for life (due to the time taken to get the most from such a package) they can begin to sound like their particular brand of software choice.

> that don't work particularly well. But its not as well specified as that one there. But generally because I know it so well I know its foibles I know how my studio works and so if something does go wrong its because something has just broken.
> (Technician B)

This process of configuration, or reconfiguration, of the recording studio software package is a part of the overall accumulation of knowledge of these technologies and is most probably holds some similarity with the practices of the analogue studio; the best place to put the amplifier, the microphone, the drums, etc. This can be achieved more readily in a home recording studio as the problem of other users altering or interfering with preferred configurations does not occur (Technician C), and the lack of time restrictions enables practice based knowledge accumulation to occur to a far greater extent.

With this ability to configure the settings of the home studio we see in these accounts that greater levels of system stability is achieved in the home studio as a result of this higher level of system familiarity and awareness of the incompatibilities and inconsistencies of particular devices. From these accounts it would seem that the home recording studio package is open and flexible in that it can be configured to the preferences of the user, yet this is not intuition. Indeed, this process of configuring the recording studio is reliant upon the accumulation of tacit forms of knowledge in the routine practices of the agent.

Clearly this is only a fragment of the complex and wide ranging practices of the home recording studio and, indeed, the professional recording studio. The question this poses, however, is this: how similar are the functions and practices of the professional and the home recording studio? Should the categorisation of these zones be thought of in terms of functionality and practice or are there other factors or boundaries through which these zones may be demarcated?

6. Interconnecting zones: contrasting the functions and practices of the professional and home recording studio

In this section I will consider how these two recording studio zones are distinct from each other by contrasting a series of key properties or aspects particular to each zone. In this sense, I will attempt here to demarcate these zones by considering and contrasting their properties relating to *functionality*, *practice*, and *environments*. I will then conclude this section by considering how these zones may be understood to interlock or interconnect in the practices of the agents who operate within them.

6.1 Contrasting functionality

The recording studio, prior to digitalisation, was largely inaccessible. However, with the development and availability of home recording studio software the functionality of the professional recording studio is transposed upon the home as the software is installed upon home computer systems[28]. This is the movement of the functionality of the professional recording studio space into the home creating two distinct zones – a process that could be described as *zoning spaces*.

Indeed, in terms of functionality it would seem that there is now little difference between the professional and the home studio:

> 'The technology of the home recording studio is just as capable as the technology used in a dedicated recording studio...there is one main draw back of the home studio and that is affording the correct size and acoustically treated room for recording and monitoring.'
> (Technician A)

In many instances, similar, if not identical, software can be found operating in both zones:

> 'They are quite similar, in many cases they can be identical. And particularly given that a lot of home studios use cracked versions of software that professional studios might well shell £200,000 pounds for.'

[28] It is for this reason that the interviewees indicate that 'the emergence of the home computer has had the most significant role in increasing access to music creation'
(Technician A)

(Technician B)

When considering the technological and functional differences between these spaces it is the hardware, rather than the software, that is often identified as being the significant differentiator:

> 'They are quite similar, however the hardware that they run on may well be different in a professional recording studio.'
> (Technician B)

He describes this as the 'hardware real estate':

> 'which is that in a home everything tends to be miniaturized. Or everything is mouse or keyboard driven, which is not a very good interface for human beings. It is much easier to go to a real mixing console and go, that's channel 12 I want to turn that up and push the fader up, rather than going through tons of menus with a mouse pointer. You just don't get the fine control that you get with knobs and sliders with a mouse. So those are the main differences.'
> (Technician B)

The difference then is that the home studio tends to be controlled through these virtual interfaces, the mouse controlling the virtual representation of a knob or slider, as opposed to physical knobs and sliders that can be directly controlled. This again creates possibilities and problems around what Technician B describes as 'fine control'. Technician C also identifies this hardware real estate as creating significant differences between the home and professional studio:

> 'the software you buy is only software and the quality of the result is often dependent on the hardware, the audio hardware, and that's often again another big difference between your pro studio and your home studio.'
> (Technician C)

The possibilities and stability of the software are directly associated with the quality and power of the hardware on which it is installed or interfaced. However, this difference is minimal, for, as Technician C points out, many of the extra functions that this additional or more powerful hardware provides are highly complex and specialised, such as the linking of audio with film images or the extensive use of surround sound, rather than being directly associated with music production.

Paradoxically, considering my previous argument that music studio software has forged two separate zones (the professional and home recording studio), what emerges from these interviews is the increased similarity of the functionality of these spaces. For instance, Technician C claims that:

> 'it is probably fair to say that the home user these days, if they've got a reasonable budget will probably be using the same software that a studio will be using. For instance we use Nuendo in our studio, and Nuendo is an expensive package to use, but a lot students will use the various flavours of Cubase at home and the difference between them is probably quite minimal.' (Technician C)

The overwhelming image of the professional and home recording studio space is that digitalisation has rendered them increasingly similar. The possibilities of both are largely indistinguishable.

The question then must be: what then is the difference between the professional and the home studio if they are virtually indistinguishable in terms of functionality? Are these differences to do with the practices occurring in these zones or are they material and spatial?

6.2 Contrasting practice

If the functionalities of the professional and home studio are indistinguishable then it is worth considering how practices (the open interpretation of functionality) may vary across these zones. In terms of practice the interviews reveal that the home recording studio is less restrictive and controlled with little restraint on time and finance. As one respondent explained:

> 'the real recording that I do is quite different. For example at the moment I'm working on a classical recording, microphones in a real space with real live musicians, whereas when I'm working on my own its all entirely electronic. So I use some bits and pieces that are similar some that are different. For example, the stuff I'm using for this recording has to be mobile, we're doing it in the national centre for early music so I have to be able to take it all down there. Whereas the studio I have at home its installed at home, its not mobile but I don't need it to be because that's where I live.'
> (Technician B)

He continues by distinguishing between the practices of the professional and the home studio:

> 'one is definitely a hobby and the other is definitely work.'
> (Technician B)

This illustrates that the practices of the home studio are framed as a form of leisure time in which organisational restrictions and objectives are removed, in the home studio there is no one 'looking over his shoulder' (Technician B). So despite the similarities in the functionality of these two zones, the home recording studio is understood to afford greater possibilities for experimentation and freedom of creative expression. The home recording studio is a 'hobby' space, a more familiar, unrestricted, and disordered space, whereas the professional studio is a 'work' space, an ordered, organised, and controlled zone of production.

The functionality of the professional and home studio are virtual identical yet the practices of the agent vary between these spaces as a result of the financial constraints, embedded notions of purpose, and the requirements of employment, amongst other determinant factors that demarcate the time and space of 'hobby' from the time and space of 'work'. The professional studio is defined as the *work-space* and the home recording studio as *hobby-space*. This then has implications for how these spaces are understood and incorporated into practice.

6.3 Contrasting environments: spatial and material distinctions

More concrete differentiations between these spaces can be found in reference to the spatial and material properties of these zones. Indeed, the spatial and material differences between these zones can be seen to be the only substantive difference between the two zones of music production. As Technician B identifies:

> 'the main difference...between a professional recording studio and a home studio is the environment, is the acoustic...that's the main difference, the environment, the acoustic environment. The home is polluted with noise, it has bad sounding rooms, this is a horrible sounding room. It is those kind of things that is the differential I think.'
> (Technician B)

These zones then may be thought of as differening *acoustic environments*. This, for Technician B, is the key distinguishing factor, the sound of the rooms and the reduction in noise pollution. This concern with acoustic environments is also illustrated in the following passage:

> 'one thing that you probably really can't sacrifice on is when it comes to actually doing extensive recording work. So mixing, production, post production work can be done at home can be done in the studio, but really if you want to record lots of musicians you probably need to sit down in a dedicated space, that's nice and quite, that's got good audio communication between the two spaces, and then some decent analogue front end. So that's probably where the real difference.'
> (Technician C)

When Technician C wishes to record musicians or singers he uses the professional studio space for the same reasons, this dedicated space can be used to cut out unwanted sound, it provides the ideal-type acoustic environment for this kind of practice. The practices that follow this moment of primary production and recording, such as the editing and processing of the recorded sounds into the finished cultural product, are then performed in *either* the home or professional recording studio (thus reflecting the similarities in functionality). It is the moment of *recording* that requires the particular acoustic qualities of the dedicated space that the professional studio provides.

For Technician B this is also an issue of the spatial organisation of sound production and capture:

> 'It's just the whole spatial thing, the lead vocal is there, the guitars are over there, the drums are over there, its not all squeezed into this tiny box in one part of the room.'
> (Technician B)

It would seem that although the demarcation of the zones of music production may not be functionality determined, force fields around these zones may be conceptualised in terms of the environmental properties allied with the organisational and formal properties of these zones. This sketching of boundaries around these two zones creates further questions for consideration, the most salient of which concerns the ways in which these spaces interlock or interconnect in the everyday practices of individual agents.

6.4 Interlocking or interconnected zones

> 'walls between official and nonofficial...inevitably...crumble'
> (Bakhtin, 2003: 207)

To enrich the theory of zones presented in this chapter it is possible that we may use the specifics of the recording studio to develop an understanding of how zones interconnect in everyday routine practices. To this end it is possible to re-approach these studio spaces in terms of Burkitt's distinction between official and unofficial practices. As Burkitt has argued:

> 'While the official and monologic are more formal and less easy to change, they are nevertheless in a necessary relation with the unofficial practices and discourses, which are playful and more fluid, dynamic, and rapidly changing.'
> (Burkitt, 2004: 224)

We can perhaps use this image of distinct yet interconnected official and unofficial practices and discourses to shed further light on this contrast between professional and home recording studio spaces.

It is possible then to think of both the professional and home studio spaces as concrete examples of official and unofficial activity spaces – spaces of praxis – in which these relations and routines of music production occur. Indeed, if we define praxis as the 'attitude that involves doing, transaction, and practical activity in general' and poiesis as 'the productive, manipulative, and uncovering attitude of humans.' (Burkitt, 2004: 212), then what we have been calling 'recording studios' may be re-labelled as sites or *zones of praxis and poiesis*. These then are 'live' zones (Lash, 2002) that highlight the fact that the 'everyday world is very much about the activity of production' (Burkitt, 2004: 212).

This approach carries within it a level of heterogeneity, as these illustrations of the recording studio reveal, 'everyday life is multidimensional.' (Burkitt, 2004: 13), it

> 'involves different social fields that are separated by irreducible gaps, yet which are permeable and, in their interaction, create a series of effects. These social fields are also produced in everyday life in ways that give them the appearance and feel – in our perceptions – of differentially materialized forms.' (Burkitt, 2004: 213)

From this perspective it is possible to reframe these two recording studio spaces as separate yet interconnected official and unofficial zones of production. We see exemplified in the accounts of these distinct zones that the

> 'official and the unofficial are not two separate realms: rather, they are open, permeable and necessarily interdependent. The unofficial realm is the living tissue of social life upon which the official social life rests, indeed, official ideas and ethics are often a crystallization of unofficial ideas and practices.'
> (Burkitt, 2004: 214-215).

The practices of the organised and structured professional recording studio are refined versions of the experimental and unstructured practices of the home recording studio. The home recording studio, as an unofficial realm or zone, is the 'living tissue' from which some of the experimental and unrestricted practices of idea formation are crystallized in the formal surroundings of the professional studio. For example, when asked if the professional and home studio operate together, Technician B responded:

> 'Occasionally yeah it does, but the hobby is much more experimental, I can do what the hell I like basically and that's what I love about it, it's an outlet for everything that I can't do elsewhere. And I deliberately try to do that type of thing. I'm not writing it to get released or anything like that, if anyone wanted to that would be really nice I wouldn't say no. But I'm doing it purely because I want to try out an interesting idea, or whatever, so yeah, very different.'
> (Technician B)

The home studio provides a creative outlet for new ideas to be played with, experimented with, developed. Successful or relevant ideas and experiments adapted from the home studio inform the official and formal practices of the professional studio.

Further to this Technician C claims that his work often moves backward and forward between these two zones. He organises these movements around three stages in the recording process:

> 'Sometimes it does, and the three different stages would be if I wanted to get high quality audio recordings from an acoustic source I'd record it here, or in another studio environment, so I'd get a singer in or a musician in and set

them up and record them. But all the mixing, post-production, editing I'd do at home in my own studio cause I'm happy with that, but I would, if I was mixing for surround, I'd do it here, and then I'd do the final authoring here as well. So the start and the ends of the project I'd do in a bigger facility, all the interim work I'd do on my system.'
(Technician C)

Again this highlights the significance of the 'acoustic environment' or, as Technician C refers to it, the 'studio environment'. The recording of sound occurs in the formal and dedicated space of the professional studio, yet this frequently moves to the unofficial space of the home studio to be edited, adjusted, played with, mixed. The 'project' is then usually completed or formalised in the professional studio as it crystallizes into a final product.

Further examples of the official being a crystallization of the living and creative tissue of the unofficial can be found in Warner's work on the music producer Trevor Horne. Warner identifies that Horne often used the professional and home studio in conjunction:

> 'Much of the music that may finally be recorded and mixed in costly studios will have been created initially using digital systems in a less expensive environment – the now ubiquitous 'home studio', which has become virtually a prerequisite for any aspiring pop musician. One result of this has been a breakdown of amateur/professional status in the production process. And this breakdown is also evident in the equipment itself: manufacturers now rarely distinguish between 'professional' and 'domestic' products.'
> (Warner, 2003: 20)

Here Warner illustrates another way in which these zones are interconnected. The music producer begins the creative process in the freedom provided by the home studio, the 'living tissue' of social life (Burkitt, 2004), and is then transferred into the official studio for completion, the crystallization of unofficial ideas and practices into official and complete cultural products. Indeed, it would be surprising if the elements that constitute cultural artefacts were not at least partially crystallized in spaces prior to entry into the relatively expensive professional studio.

By focusing upon 'local aspects of relations, activities, and communications' (Burkitt, 2004: 222) the recording studio provides illustrative frameworks for Burkitt's theoretical insight. In these zones we see a 'fusion of the official and the nonofficial' (Bakhtin, 2003: 208), in so doing it becomes possible to avoid two significant problems. The first, is that by focusing upon the 'relation between the official and the unofficial realms of everyday life' (Burkitt, 2004: 215) we get some sense of how these zones are demarcated by boundaries yet interconnect. They are not discrete or detached. The second is that by drawing upon a framework of official and unofficial spaces or zones we may bypass the increasingly problematic virtual/physical dualism (Haraway, 1991; Hayles, 1999). As such this approach reflects recent work concerning informatization and space in which virtual and physical spaces are understood to enmesh with material consequences for citizenship, social division, geographical and demographic categories, etc (see Burrows & Ellison, 2004; Graham, 2004; Mitchell, 2002).

By taking the recording studio as a case in question we find that both virtual and physical spaces are interwoven in recording studio of various types. The mixing desks, amplifiers, software, hardware, digital keyboards, drums, etc, of the recording studio form complex relations between virtual and physical as well as analogue and digital. The acoustic environment of the recording studio is one such example of interlocking zones in which we see relations between 'fluid' and relatively permanent forms of 'belonging and association' (Burkitt, 2004).

To return once more to Lash's formulation of zones we may then reframe or recast live/tame zones as *official zones* and live/wild zones as *unofficial zones*[29]. The purpose of which is to integrate a greater sense of interconnectivity that intimates toward a clearer demarcation of these zones. We can then think of the organisational aspects and formality of these zones as ordering and structuring everyday practices. The important point here is that we should not think of the studio space, because of its

[29] Without engagement these recording studio spaces will become inactive or 'dead zones' (Lash, 2002: 28).

glamorous, seductive, or iconic status, as somehow distinct from other zones of production, or indeed, from the attached issues of citizenship and engagement. If, as Burrows and Ellison contend, we 'recast social citizenship as 'engagement'' (Burrows & Ellison, 2004: 334), we may then place the recording studio into wider patterns and constellations of engagement and exclusion. We see in the case of the recording studio that it is not only access to these zones that is important but also the ways in which people may engage with (or within) these zones. Put simply, access and engagement are not just about entering, activating or installing zones, but are about knowing what to do once inside[30].

The boundaries around these official and unofficial zones are a consequence of spatial factors, defined here as the acoustic environment, combined with knowledge and understanding of the technological systems that populate and define these zones. To be citizen in these zones requires access, familiarity, and knowledge of how to engage[31].

7. Conclusion

This chapter explores the claim that the digitalised recording studio, as distinct from the digital recording studio, is a complex technosystem of analogue and digital as well as virtual and physical technologies. We have also seen that the appropriation of digital music technologies in these spaces has substantively altered practice and cultural products, but that these transformations are routed in and informed by technologies and practices of the analogue age. Indeed, the three technicians interviewed all claimed that digital recording studio technologies are often designed around the forms and functions of analogue technologies. However, although based upon analogue editing and effect technologies we see that digital technologies have created new possibilities for non-linear alteration and manipulation, particularly in the case of editing and effects.

[30] Consider here how the technicians described operating systems around the incompatibilities that they knew existed from previous experiences.

[31] For example: 'On the one hand, studio based software has liberated many restrictions placed on someone creating music. Such software allows a single person to take on the role of producer, artists, mastering house, and distributor. Traditionally these would have been discrete roles all with their own agenda. On the other hand, many of these programmes present a steep learning curve that can often hamper the creative process.' (Technician A).

Having said this, perhaps the most significant transformation associated with the digitalisation of the recording studio is the emergence of home recording studio software packages. These virtual devices may be installed on home computers thus offering almost identical functions to the professional studio. The key differences between these two zones of production are entirely environmental, the 'acoustic environment', and organisational, the time restrictions placed on access for example[32].

Placing these recording studios within a theory of zones or zoning has the dual effect of enriching an analysis of these spaces whilst also providing concrete exemplifications of *zoning in practice*. Indeed, I argue here, that the insights provided by these illustrations indicate that we may develop theories of zones to incorporate a greater level of interconnectivity in the multidirectional flows of practice between the home and professional studio as detailed in the accounts given by the music technicians interviewed. *The professional and home recording studio are distinct yet interconnected official and unofficial zones*, 'fluid infoscapes' (Burrows & Ellison, 2004), ordered or demarcated by a variety of forces that include organisational/institutional structures, knowledge formations, capacity for engagement, familiarity, capital, access, ownership, and perceptions of creative expression. The official/unofficial binary opposition provides a model for this interconnectivity and in so doing extends the understanding of the demarcation of these zones in/of practice.

[32] Allied with less significant differences in hardware

Chapter 7: The iConic iNterface and the veneer of simplicity: MP3 players and the reconfiguration and recontextualisation of music collecting and reproduction practices in the digital age

Chapter contents

Chapter abstract

Apple's iPod and MP3 players in general have risen to cultural prominence in recent years. In some instances the imagery of the iPod has even been used to define demographic or generational boundaries: "the iPod generation". Figures now indicate that in Britain as many as 48% of 16-34 year olds own some form of MP3 player, Apple have sold over 35 million iPods worldwide since their launch in November 2001, and the billionth worldwide legal music download was recorded in February 2006. In this context of relative mass appropriation we are faced with a complex skein of pressing sociological questions concerning the transformative capacities of these technologies. From this set of questions this chapter focuses specifically upon how MP3 and MP3 players are reconfiguring and recontextualising music collecting and reproduction practices. In addressing this central question it draws on a variety of sources, including structured interviews, photographs, advertising campaigns, newspaper and magazine articles, to attempt to construct a montage of these MP3 technologies in everyday life. It begins with material details and functionality, the first section deals with the MP3 compression format, and the second with the MP3 player. The third and fourth sections then focus upon the issues of reconfiguration and recontextualisation respectively. In the fifth section I draw on these illustrations, and the work of Katherine Hayles, to develop a theoretical model of MP3 player appropriation, or what is commonly referred to as 'iPodding'. The central argument of the chapter is that the MP3 player has reconfigured and reconstextualised music in distinct yet interrelated ways: (1) the reconfiguration of music as a virtual (MP3) rather than a physical cultural artefact (vinyl record, tape, or CD), which has implications for understandings of music and music collecting/archiving; and, (2), extending the work of the personal stereo, the MP3 player is recontextualising music by moving it out across the spaces of everyday life, a process that transcends boundaries between public and private zones. The chapter suggests that these reconfigurations and recontextualisations, embodied in complex and mundane everyday practices, can be understood in terms of Hayles' (1999) concept of 'incorporative' and 'inscriptive' practices allied with Apple's own theory of the iPod as 'iconic interface' cultivating an auratic 'veneer of simplicity'.

1. Introduction: mobile ICTs?

> 'it's more than three years since we first proclaimed the original Apple iPod a Best Buy and a revelation. The general public soon caught up and now the iPod is everywhere.'
> (*Which Guide to MP3 players*, 2005: 6)

> 'One of the most quoted statistics in newspaper and web articles concerning the phenomenal rise of digitally deliverable music is that "MP3" is the second most popular search engine term requested after "sex".'
> (Mewton, 2001: 27)

> 'The telltale white wires protruding from dozens of ears on a busy Tokyo street say it all: these are heady days for Apple in Japan. In a world once dominated by Sony, Apple's iPod leads the market in digital music players, with a 36% stake against Sony's 22%.'
> (*The Guardian*, 19th of August 2005)

It has been argued that mobile information and communication technologies (ICTs) are increasingly ubiquitous in the spaces of everyday life (Galloway, 2004) and that 'mobile devices' are taking increasing significance for the 'ICT revenues' of multinational manufactures and retailers (Lash, 2002: 205). As such mobile ICTs are 'transmutations introduced by modern institutions [that] interlace in a direct way with individual life' (Giddens, 1991: 1). Even a cursory glance around city streets reveals that mobile devices, such as mobile telephones, digital cameras, and palmtop computers, are enmeshing networked bodies with concrete spaces (Mitchell, 2003), and, in the case of MP3 players, contribute toward the constitution of the 'aural ecology of the city' (Atkinson, 2005). In some cases these devices can even be understood to materially transform or 'undercut traditional habits and customs' (Giddens, 1991: 1). We see exemplified in the case of mobile ICTs the processes of navigation 'through technological forms of social life...technological nature...technological culture.' (Lash, 2002: 15). This navigation is both virtual and physical as we 'navigate' through archived databases of cultural artefacts whilst moving along streets or around buildings.

Perhaps the most visible and prominent of these mobile ICTs is the personal stereo system and the attached earphone (see Bull, 2000; and Thibaud, 2003). The purpose of this chapter is to examine the implications of the emergence of the most recent of these mobile music reproduction systems, the MP3 player, as a specific example of mobile ICTs in everyday life. In this context of relative mass appropriation we are faced with a complex skein of pressing sociological questions concerning the transformative capacities of these technologies.

This chapter focuses upon the question of how these technologies are reconfiguring and recontextualising music collecting and reproduction practices. In addressing this central question it draws on a variety of sources, including structured interviews (see appendix 2), photographs, advertising campaigns, newspaper and magazine articles, to attempt to construct a montage of these MP3 technologies in everyday life. The chapter uses this range of sources to explore how these 'mobile' music technologies are reconfiguring and recontextualising music collecting (archiving) and reproduction (retrieval) practices.

The chapter is divided into six sections. The first two deal with the material details of MP3 technology. The first with the MP3 compression format and the second with the MP3 player. The third and fourth sections then focus upon the ways that these technologies have reconfigured and recontextualised music in everyday life. The third section focuses upon the reconfiguration of music in advertising rhetoric and in the practices of appropriators, so marking a shift from the collection of physical cultural artefacts to the virtual digital archive of sounds on the hard drive. The fourth section focuses upon the spatial recontextualsiation of music through the examination of a specific set of cultural events, *noWax*, at which the MP3 player acts as a control interface. These events are evidence of the shift of the music collection from the fixed and heavy collection of the analogue and even the first age of digitalisation, to the light and mobile collection. This is a cultural movement that resonates with the broader shift from heavy to light forms of modernity (Bauman, 2003). In the closing sections I conclude by developing a theory of the MP3 player which draws upon the work of N. Katherine Hayles and Apple's own theory of the iPod. The central argument of the chapter is that music is currently undergoing a period of reconfiguration and recontextualisation resulting from a complex interplay between digital technology and digital rhetoric. And, second, that the everyday practices of appropriation that constitute these reconfigurations and recontextualsiations may be understood in terms of 'incorporative' and 'inscriptive' practices (Hayles, 1999), the complexity of which is concealed, according to Apple, behind the 'iconic interface' and its auratic 'veneer of simplicity' (Ive in *GQ*, August 2005 issue: 158).

2. MP3: compression and spatial mobility

MP3, which is an abbreviation of *Motion Picture Experts Group One Audio Layer Three*, is an 'inter-standard compression program' (Mewton, 2001: 25) 'invented' by a German research firm in 1991. MP3 reduces:

> 'the amount of digital information required to store music. It does this by encoding the data more efficiently and lopping off bits that your ears won't really miss. This process is called compression...It reduces sound quality only a little – you can just about tell the difference on a good stereo, but probably not when you're out and about, listening through headphones.'
> (*Which Guide to MP3 players*, 2005: 2)[1]

The process of compression reduces the music file 'to approximately one twelfth of the size of a normal audio CD file' (Mewton, 2001: 25). This has the direct consequence of reducing the amount of space required for the storage of these files and increasing their internet transfer speed. In so doing, and contrary to the rhetoric of *perfect digital reproduction*, some of the edges, the subtleties, the extremities of the music are cutaway in order to reduce the size of the music file[2].

Here a virtual reconfiguration of Adorno's 'scriptal spiral' (2002d), a socially and politically connected etching of the cultural form onto a disc format, is inscribed (Hayles, 1999) upon the digital file as a simulated rather than literal etching of the

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[1] Available in print or as an emailed PDF file by calling a telephone number advertised in a variety of national newspapers.
[2] The utopian perception of the digital format as stable, permanent, and non-deteriorating was further undermined, in favour of a dystopian position, by a recent report indicating that rewritable CDs, known, as CD-Rs, may deteriorate over time and that files may be lost as a result (*The Independent*, 21st of April 2004)

cultural artefact. As such music may now be *inscribed upon the digital file and the hard drive*.

Figure 7.1: My tape Sony Walkman and a tape used for various mixes.

Using more concrete terminology the 'music lawyer' Conrad Mewton defines the MP3 as a 'compression/decompression algorithm, or codec, used for transmitting audio information via the internet.' (Mewton, 2001: 212). These compressed music files may then be stored and reproduced by a variety of devices; the MP3 player[3] is one such mobile retrieval device. Similarly Duncan & Fox describe MP3 as:

> 'One of the oldest – and probably best-known – compression/decompression formats (codecs)…It is popular with users for its near-CD quality and relative high speed of encoding and decoding. It is less popular with the music industry because it lacks controls to prevent copying.'
> (Duncan & Fox, 2005: 9)

In many instance the MP3, an unencrypted and therefore open format, has come to act as a metonym for all digital compression formats, whilst numerous other similar formats are available and widely used. Unlike MP3, some of these alternative music compression formats are secure and encrypted, these include 'AT&Ts a2b, Liquid

[3] It is worth noting that the cost of these devices has reduced sharply over the last three years. In the run up to Christmas 2005 the supermarket ASDA, as part of their television advertising campaign ran an advert (ITV1, 14th of November 2005) promoting MP3 players for sale for £14.97.

Audio, IBMs Madison project...[and] Microsoft's Windows Media Player (WMA)' (Mewton, 2001: 25).

Duncan & Fox observe that:

> 'As demand for compact digital music players has exploded, new technologies for compressing the files have been developed and introduced, e.g. MP3, AAC, ADPCM, FLAC, OGG, and VQF. These technologies differ by compression rate and loss of audio quality. They also vary by the amount of power required to code or decode them and the bit rate, or number of bits per second used in the audio file. While the technology for audio file compression continues to improve, the usefulness is compromised by incompatibilities among them'
> (Duncan & Fox, 2005: 9)

The essential point from which to proceed, without going into the more specific technical details of these technologies, is simply that a variety of these music compression technologies are available and that the incompatibility of these formats is often central in the restriction of copying across different devices. Take for instance the Apple iPod[4]. The MP3 player market has, apparently, come to be dominated by the 'incredibly successful iPod' (*Which Guide to MP3 players*, 2005: 2). Yet despite being widely labelled as MP3 player, 'Apple's itunes shop uses a format called AAC[5], which can be played only on iTunes[6] software and iPods.' (*Which Guide to MP3 players*, 2005: 4). This AAC format is used in order to 'add copy restrictions' (*Which Guide to MP3 players*, 2005: 4). These copy restrictions, based upon the incompatibilities of technologies, are being played out in the battle for market share between Microsoft and Apple, as both develop and extend their range of digital music technologies[7]. In this example the incompatibility of digital formats is utilised to

[4] For more on the Apple iPod and its prominence see Consentino (2006)
[5] Advanced Audio Coding (AAC)
[6] Apple's iTunes service was reported to have sold '150m tracks around the world' in April 2004 and that around '70% of the global online music market is controlled by iTunes' (*The Guardian*, 4th of April 2004)
[7] It is worth noting that Apple's pricing policy, relating to this issue of market dominance and the control of copying through the appropriation of incompatible formats, lead to 'Apple's iTunes online music service' being 'referred to the European commission after a complaint over charges by British

create boundary constraints around cultural artefacts. Clearly, as illustrated by this and the previous findings regarding digital problematics in the recording studio (chapter 6), it is not the case that with digitalisation 'any component can be interfaced with any other' (Haraway, 1991: 163). Unrestricted compatibility is not a vision shared by manufactures who wish to demarcate and protect property rights and market share. Indeed, digitalisation is based upon a tension between compatibility and incompatibility relative to the territorializing potentials of the companies who dominate market sectors.

The construction of this competition between Apple and Microsoft, or the 'iWar' (*The Observer*, 25th of July 2004), is illustrated in the following partisan statement from Apple's Co-founder Steve Jobs:

> 'There are lots of examples where not the best product wins...[Microsoft] Windows would be one of those, but there are examples where the best product wins. And the [Apple] iPod is a great example of that.'
> (*GQ*, August 2005 issue: 159)

The possibility of the 'iWar'[8] emerged as Microsoft launched a music reproduction device that was not compatible with the iPod or with the iTunes website[9]. This was coupled with Sony's launch of their Network Walkman which uses an ATRAC3 format (*The Observer*, 25th of July 2004). The Apple/Microsoft 'iWar' – which is an example of the dominance of the 'i' prefix used to evoke the music downloading phenomenon in media discourse – is, at the time of writing, only in its early stages, yet it is already clear that these battles for market share are continuing as the number of MP3 players on the market proliferates.

The point to extract here is that MP3, and digital compression formats in general, by reducing the size of music files has increased the spatial mobility of music in terms of

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Customers.' (*The Guardian*, 4th of December 2004). This pricing policy related to the reported 15% difference in the price of downloads between Britain and France and Germany.
[8] The non-capitalised 'i' prefix is frequently used to evoke the digital music downloading phenomena.
[9] iTunes, Apple's online music download store, was launched in Britain in June 2004 (The Guardian, 17th of June 2004).

being stored in greater quantities on mobile music reproduction devices and by increasing the possibilities of transferring music across the internet.

I will now proceed by focusing more closely upon the MP3 player, and more specifically on the material details of the Apple iPod.

3. The MP3 player: interfacing with the digitalised mobile music collection

When walking city streets, through buildings, travelling on trains, sitting in waiting rooms, queuing in shops, it is not uncommon to see people with wires leading from their clothing to their ears. Some earphones, also referred to as headphones, or what Thibaud refers to as the 'primary earshell' (Thibaud, 2003: 340), are bigger than others. Some fit inside the ear, some hook over the ear, others are held in place by a band of plastic across the crown of the head. For Thibaud these devices operate a 'separation of the eye and ear' (Thibaud, 2003: 340), for, it is presumed, the soundscape is to some degree detached from the landscape by this technology.

A sight that has become increasingly common is the ubiquitous white earphone, the indicator, perhaps unreliably, that situated somewhere on the body is an Apple iPod MP3 player[10]. In terms of uptake and spread a recent survey reported in the July 2005 issue of the *Observer Music Monthly* magazine, suggested that as many as 48% of 16-34 year olds owned some form of MP3 player[11]. And, in terms of the iPod, Apple has anticipated that by the end of 2005 it will have sold 35 million iPods since they were launched in November 2001 (*The Independent*, 26th of November 2005).

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[10] These devices are not only carried surreptitiously they may also be worn on the arm in an official iPod armband holder available from the Apple website: http://store.apple.com/Apple/WebObjects/ukstore.woa/90101/wo/dP4pBua7d5lq2xT6brA1AaRekVF/1.SLID?mco=8E665D67&nplm=MA183, accessed 04/11/2005.

[11] It was also reported in this article that 36% of Britons who had downloaded music had never paid for it and that 23% of Britons had downloaded a mobile phone ringtone. The source of these findings was 'ICM Research' who had 'interviewed a random sample of 1083 adults aged between 16 and over'. These interviews had been conducted 'face to face between 17 and 27 June 2005 across the country and the results have been weighted to the profile of all adults. ICM is a member of the British Polling Council and abides by its rules. Further information at www.icmresearch.co.uk'. (*Observer Music Monthly*, July 2005)

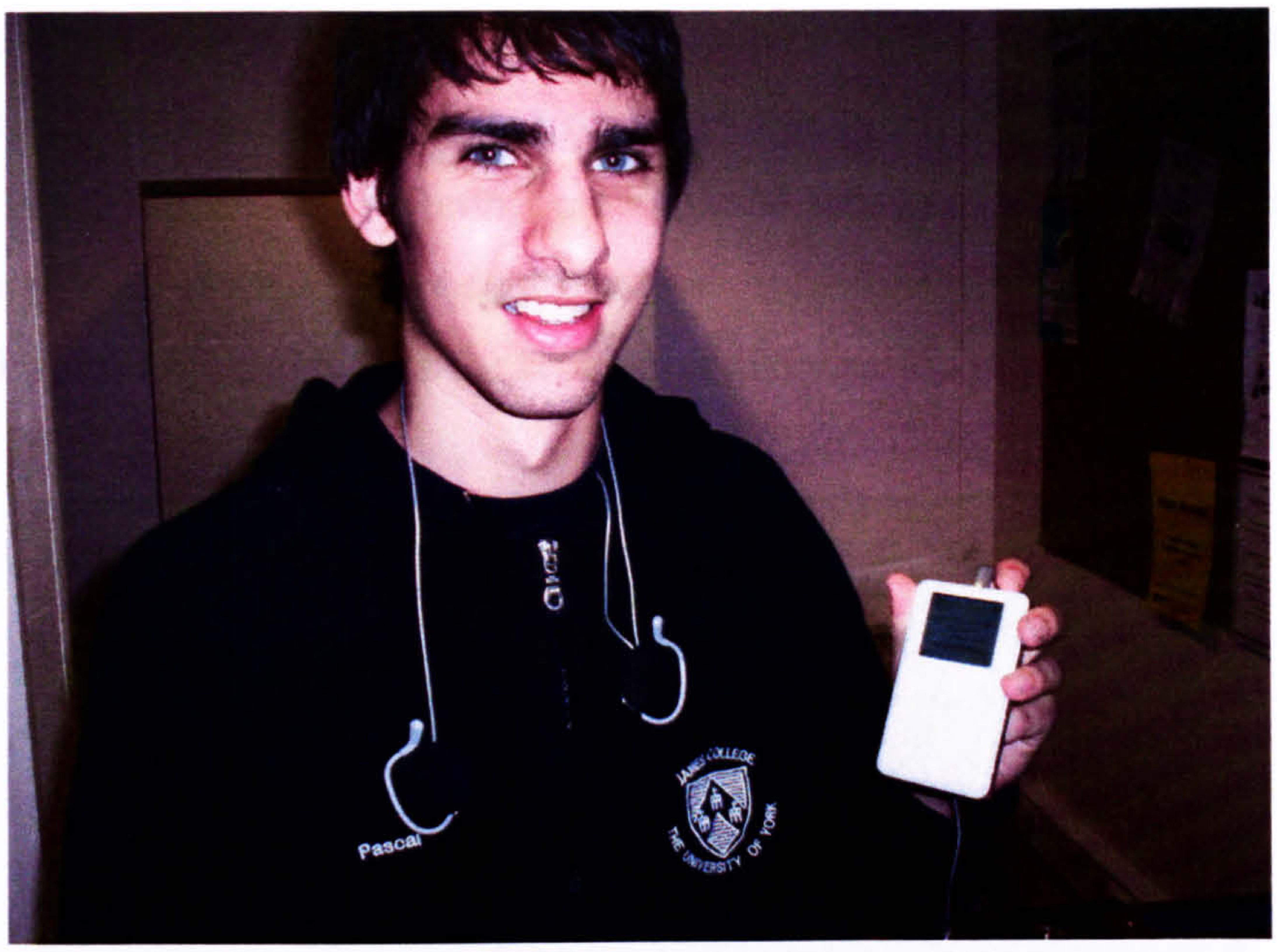

Figure 7.2: An iPod and its owner (notice the absence of the white earphones)

In terms of functionality, the MP3 player is a device for storing and retrieving digitally compressed music files and reproducing them through amplification devices, usually earphones. The MP3 player allows large quantities of music, anything from around 100 to 15,000 songs (dependent upon the device), to be carried around any space and retrieved/reproduced through the MP3 player's controlling mechanisms – a process that is described in the following passage:

> 'The design of the big iPods makes them particularly easy to use, even one-handed...You simply move your finger around the touch sensitive wheel to scroll up or down a menu. By pressing down on the east, west and south points of the wheel, you can play and skip songs...To move down through the menus (say, from 'Browse' to 'Artists' to 'David Bowie' to 'Hunky Dory' to a particular song), you press the central button. To move to higher menus, you press down the top of the wheel...You can even use these simple controls to make your own compilations on the spot.'
> (*Which Guide to MP3 players*, 2005: 7)

This spatial mobility of music is often described as the practice of "carrying around a music collection", "a music collection in your pocket", the "pocket Jukebox", etc. In this sense the MP3 player mobilises and consequentially recontextualises the music collection. Rather than being restricted to private or domestic spaces, the music collection may be carried around and retrieved across any space. The limitations on are only battery life, the collecting practices of the appropriator, and unforeseen systems problems. As one respondent recalled: 'recently my MP3 player froze on the train and I've had to send it back for repairs.' (MP3 user C).

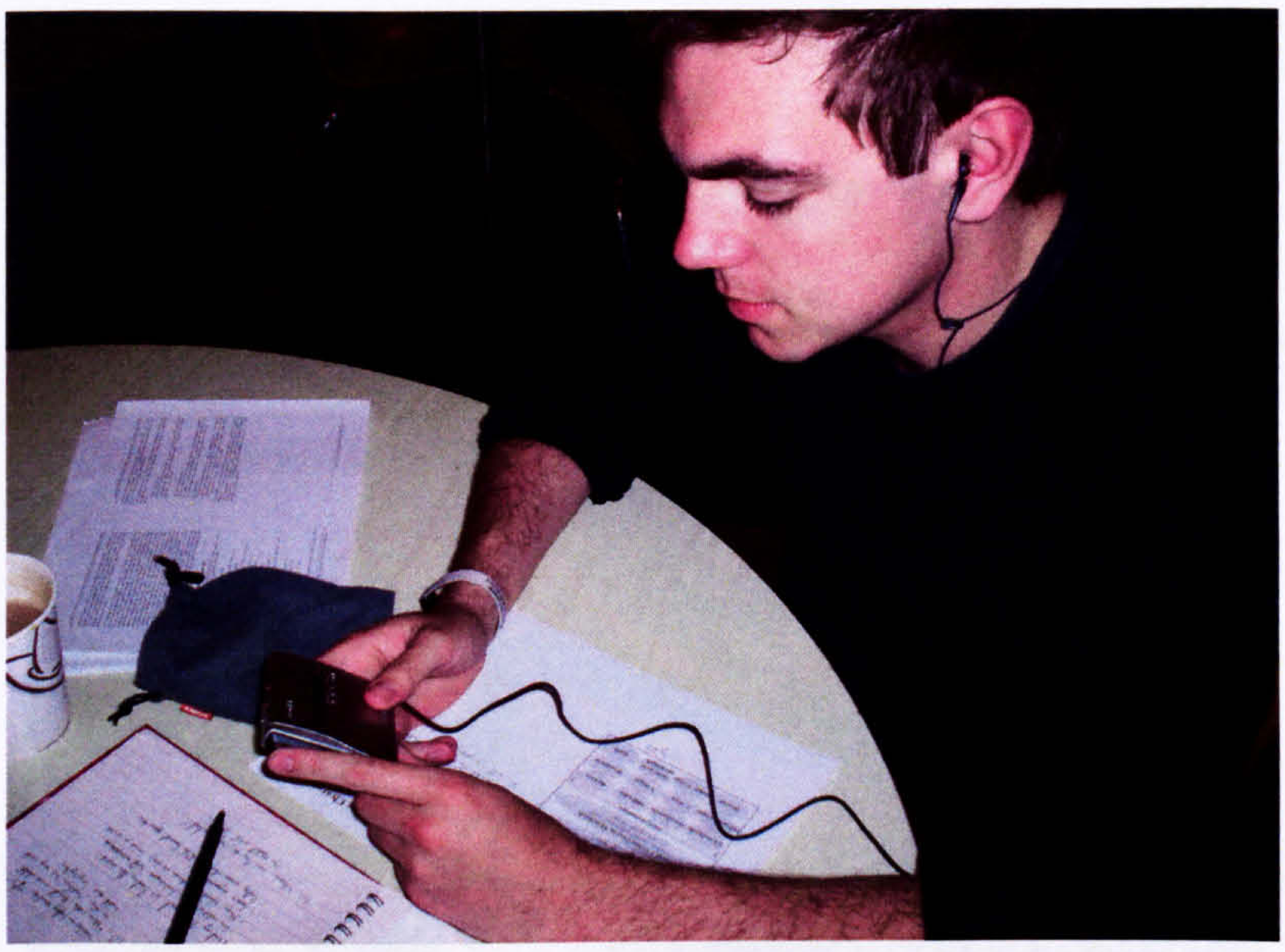

Figure 7.3: A Sony Walkman Hi-MD MiniDisc player

Figure 7.4: A Sharpe MiniDisc player (held together in places by adhesive tape)

The MP3 player is clearly an extension of previous mobile music reproduction devices such as the MiniDisc player (see figures 7.3 and 7.4), the mobile CD player (see figures, 7.5, 7.6, 7.7, 7.8, 7.9), or the tape based personal stereo system (see figure 7.1) – yet with one clear differential, the quantity of music it mobilises. Rather than being restricted to the quantity of music that could be stored on a CD or tape, or even a mini disk or vinyl record, the MP3 player opens up the possibility of carrying around the equivalent of hundreds if not thousands of CDs or tapes.

Figure 7.5: A Sony CD Walkman D-E351 personal mobile CD player (this device contains only one CD at a time).

Figure 7.6: A Panasonic mobile CD player

Figure 7.7: A Sony G-Protection CD Walkman

Figure 7.8: A Panasonic SL SX315 mobile CD player

Figure 7.9: A Phillips Mobile CD player

Under the heading 'What you'll need' the *Which Guide to MP3 players* (2005) describes some of the possibilities of MP3 music reproduction:

> 'Some MP3 players will record directly from your stereo, but really you need a computer...Computers are quick, so you don't have to wait for an album to play through. And they let you tag your MP3s with names, which makes songs a lot easier to find later... You also need MP3 software for your computer. MP3 players come with a CD which contains the software; alternatively, you can download it from the internet (try www.apply.com/itunes for a good example).'
> (*Which Guide to MP3 players*, 2005: 3)

These MP3 players[12] may be connected to a computer through a USB[13], USB2, or a firewire connection, and music can then be transferred from the computer to the MP3 player.

[12] The MP3 player, in some cases, such as Apple's iPod Nano, have no moving parts and therefore overcome the problems of the jumping or skipping due to vibrations.

[13] A USB is a 'Universal Serial Buss. USB ports are fitted to most modern computers, enabling them to be connected to hardware, such as scanners or CD writers' (Mewton, 2001:214) or MP3 players.

Which Guide to MP3 players (2005) places these MP3 players into two general categories:

> 'First, there are hard-disk models. These have massive amounts of memory and can store thousands of songs. Some hard disk models can play videos as well as music...Second, there are solid-state models. Solid-state models are smaller and lighter but even the most advanced store only 250 songs or so.'
> (*Which Guide to MP3 players*, 2005: 3)

The music stored on these MP3 players can then be reproduced through headphone speakers, or they can be connected to 'a hi-fi with a lead from the headphone jack to your amp. You can pick up one of these leads from an electronics or hi-fi store for £3 or so.' (*Which Guide to MP3 players*, 2005: 5).

However, there are alternative ways in which to reproduce digitally compressed music files across the spaces of everyday life:

> 'Of course, if you have an MP3 player, the chances are that you'll end up with a computer chock-a-block with MP3s. You can connect your PC's sound output directly to your stereo, but there are more hi-tech ways of doing things...You can wirelessly link your computer and hi-fi. That way, the hi-fi can stay in the lounge and the computer in the study. The maximum range is about 100 metres, but in practice current home technology has trouble reaching further than the next room.'
> (*Which Guide to MP3 players*, 2005: 5)

The reproduction of digital compression file format music across these domestic spaces may be realised by attaching equipment that networks computer systems with stereos such as the *Phillips SLA5500 Wireless Audio Receiver*, for a computer with a wireless system, or a *Sonos Digital Music System*, for computers without wireless (*GQ*, August 2005 issue: 47). Alternatively it is also worth noting that it is possible to plug, or 'dock', the iPod into the ports of specifically designed amplification devices in order for the pocket size collection to be 'unfolded' (see chapter 4) around domestic spaces:

> 'Slot the iPod into the unit, or connect it through the auxiliary port and bingo! – you have a neat, stylish and portable set-up. It's recommended for office or hotel use (where its travel alarm-clock feature is handy) but it's just as good for taking your iPod music to a room in your house if you want a little privacy...Moving it around is easy, too, as it folds up nice and snug.'
> (*The Independent*, 12th of June 2004)

Devices are now available, such as the *SoundDock Digital music system* from *Bose* (see figure 7.10), *Tivoli's iPal*[14], and *Altec Lansing's inMotion iPod*[15] (described above), in which the iPod is inserted into a port and the sounds reproduced may be amplified by the integrated speaker system. Furthermore, illustrating the trend for hybridity and integrated convergence based systems, the recently released Microsoft Xbox 360 games console – suggesting an interesting compatibility potential that problematises and complicates the accounts of the 'iWar' between Apple and Microsoft – also has a USB port and is compatible with the iPod, thus allowing music stored on the iPod device to be reproduced by the games console system ('Microsoft's Big Games Gamble' *BBC 2*, 7pm, 4th of November 2005). There are also now emerging systems that enable iPods to be docked into car dashboards and the music reproduced through car stereo speaker systems. A recent example of this is the *Dension Ice>Link FM.* This recently emerging technological phenomena may, along the lines initiated by Bull (2005), offer a path into recently emerging theories of *Automobility.*

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[14] Featured in 'gadgets of the week', in *The Independent*, June 12th 2004. Cost £140 and available from www.ruark.net.
[15] Featured in 'gadgets of the week', in *The Independent*, June 12th 2004. Cost £99.01 from www.apple.com/uk.

Figure 7.10: the *SoundDock Digital music system* from *Bose*

We are still then left with two key questions to consider. The first, concerns the details of the appropriation of mobile music technologies in everyday life: who are using these technologies and how are they using them? This may be recast as a question of interfacing. The second concerns the implications or consequences of the reconfiguration and recontextualsiation, or perhaps, 'recrafting' (Haraway, 1991), of the digital compression of music.

MP3, used here to represent all digital compression formats, and the MP3 player, have had the effect of reconfiguring and recontextualising music collecting and reproduction practices in distinct yet interrelated senses. First, they have reconfigured the music collection from the disc and spool collection of physical cultural artefacts which can be touched, held, seen, smelt, and stored in wracks, boxes, and shelves, to the virtual cultural artefact of the digital music file, which may only be conceptually touched, held, seen, and smelt and stored in virtual wracks, boxes, and shelves in the hard drive. And, second, it has recontextualised the music collection from private domestic spaces to the public and commercialised spaces of everyday life[16]. The MP3 player, through the processes of digital compression into cultural archives, has

[16] The question then is what becomes of the collection if as Benjamin suggests 'the phenomenon of collecting loses its meaning as it loses its personal owner' (Benjamin, 1999c: 68)? If we move toward networked collections, in which personal ownership is superseded by file transfer and sharing across networks, has collecting lost its meaning in the processes of moving from the personal to the networked? I will return to these questions in chapter 8.

extended the personal or mobile stereo's affordances to enable entire collections to be carried around. A practice that was not possible in the pre-digital era due to the logistical and spatial issues attached to previous music reproduction formats and systems. The question then is to what extent these reconfigurations and recontextualisations have substantively transformed everyday practice?

I will now look in turn at the ways in which the appropriation of MP3 technologies, in interplay with the rhetoric of digitalisation, is reconfiguring and recontextualising music collecting and reproduction practices.

4. Reconfigurations: unpacking my MP3 library

> 'I am unpacking my library. Yes, I am...I must ask you to join me in the disorder of crates that have been wrenched open, the air saturated with the dust of wood, the floor covered with torn paper, to join me among piles of volumes that are seeing daylight again after two years of darkness, so that you may be ready to share with me a bit of the mood...what I am really concerned with is giving you some insight into the relationship of a book collector to his possessions, into collecting rather than collection.'
> (Benjamin, 1999c: 61)

The MP3 player appears to be an increasingly embedded mobile music technology. If we take the reported figures as being accurate then in the period of the 1st of January to the beginning of April 2005 5.3 million iPods had been sold by Apple, a 558 percent increase on the same period in 2004 (*The Independent*, 28th of April 2005), and 'almost 10m iPods sold worldwide' in the first half of 2005 (*The Observer*, 5th of June 2005). It is clear from these marketing statistics and from anecdotal evidence based upon everyday observations that MP3 players are becoming increasingly ubiquitous[17]. In addition to these sales and marketing figures, the rise to cultural prominence of these MP3 technologies is revealed by even a cursory glance at newspapers, magazines, e-zines, blogs, etc. These sources feature a plethora of advertising, feature articles, retail opportunities, reviews, and troubleshooting tips

[17] Particularly over the last 2 years.

concerning these technologies. Indeed, MP3 players can now even be purchased from vending machines in library spaces (see figure 7.11).

Figure 7.11: Vending machine dispensing MP3 players amongst other digital technologies.

Figure 7.12: The vending machine's information on the MP3 player

This vending machine distribution of the MP3 player, amongst other digital products, intimates that the MP3 player is part of a shift toward disposable technologies, instant localised consumerism, convenience culture, and the commodification of space.

Figure 7.13: An iPod

The Apple iPod, a mobile music device launched on the 10th of November 2001 (*GQ*, August 2005 issue: 159), is often referred to, particularly in popular media discourse, as "the music collection in your pocket" or "a pocket Jukebox". In many ways the image of the iPod has come to dominate the depiction of contemporary musical appropriation. An early model of the iPod 'weighs little more than 170g (6oz), is less than 2.5cm (1in) thick – and can store up to 7,500 songs at a time.' (*The Independent*, 14th of June 2003). Later models have decreased in size and weight.

Figure 7.14: A section from a double page advert for the iPod Nano (taken from the *The Guardian Weekend*, 24th of Sepetember 2005)

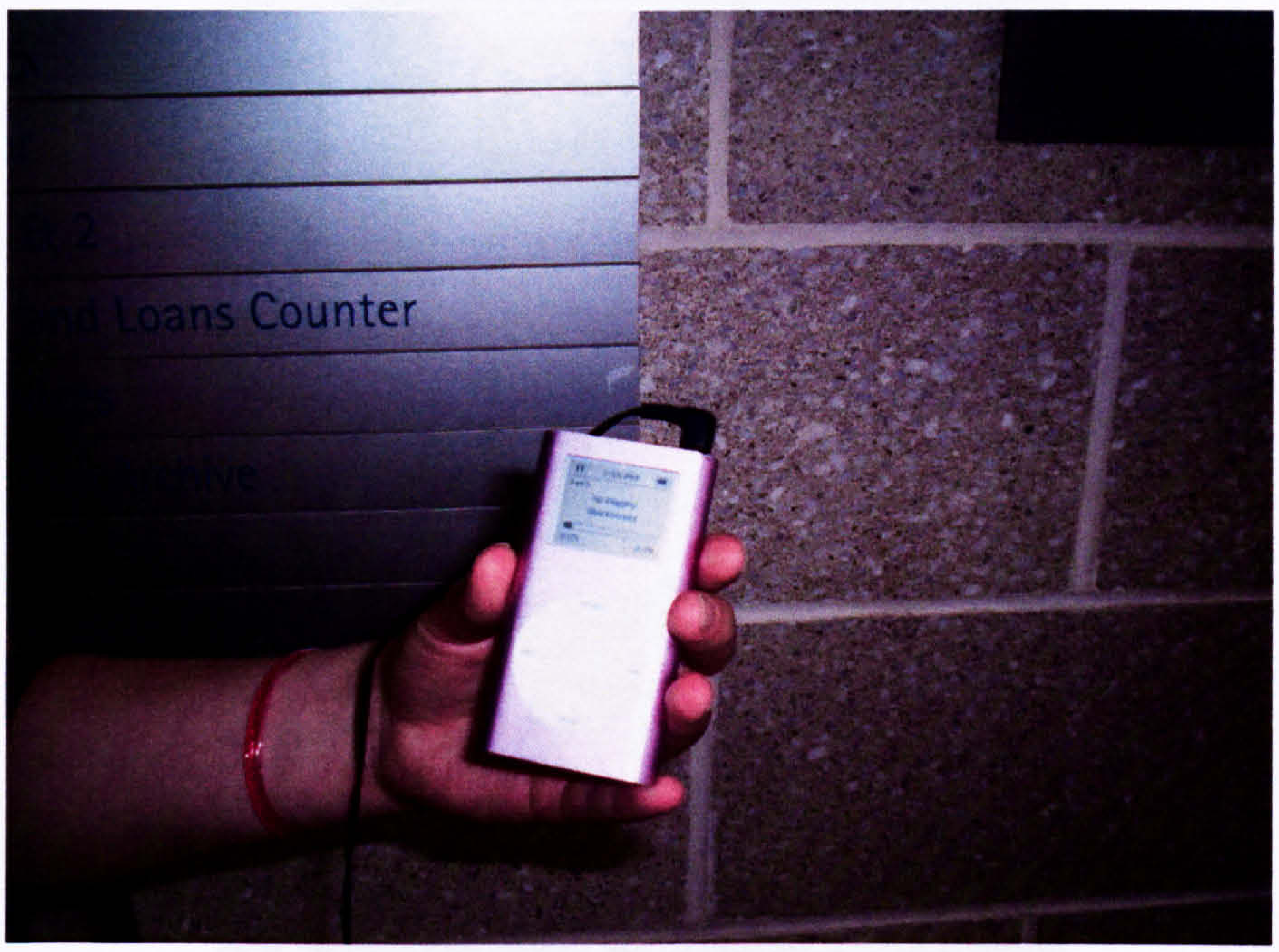

Figure 7.15: The iPod Mini

The highly fetishised images and rhetoric of the iPod, the iPod mini[18] (see figure 7.15), the iPod Shuffle[19], the iPod Nano[20] (see figure 7.14), and the most recent iPod[21]

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[18] 4GB memory, 1,000 songs, and available in 5 colours. (onle limited information is available on this produce as it is not longer available)

[19] Either a £69, 512MB memory, 120 songs, 22g, model or a £89.99, 1GB memory, 240 songs, 22g, model, taken from information on www.apple.com/uk accessed 5/11/2005.

[20] Either a £139, 2GB memory, 500 songs, 42g, 90 x 40 x 6.9mm model or an £179, 4GB memory, 1000 songs, 42g, 90 x 40 x 6.9mm model, taken from information on www.apple.com/uk accessed 5/11/2005.

[21] Either a £219, 30GB memory, 7,500 songs, 136g, 103.5 x 61.8 x 11mm model or a £299, 60GB memory, 15,000 songs, 157g, 103.5 x 61.8 x 14mm model, taken from information on www.apple.com/uk accessed 5/11/2005.

with 2.5 inch colour screen[22], positioned across a variety of media, suggest a shift toward digitalised music storage, collection, reproduction, and listening practices[23]. In some instances the iPod is even referenced to define a particular demographic: '*the iPod generation*' (*The Independent*, 16th of April 2005). In short, appropriation has been rhetorically reformulated, redefined, or recrafted as a type of cyber-appropriation where the materiality or physicality of music appropriation is called into question[24]. This is not to say that advertising determines appropriation, rather it is to argue, in the sense that Haraway contends, that 'instrument' and 'concept', 'myth and tool mutually constitute each other' (Haraway, 1991: 164).

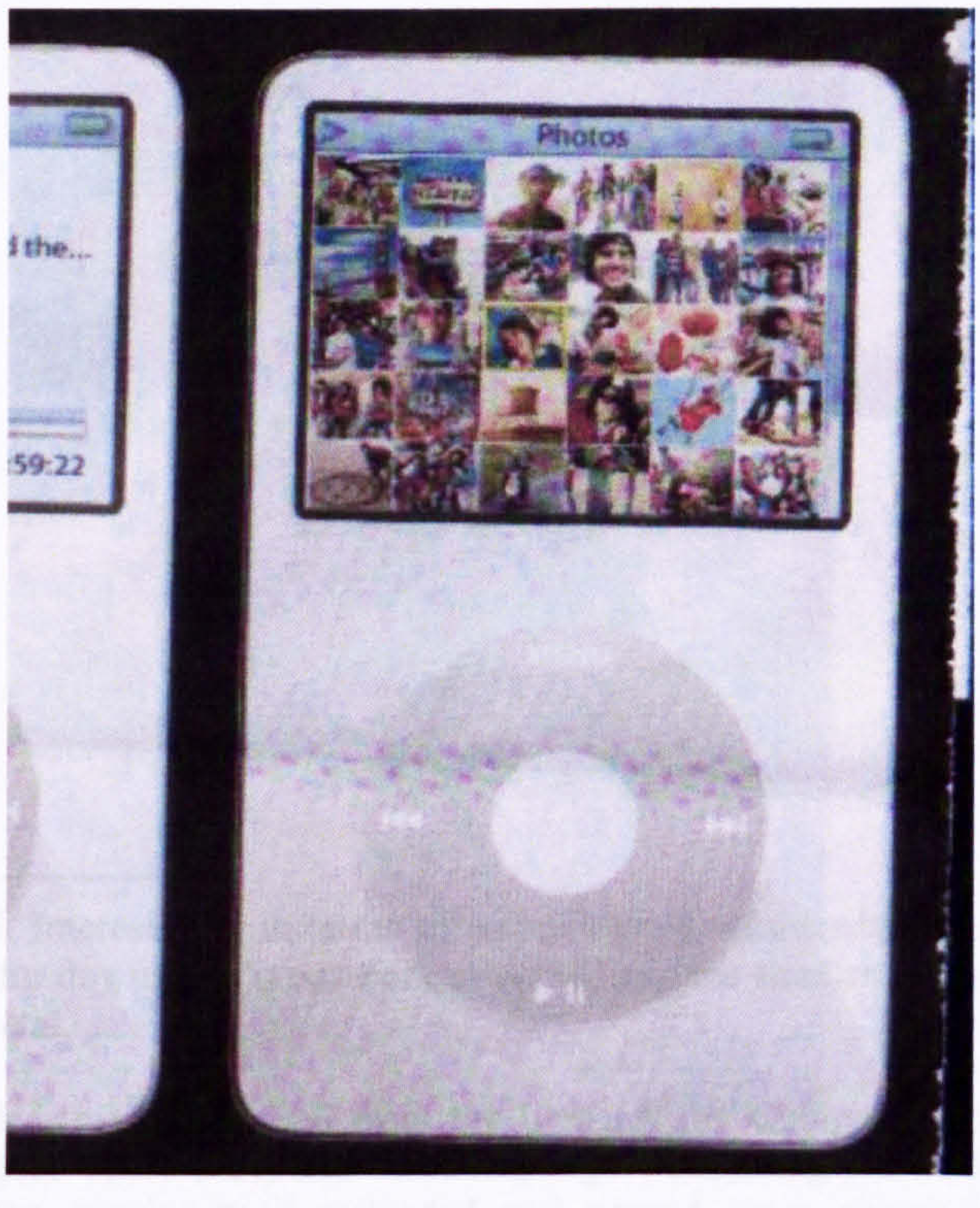

Figure 7.16: Image of new iPod with video screen (taken from an advert in *Observer Music Monthly*, November 2005)

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22 According to *The Washington Post* Apple Computer Inc. took 20 days to reach 1 million downloads of videos from its online store. This article idenitifes that porn on the new video facility of the iPod is a rapidly growing branch of pornography. (*The Washington Post*, 15th of November 2005, http://www.washingtonpost.com/wp-dyn/content/article/2005/11/14/AR2005111401456.html?referrer=email&referrer=email , accessed 15th of November 2005.)

23 A recent version of the iPod came with a U2's 2005 album *How to dismantle and atomic bomb* already downloaded onto its hard drive.

24 It is also possible for the individual generic form of the iPod to be recrafted as a personal object, or, as the Apple website suggests, 'Make your iPod *really* your iPod' (www.apple.com/uk), by having a message engraved on the back of the device. 27 characters can be engraved on a conventional iPod and 23 characters on an iPod Mini.

Furthermore, the iPod is not solely limited to the download of music files, for example subway maps from various cities across the world may be downloaded to the iPod (through http://www.ipodsubwaymaps.com/index.php)[25], the iPod Nano advertising also details other possible downloads such audiobooks, photos, home movies, short films, music videos. The image of the radio is also often used to emphasize the *Podcasting* (Crofts et.al., 2005) capabilities of the iPod, where specifically identified files from radio (or other) broadcasts may be stored and accessed or retrieved at will, BBC radio 4 recently launched such a service (*The Independent*, 16th of April 2005)[26].

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[25] Accessed 7/11/2005. Interestingly in terms of technological affordances, this site suggests that the subway maps it offers for download do not work effectively on the smaller screen of the iPod Nano.

[26] According to Crofts etal,

> 'The term "Podcasting" is derived from the iPod (Apple Computer's popular device for playing compressed audio files) and "broadcasting." Podcasting allows for audio files that would have been previously downloaded and played on a personal computer to be automatically downloaded and listened to on portable music playing devices (such as the iPod and other MP3 players).'
> (Crofts *etal*, 2005: 1)

They argue that it was Really Simple Syndication (RSS) file format that made this possible. The original intent of which 'was to automatically update blog postings, news headlines and other internet content' (Crofts, etal, 2005: 1) As a consequence of this technology 'individuals...would not have to search for updates...the software would do it for them' (Crofts etal, 2005: 2). From this, illustrating the *serration* of these technologies (Hayles, 1999) the software for Podcasting was then developed when Adam Curry who 'saw the potential of RSS technology to help provide greater flexibility and downloading audio files' (Crofts *etal* ,2005: 2). This type of podcasting is now also available, for example, through BT (BT.com) who's LAUNCHcast service, continuing the living and re-active rhetoric found inscribed on the music software packaging, 'learns' your 'taste' and plays music accordingly. This, along with the common conception of the illegal and legal downloading of specifically selected files, emphasises the networked image of these seemingly individualised digital music storage and reproduction technologies. This in a sense illustrates the *individualised-whilst-networked* paradox of the digital age.

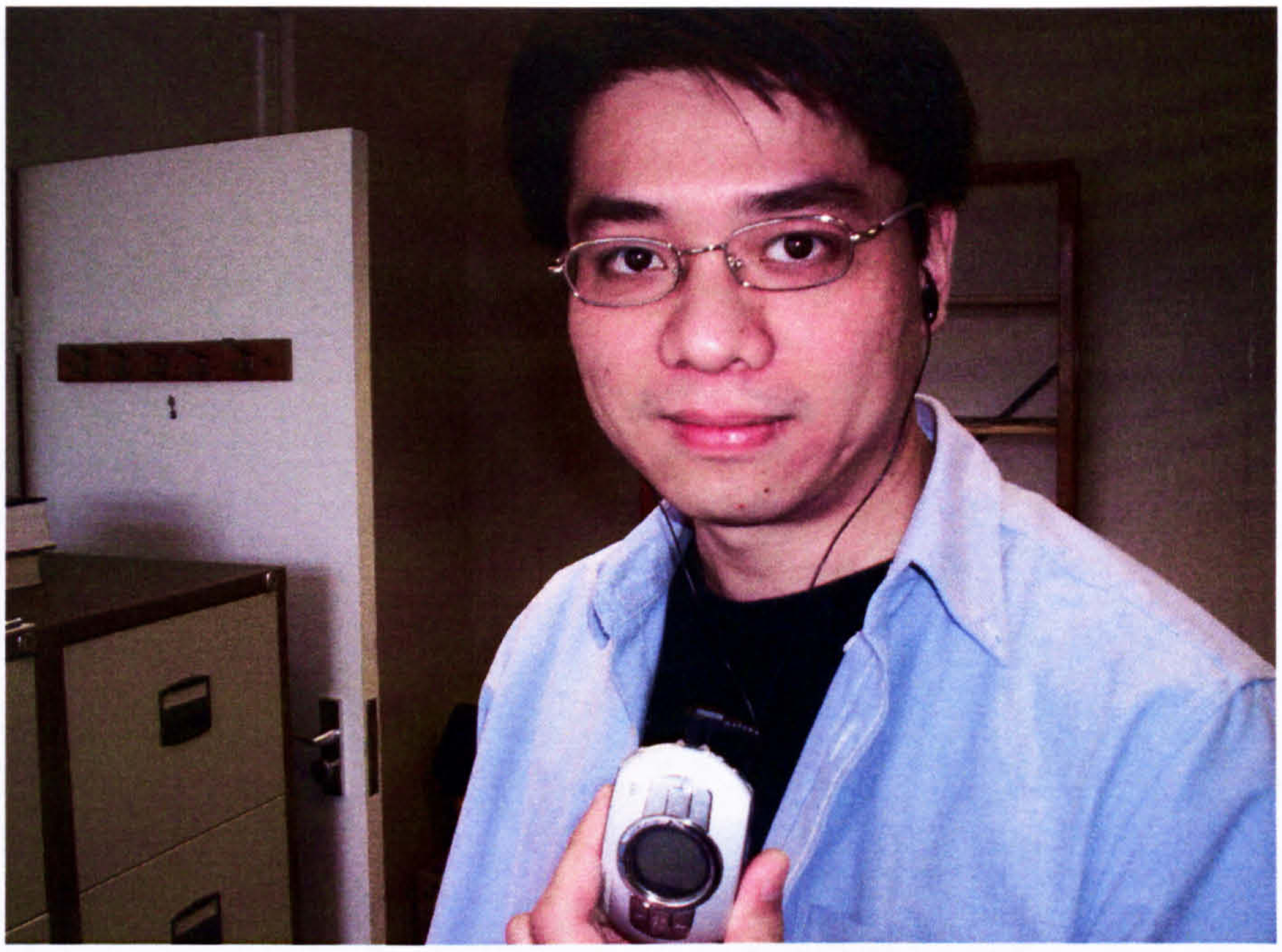

Figure 7.17: A Miruku (a Korean brand) MP3 player.

Of course the iPod, although apparently dominant[27], is not the only MP3 player available on the market, the range of alternative MP3 players, is rapidly expanding, again a cursory glance through music magazines or national newspaper supplements reveals a vast array of digital music reproduction devices and accessories. Examples of other MP3 players can be seen in use in figures 7.17 to 7.21.

[27] Interestingly Apple's innovation, focus and design capabilities are often cited as the reason for the iPod's success and this success is then framed in terms of dominance, suppression and market control. This is exemplified in the following passage: 'The iPods look pretty cool, too. Once they just played music, but there's photos and video now. And already the iPod rules: Apple has sold more than 28 million since they were developed and now has somewhere between 70 and 80 per cent of the legal digital music market: a market that Apple, with some justification, claims to have invented, while the record industry was trying to shut down Napster...The worry, though, is that Apple is already using its power in the digital music market to try to maintain dominance — perhaps with pricing to match. To the mounting frustration of the music majors, Apple is controlling strictly the price of singles. The record companies want to sell tracks at both below and above Apple's prices of 79p/99 cents per song.' (*The Times*, 4th of November 2005)

Figure 7.18: An Alba 128MB MP3 player

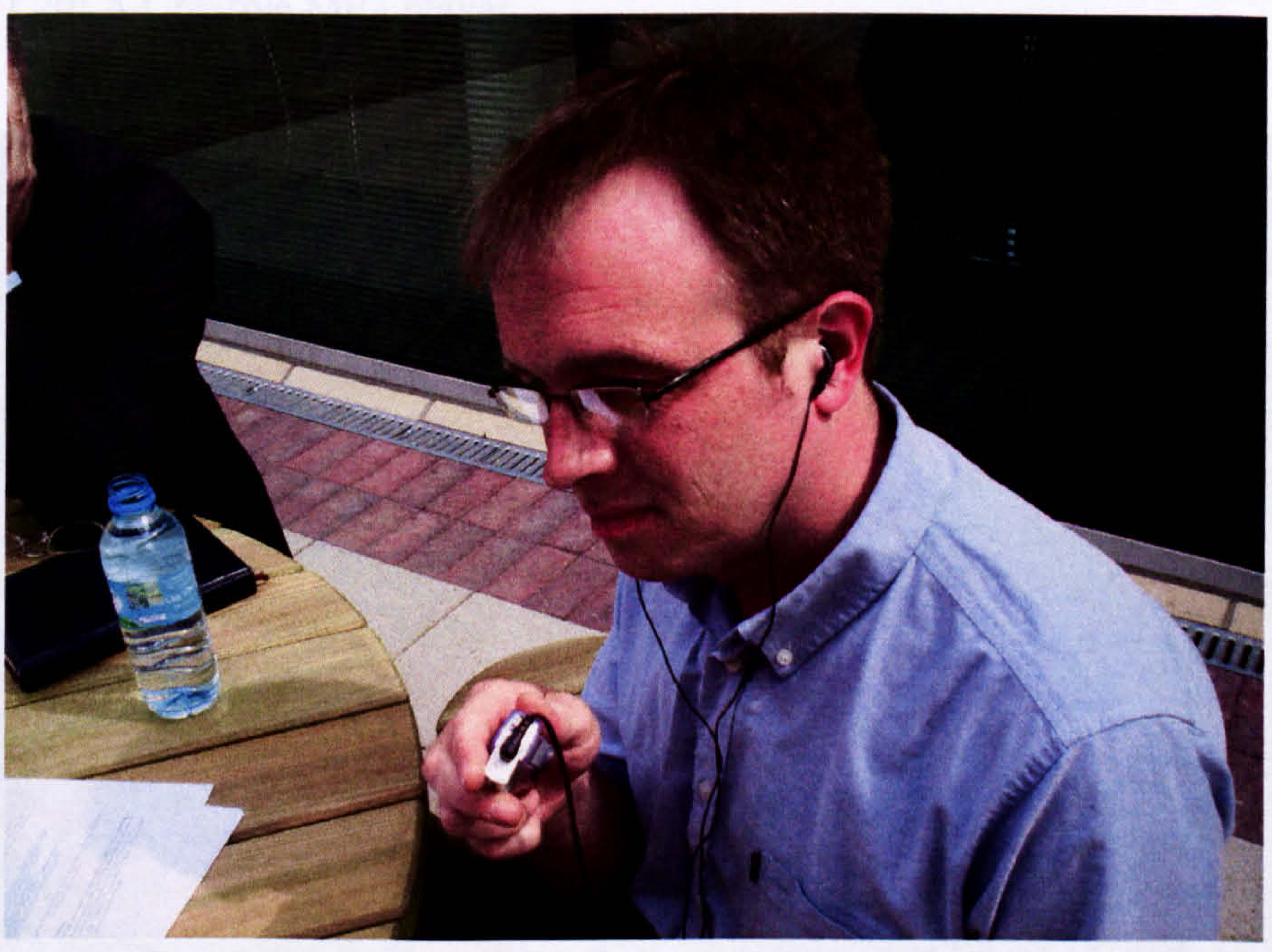

Figure 7.19: A Creative Muvo 128 MP3 player

Other MP3 players currently available include the *Yamada Beatbox*, with built in speakers allowing its user to 'put on a tune and force an entire train carriage to listen to your music without having to lug a huge machine around with you.' (*The*

Independent, 30th of April 2005), the *IRiver IFP-599T, Phillips HDD120, Creative MUVO2, Creative ZEN XTRA*, amongst innumerable others.

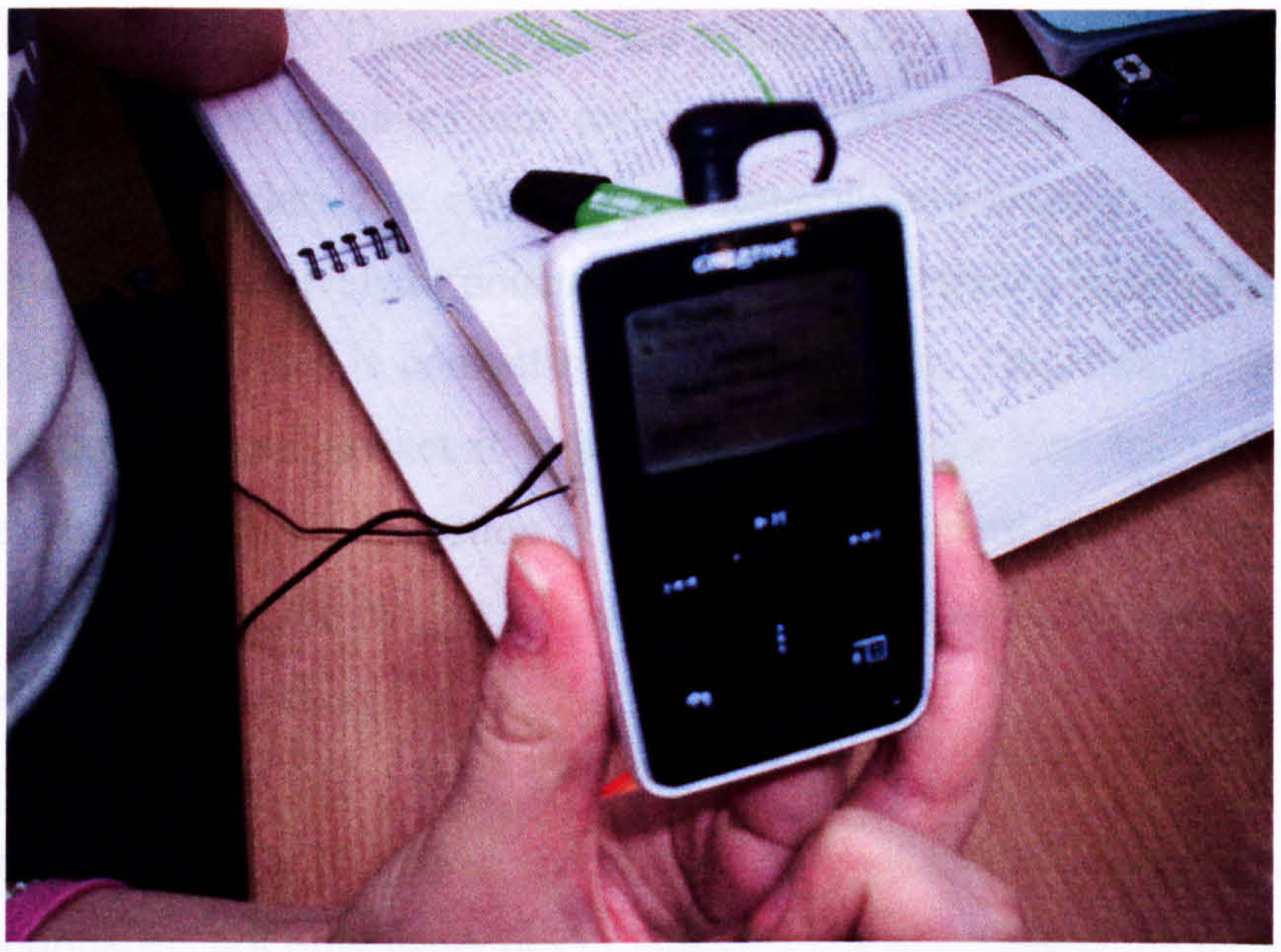

Figure 7.20: A Creative MP3 player

Figure 7.21: A Creative MP3 player

Perhaps the most significant recent technological development in this area concerns the miniaturisation (Haraway, 1991) of MP3 technology and its convergence with the mobile telephone. Models such as the *Sony Ericsson W800i Walkman Phone, Sony Ericson P910i, Samsung SGH-D500, Samsung SGH-Z107, Nokia 6230,* and *Nokia N91* combine mobile telephone technology with digital music reproduction and digital photography technology[28]. These devices are miniaturized combinations of previously discrete technologies communications technologies. The hybrid of MP3 and mobile telephone technology has the effect of creating always-already networked MP3 players, which can, effectively or potentially, link to the internet, access and reproduce any digital music file that is compatible with the device. This then is more than a music collection in your pocket it is a *portal* or *interface* into vast sets of music collections. Here the music collection is potentially networked and infinite, the music collection extends from the pocket and around globalised musical networks of music archives within music archives.

This hybrid MP3/mobile telephone technology, as well as the new iPod with video screen functionality, not only generates or suggests questions about the transformation of collections and the practices of collecting, in terms of both music and photographs, it also generates new questions about how these musical and visual digital files may be stored together and accessed simultaneously, and, how this may relate to the stimulation (De Nora, 2003) or simulation (Baudrillard, 1983) of memories and emotions (Benjamin, 1999c, DeNora 2003). Perhaps this hybrid visual and audio technology, bringing the eye and ear, landscape and soundscape, back into alignment (Thibaud, 2003), presents an opportunity to extend Tia Denora's (2003) recent work on the reflexive use of music to stimulate memories and emotions[29]. The convergence of technologies does not end here. MP3 players have also been hybridised with sunglasses (http://www.globalat.com/mp3glasses.html)[30], sweet dispensers (http://www.pezmp3.com/index.php)[31] and camcorders, such the Daewoo 6in 1

[28] In addition to this 'a tie-up between 3, the Hutchinson Whampoa-owned mobile operator, and Warber Music' to make music videos available on mobile phones (*The Times*, 14th of November 2005). New videos by Madonna and James Blunt are to be made available on this service. 3 also 'delivered the world's first "mobcast", allowing some 2,000 viewers to watch a Natasha Bedingfield gig at the Institute of Contemporary Arts in London on their mobile phones.' (*The Times*, 14th of November 2005). This is a mobilised extension of the webcast phenomenon by which performers broadcast their performances on the internet and subscribers were able to access these sounds and images.

[29] The combination of music and images is not restricted to these mobile phones, other digital audio players, such as the *Toshiba Gigabeat* also enable music and images to be downloaded, stored, and accessed in unison.

[30] Accessed 7/11/2005.

[31] Accessed 7/11/2005.

Digital Video Camera[32]. Indeed, the convergence of MP3 players with other technologies appears to be a trend that is taking on increasing significance, as with the digital camera it is likely that virtually all mobile telephones will soon be fitted with MP3 technology.

The question then concerns how understandings of cultural artefacts shifted in relation to the emergence of MP3 technologies.

4.1 Rhetoric and practice: shifting the understanding of cultural artefacts

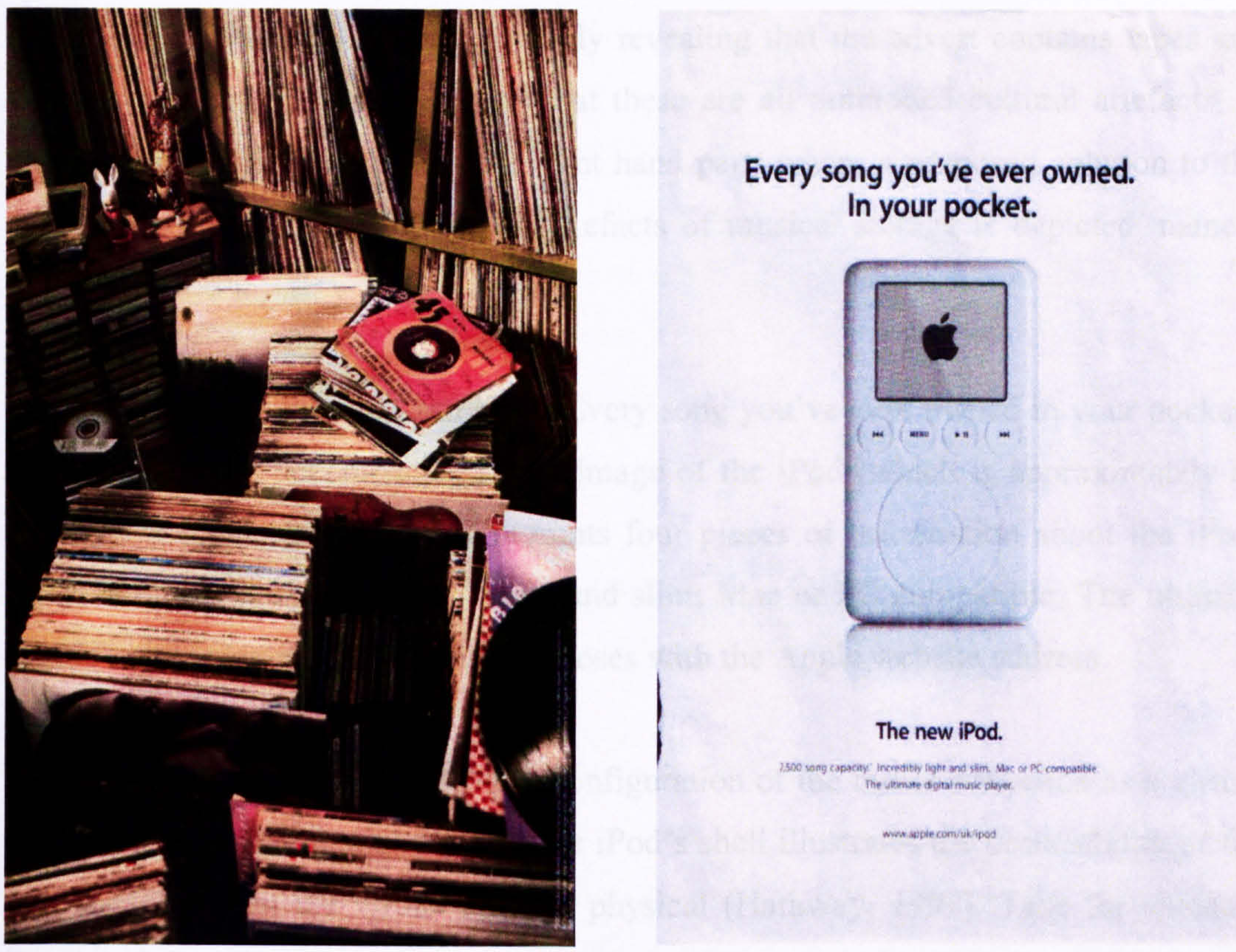

Figure 7.22: 2003 two-page advert for the Apple iPod

In 2003 this two-page advert (see figure 7.22) appeared across a range of print publications including the July 2003 edition of *The Face* magazine. It juxtaposes the images of the record collection and the iPod, and, it is worth noting, this advert appeared in what were the early stages of iPod technology at a point when the

[32] The 6 in 1 facilities are: digital camera, camcorder, PC webcam, MP3 player, voice recorder and Mass Data Storage Unit

redefinition of the collection was an essential marketing prerequisite. Apple, as demonstrated in this advert, clearly foresaw a need for the reflexive redefinition of the objectified or physical form of the music collection.

On the left page is a picture of a room containing piles and wracks of vinyl records in sleeves. There is a mixture of both seven-inch and twelve-inch records as well as CDs and audiotapes. The room is a mess, although the records are in shelves and boxes to suggest that there is some level of care and order amongst a kind of unstructured everyday disorder (Burkitt, 2004). This is perhaps a visual illustration of the 'dialectical tension between the poles of disorder and order' in the life of the collector (Benjamin, 1999c: 62). It is particularly revealing that the advert contains tapes and CD's as well as Vinyl. It suggests that these are all outmoded cultural artefacts. A suggestion that is reiterated on the right hand page where a proposed solution to the spatial inefficiency of the physical artefacts of musical storage is depicted, namely 'The new iPod'.

The advert claims that you can have 'Every song you've ever owned in your pocket'. This statement is accompanied by an image of the iPod (which is approximately an actual size picture). The advert presents four pieces of information about the iPod: 7,500 song capacity; Incredibly light and slim; Mac or PC compatible; The ultimate digital music player. The advert then closes with the Apple website address.

This rhetoric of the redefinition or reconfiguration of the music collection as a virtual collection of discs contained within the iPod's shell illustrates the permeability of the boundary between the virtual and the physical (Haraway, 1991). Take for example Duncan & Fox's (dualistic) contention that we 'have transitioned from viewing music as a physical product to seeing music as a virtual product- a computer file that can be transferred from person to person and from device to device' (Duncan & Fox, 2005: 4). Indeed, according to this utopian or technologist rhetoric, the music collection has, to some unstated degree, been transposed upon the iPod. We *may* now carry 'entire record collections' in our 'pockets'. What then becomes of the glass presentation case and aesthetic delights of Benjamin's (1999c) book collection? What are the consequences of leaving our collection constantly *packed away* on a hard-drive? Can this type of library be unpacked? If the aesthetic aspects of the book collection are as important to these collecting practices as Benjamin has contended then the removal of the physical form from the music reproduction/storage format requires detailed consideration. If the 'scriptal spiral', to use Adorno's term for the inscription of music upon an artefact, is no longer inscribed in a groove upon a disc or spool that can be held in the hand, or, as Benjamin argues, looked into to reveal a past history, an experience, or a memory – without necessarily being read or in this case listened to – and we can no longer store music in the 'glass cases', what becomes of the music collection and or the music collector? In other words if the explicit physical identity forming and aesthetic material biography of the music collection are removed from the domestic space and reinscribed upon a digital file, what are the consequences? Bell contends that:

> 'Culture, for a society, a group, or a person, is a continual process of sustaining an identity through the coherence gained by a consistent aesthetic point of view, a moral conception of self, and a style of life which exhibits those conceptions in the objects that adorn one's home and oneself and in the taste which expresses these points of view.'
> (Bell, 1978: 36)

If this is the case then what are the consequences for culture and identity if these 'objects' no longer 'adorn' one's home but become virtualised?

Indeed, these are far reaching questions and problems that will require time to be studied, for it is only over the period of these investigations that the MP3 digital compression format and MP3 player has come to be widely appropriated. It is now the place of future studies to explore how these issues unravel across time. What is clear here is that the interface through which the collection is conceptualised, retrieved, and reproduced, the practices of collection and reproduction have to some extent been reconfigured or recrafted by the onset of the technologies and rhetoric of a second age of digitalisation.

It is interesting that these themes and images of reconfiguration have been reiterated in more recent advertising for the Orange SPV C550, a hybrid mobile phone and MP3 player technology. Clear similarities can be found between this advertising campaign (see figure 7.23 below) and the juxtaposition of physical and virtual cultural artefacts in the early iPod advertising. Clearly the rhetorical reconfiguration of music collecting and reproduction is ongoing.

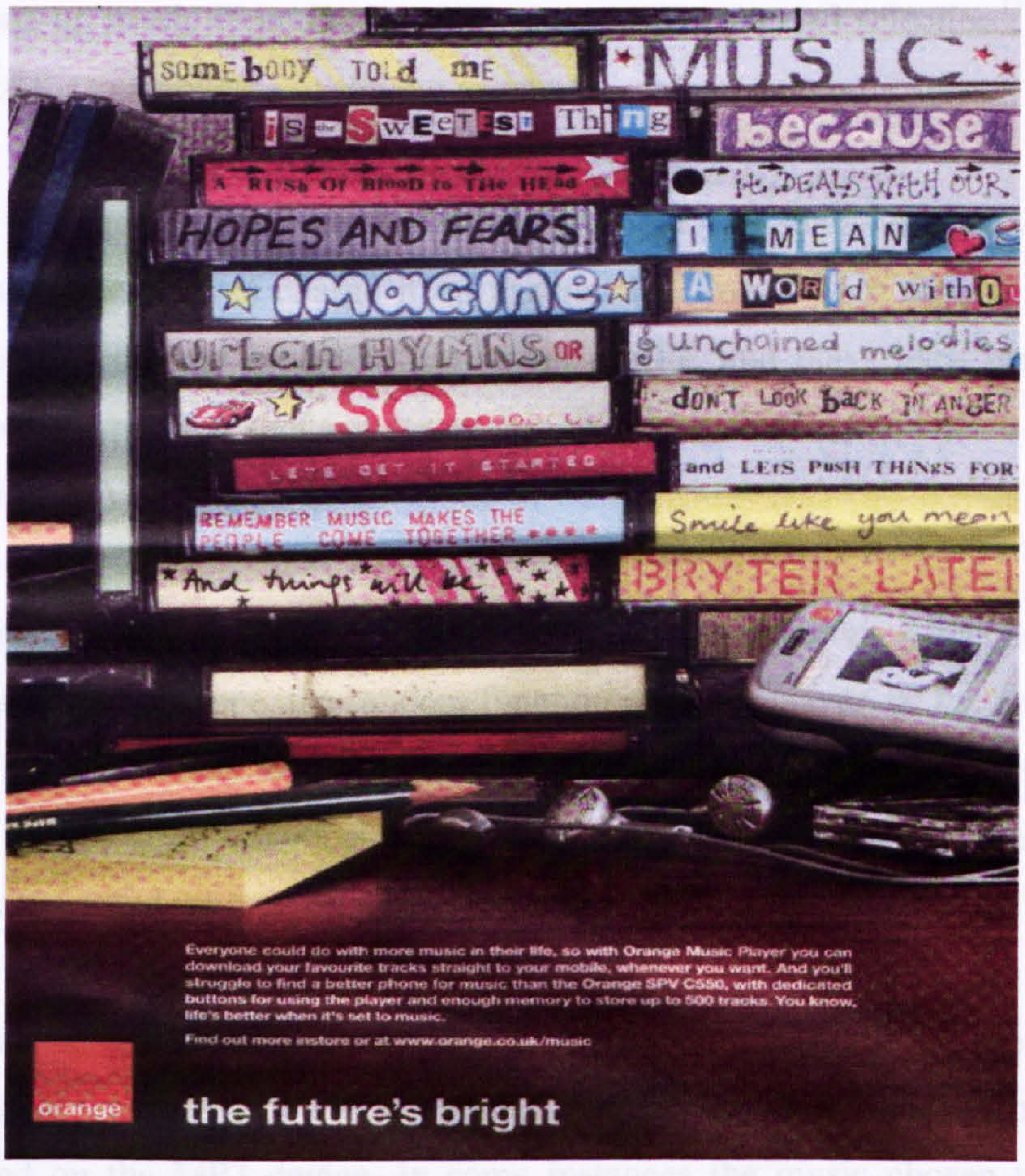

Figure 7.23: An advert for the Orange SPVC550, a hybrid mobile telephone/MP3 player (taken from the *Observer Music Monthly*, November 2005)

These reconfigurations, the imbrication of virtual and physical cultural artefacts, intimate questions regarding the increasing capabilities and intelligence of these musical technologies to organise and structure reproduction/listening practices or habits. The facilities or functionality of these musical devices make suggestions toward the increasingly inert user (Haraway, 1991, see also chapter 4). The iPod for example can be set to access tracks at random, the shuffle function (*The Observer*, 5th of June 2005), or set to playback favourite tracks by monitoring the preferences and tastes of the appropriator. The retrieval and reproduction of music, therefore, may be controlled, to some extent by the technology. This non-linear reproduction of music, which is an extension of the random play feature on most CD players, no longer requires a disk to be selected from a pile or rack and placed into the player, this even bypasses the possibilities of multiple CD players, which could often hold up to around 10 CDs at once. The iPod is making, or taking out of the hands of the agent, some of the decisions on music reproduction from the pre-downloaded selection[33] of musical tracks. Take for example the following account:

> 'I've only got a small one that can store about 150 songs at a go, about 8 hours of music. So I charge it up and refill it from day to day. It fills up randomly from my music collection on my PC and plays back the songs randomly. I put 150 songs on it and just have it on shuffle playback.'
> (MP3 user A)

In this sense the iPod enables a non-linear reproduction experience far exceeding the affordances of the mix tape, the random function on a CD player, or the movement of the needle between tracks on a vinyl record. In addition to this we see the practice of non-linear reproduction breaking music out of the confines of the album format in favour of fragmented reproduction of individually selected tracks.

The respondents who were operating smaller memory devices describe the practice of 'refilling' (MP3 user A), of dipping into the music collection and exchanging the music stored on the MP3 device. In some instances the music chosen to refill the device was selected by the device itself rather than the user. Indeed, this could well be held up as an example not only of the increasing intelligence of these devices but also as an instance where 'information could be equated with randomness as well as with pattern' (Hayles, 1999: 25). This illustrates that information need not be defined as ordered and patterned but also as chaotic, complex, and, most significantly, non-linear.

In user accounts of MP3 technologies, however, descriptions of music collections do not match the advertising imagery of *complete reconfiguration*: the abandonment of the old in favour of the new. Indeed, in virtually all instance the interviewees indicated

[33] If indeed these tracks were selected, the Podcasting phenomena enables selections of songs to be downloaded to the iPod without knowledge of their contents.

that they combined MP3 and CDs in their everyday practices[34]. A number of the interviews describe the CD as a source of 'imported' music for the MP3 collection in combination with music downloading (MP3 user A, MP3 user L, and MP3 user K). Further to this, these accounts also indicate that MP3 players are also used to store and mobilise other forms of information apart from music, these include text files such as Word files and PDF files (MP3 user B, MP3 user H and MP3 user I) and films (MP3 user K).

4.2 Wired for sound: body/culture reconfigurations

These accounts indicate digitalisation has to varying degrees caused a reconfiguration of reproduction and collecting practices in everyday life. Alongside this, we see in these descriptions what might be thought of as body/culture reconfigurations, material transformations of the ways in which cultural artefacts, bodies, and spaces intersect through these digital music files and collection or archive portals or interfaces. As these cultural artefacts are virtualised as digitally compressed music files new questions are created about the way we relate to culture and cultural artefacts, or how culture is embodied or incorporated in the everyday. The movement from the physical artefacts of the past, which adorned our homes, filed the spaces of our everyday lives, toward digitalised and compressed, mobile and virtual, cultural artefacts, although complex, indicates some reconfiguration of corporeal and spatial cultural formations and practices. These reconfigurations appear to be increasingly normalised in habitual or mundane musical practices.

What can perhaps be concluded at this point is that the spatially configured boundary between music collections and the human body are being recrafted, redefined, or reconfigured by MP3 technologies and the mobile digital music archive, particularly as music collections and reproduction practices are reconfigured as virtual or as virtual/physical hybrid collections. Indeed, the boundary between the body and the technology appears increasingly permeable as the appropriation of MP3 players, the interface between the human body and the digital archive, constitutes the mobile-

[34] Although it is worth noting that these digital technologies were almost entirely dominant in terms of music collecting and reproduction practices. There were virtually no descriptions of combined digital and analogue collections. Rather these collections were combinations of first and second age digital music technologies (see chapter 5).

anytime practices of collecting and reproduction[35]. However, what is clear is that music collecting and reproduction practices are complex, and that they have not moved completely to the virtual collection as the utopian or advertising rhetoric would have us believe. Even in the practices of these MP3 users who are familiar with the technology compact disks are still widely used as a physical dimension to music collection and reproduction. The problem here is how best to conceptualise these habitual and mundane practices as reconfigured by digitalisation, that is how to conceptualise these body/culture reconfigurations.

As this discussion intimates, these reconfigurations, the compression of music into virtual digital music files, opens up possibilities for the increased spatial mobility of music. It is this issue that I will now explore.

5. Recontextualisations: noWax and the (cyber-)cultural event

> 'This stuff has the same feeling as when you made your own mix tapes for your mates birthday, class tune after classic tune. You as audience are no longer sat hearing other DJs as the platform is open up to you and your mates'
> (Amanda Young, http://www.leftlion.co.uk/articles.cfm/id/968?d7553e00, accessed 26th of November 2005)

> 'Imagine this: You are a DJ but you don't have any bulky gear. You don't need to drive to a gig, the subway/underground will do just fine. You also don't need an assistant to carry milk crates of heavy vinyl. Everything you need is in your pockets and the size of a cigarette pack. You only have 2 iPods, but together they hold enough music to play for several months straight, 24-7, without a single repeat. You are a MP3J.'
> (J.Love, http://www.methodshop.com/mp3/articles/mp3j/mp3j.shtml,
> accessed 29th of November 2005)

[35] Enfolded here are sets of highly complex questions and analytical problems, non more so than the issue of the imbrication of levels of interfaces. Or, extending Haraway's notion of 'polymorphous interfaces' (Haraway, 1991), Hayles suggests that the 'posthuman subject is an amalgam, a collection of heterogenous components, a material-informational entity whose boundaries undergo continuous construction and reconstruction.' (Hayles, 1999: 3).

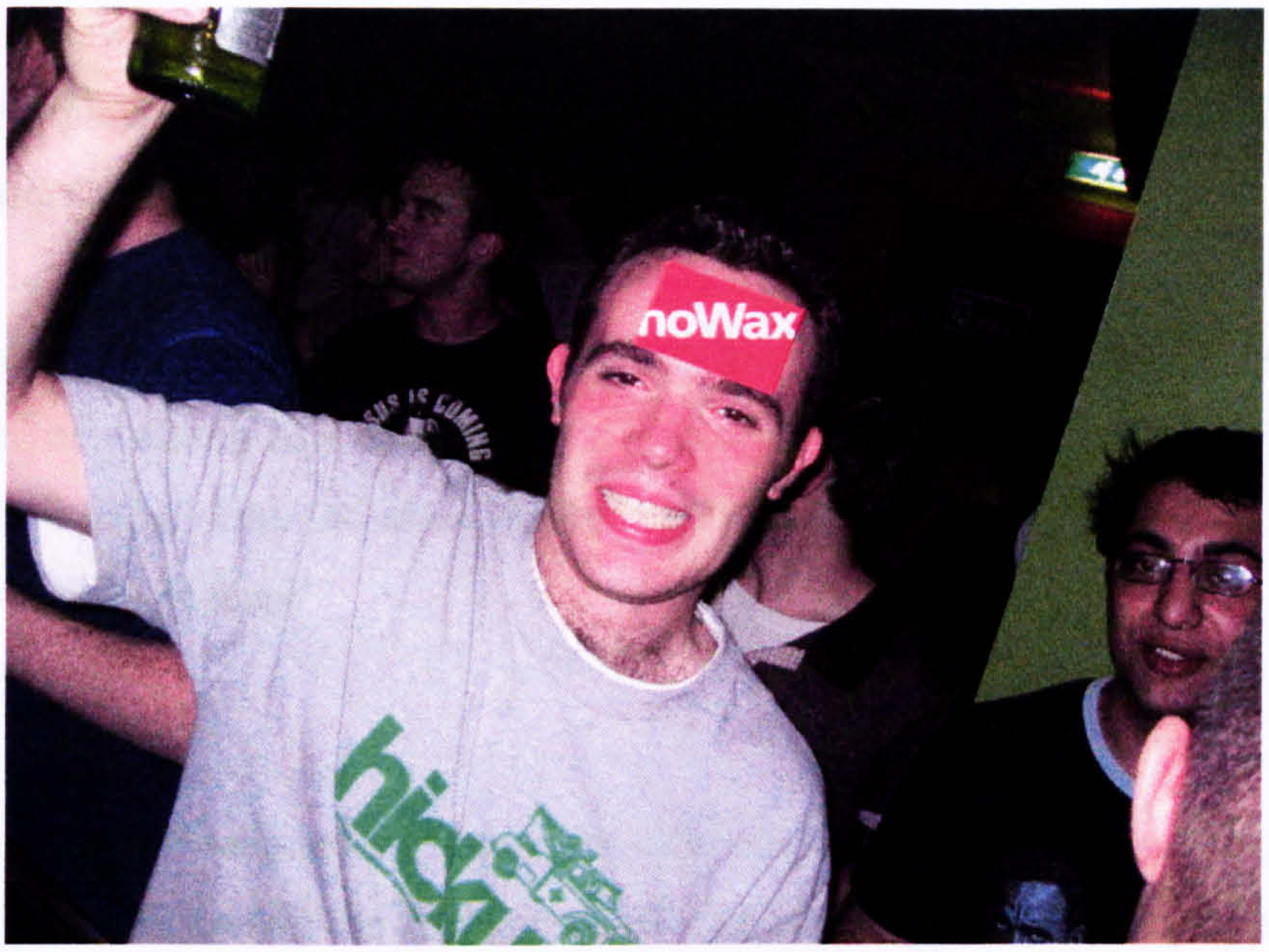

Figure 7.24: A noWax event held in Sheffield (image supplied by Charlie Gower at noWax)

Much like previous personal stereo systems, or mobile music reproduction devices, the MP3 player can be seen to have implications for 'the everyday experience of…people…as they move through the city' (Bull, 2000, 3) and that 'new sonic territories are composed in the course of this mobile listening experience' (Thibaud, 2003: 329). Interfacing with such mobile ICTs is 'part of an urban tactic that consists of decomposing the territorial structure of the city and recomposing it through spatio-phonic behaviours.' (Thibaud, 2003: 329). Or, as Benjamin argued, technologies of reproduction 'can put the copy of the original into situations which would be out of reach for the original itself.' (Benjamin, 1999: 214).

The key differential between the MP3 player and previous mobile music reproduction devices that utilised tape, CD, or even Minidisk, is twofold. First, the MP3 player affords a much greater quantity of music to be carried around these spaces. And, second, as I have discussed, the MP3 player facilitates non-linear reproduction/listening practices to a much greater extent than previous personal stereo systems; the agent may reproduce songs in any order or at random across entire archives of music. With regard to spatial recontextualisation the focus here is specifically upon the first of these key differentiators.

In the interviews conducted the respondents all identify mobility as a key aspect of these MP3 players. Often public spaces, rather than private or domestic spaces, become *zones of activation* for MP3 players:

> 'I quite like walking around listening to it. Walking across town or by the river, or walking across campus...It's also quite useful for on the train and stuff like that. Out and about really, I never use it at home, its easier to use my CD player there'
> (MP3 user A)

Similarly another respondent described the 'walk to work' as being 'almost exclusively' (MP3 user F) the space in which they activated their MP3 player. The use of MP3 players when travelling, walking, trains, buses, etc, is a common factor in these accounts[36]. Resonating with the theme of the 'recomposition' of city spaces (Bull, 2000; Thibaud, 2003) the practice of walking whilst listening appears frequently:

> 'I haven't had a portable music device since my walkman at school, about 12 years ago. So I'm proper enjoying walking about at the moment being able to listen to some of my music.'
> (MP3 user D)

Further responses indicate an even clearer enmeshing of bodies, music technologies, and public spaces:

> 'All the time, it's like a permanent attachment to me, I don't go anywhere without it pretty much. Even now in the car I've got a radio plugin thing so I can take the MP3 player from round my neck and plug it in the radio thing and I can just tune my car radio to it. So I use the same music then rather than take loads of CDs with me on the road.'

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[36] This mobile music reproduction is also described as a solitary practice. The MP3 is described as a device that is used in isolation: 'when I'm not with anyone else' (MP3 user J) and 'If I go somewhere on my own,' (MP3 user H)

(MP3 user L)

These technologies are now clearly embedded in everyday mobilities, mundane practices, and routine of leisure and travel.

Furthermore, as one respondent identifies, the MP3 player enables the record collection to be mobilised across national borders. This enables music to be appropriated during prolonged periods of travel and in the private spaces of the destination:

> 'Because I'm overseas I've put all my CDs onto it so I can take them wherever I go. And I use it predominantly when I'm travelling for something to do.'
>
> (MP3 user C)

We see here that MP3 compression and MP3 reproduction technologies have enabled or extended practices that were previously either not possible or were limited to the mobilisation of much smaller quantities of music. Clearly MP3 technology is spatially recontextualising human-music relations. The question then concerns the ways in which particularly practices are implicated by this.

This section is concerned with exploring further some of the ways in which these MP3 player devices are appropriated within the public spaces of everyday life. To this end the following case study, based upon the noWax brand and events, captures one example of the recontextualisation of music collections and reproduction from the private spaces of the home to the public spaces of the nightclub, namely the noWax event. noWax is used here as a case in question and example of the recontextualsiation of music reproduction practices.

5.1 What is noWax? The history of noWax

According to its co-founders, noWax:

'sprang from the ashes of an excitable conversation between Raj Panjwani and Charlie Gower deep within the offices of Sense Worldwide. Charlie had DJed previously with iPods but was convinced that a more interesting way for DJing with these new bits of kit could be found.'
(noWax history, Appendix 4)

The resulting events designed to encapsulate this 'more interesting' clubcultural formulation are reflexively framed by its co-founders as a movement toward a *democratic club culture*:

'The premise is simple: Anyone who had an MP3 player can come and DJ. This democratic style leads to a wide range of music being showcased on the night. Each MP3J plays three tracks alternatively with another MP3J on the other side of the mixer.'
(noWax history, Appendix 4)

Following the formulation of this initial premise noWax 'took it's first steps on 3rd July 2003' (noWax history, Appendix 4). During this period the democratic potentials of noWax were further developed in line with the contemporaneous digital technologies of person-to-person file sharing:

'After five months or so we decided that the only way to really develop the concept was to follow the file-sharing ethos and give the night away...so we created a website – www.nowax.co.uk...We invited anyone who wanted to host a noWax party of their own to get in touch. All they had to do was find a venue and set a date. We then send them the instructions and the bits they need to host a night with the noWax format.'
(noWax history, Appendix 4)

This subscription to the digital rhetoric or ethos of sharing (see chapter 8) is reflected on the noWax website through which visitors are invited to organise their own events: 'Want to host your own noWax? Click here' (www.nowax.co.uk, accessed October 5th

2005). noWax is a kind of globalised, open, communal, and 'shared' brand[37] that centres around the activities of the cofounders but may be accessed and appropriated by others at no financial cost:

> 'If they want to charge a fee on the door to make some money back, they are free to do so. We don't take a cut. So far this approach has obviously proved popular as we have had noWax nights in Manchester, Cardiff, Leeds, Liverpool, London, Atlanta, Derby, York, Plymouth and Tokyo. We have had enquiries from right across the globe, San Francisco to Lake Garda, Paris to Singapore.'
> (noWax history, Appendix 4)

The website, www.nowax.co.uk, and the associated email list act as an informational hub of this networked community, they are used particularly to organise, promote, and record events (noWax history, Appendix 4).

5.2 Hang the DJ: dancing in democratised spaces

> 'Burn down the disco, hang the blessed DJ, because the music that they constantly play says nothing to me about my life.'
> (The Smiths, 'Panic' from *Louder than bombs*, recorded 1983-1986, Warner Music UK LTD, 1993)

[37] It is worth noting that the co-founders label noWax as a 'brand' and suggest that it has grown in 'stature'. They also note that they 'sold out' of their 'first run of noWax T-shirts and noWax home kits.' (noWax history, appendix 4).

Figure 7.25: A noWax event, venue unknown (image supplied by Charlie Gower at noWax)

A recent noWax event at Bar Centro in Manchester in April 2004 was reported under the postmodern thematic headline 'Death of the DJ: How iPod is bringing democracy to the dancefloor' (*The Independent*, 24th of April 2004). Indeed, this notion of democracy features heavily in the rhetorical formulations surrounding these events. The article continues:

> 'SOME CARRIED the elaborate third generation models with the iconic white earphones. Others settled for scratched, faintly retro first-generation versions and wore subdued plugs instead of the white ones they dismiss as fashion statements.'
>
> (*The Independent*, 24th of April 2004)

It would seem that iPod models carry with them a sense of nostalgia, that they can be *retro* despite being less than five years old. Indeed, it appears that some level of Bourdieu-esque cultural capital, or club-cultural capital (Thornton, 1995) is attached to being *there* first, to the owning of a *retro* iPod[38].

[38] It is also likely that in some instances the iPod's white earphone indicators are substituted for a less obvious colour for the purposes of avoiding theft rather than obtaining coolness or clubcultural capital (Thornton, 1995).

Figure 7.26: A noWax event, venue unknown (image supplied by Charlie Gower at noWax.

The Independent article, moving across the boundary between nature and culture, and illustrating Thrift's (2004) identifications of biological metaphors in technological discourse, suggests that noWax was 'spawned by Apple's best-selling gadget.' (*The Independent*, 24th of April 2004). The iPod, or any MP3 player, is the device through which agents can interface with a noWax event. The iPod is the gateway or portal into this space, or, more accurately, the interface between individual agents and the cultural event. Therefore the iPod interface described above acts as a material portal into, and a controller for, the noWax event[39].

[39] The interface is seen in fact to be constituted by a series of what Haraway (1999) might call 'polymorphous interfaces', or interfaces within interfaces: the screen, the buttons, the on-screen buttons, the earphones, the volume control, etc, this is not to mention the complex interfacing issues that arise when the iPod is connected to a computer, a nightclub PA system via a MIDI amplification device, or any of the specialised domestic MP3 player amplification devices available on the market (such as those manufactured by Bose). The interface is not a singular entity but a complex imbrication of interfaces, a plurality of technologies and organic/inorganic boundary conditions.

Figure 7.27: MP3Js at the decks during a noWax event, venue unknown (image supplied by Charlie Gower at noWax)

Figure 7.28: Musical cyborgs dancing at a noWax event, in Tokyo (image supplied by Charlie Gower at noWax)

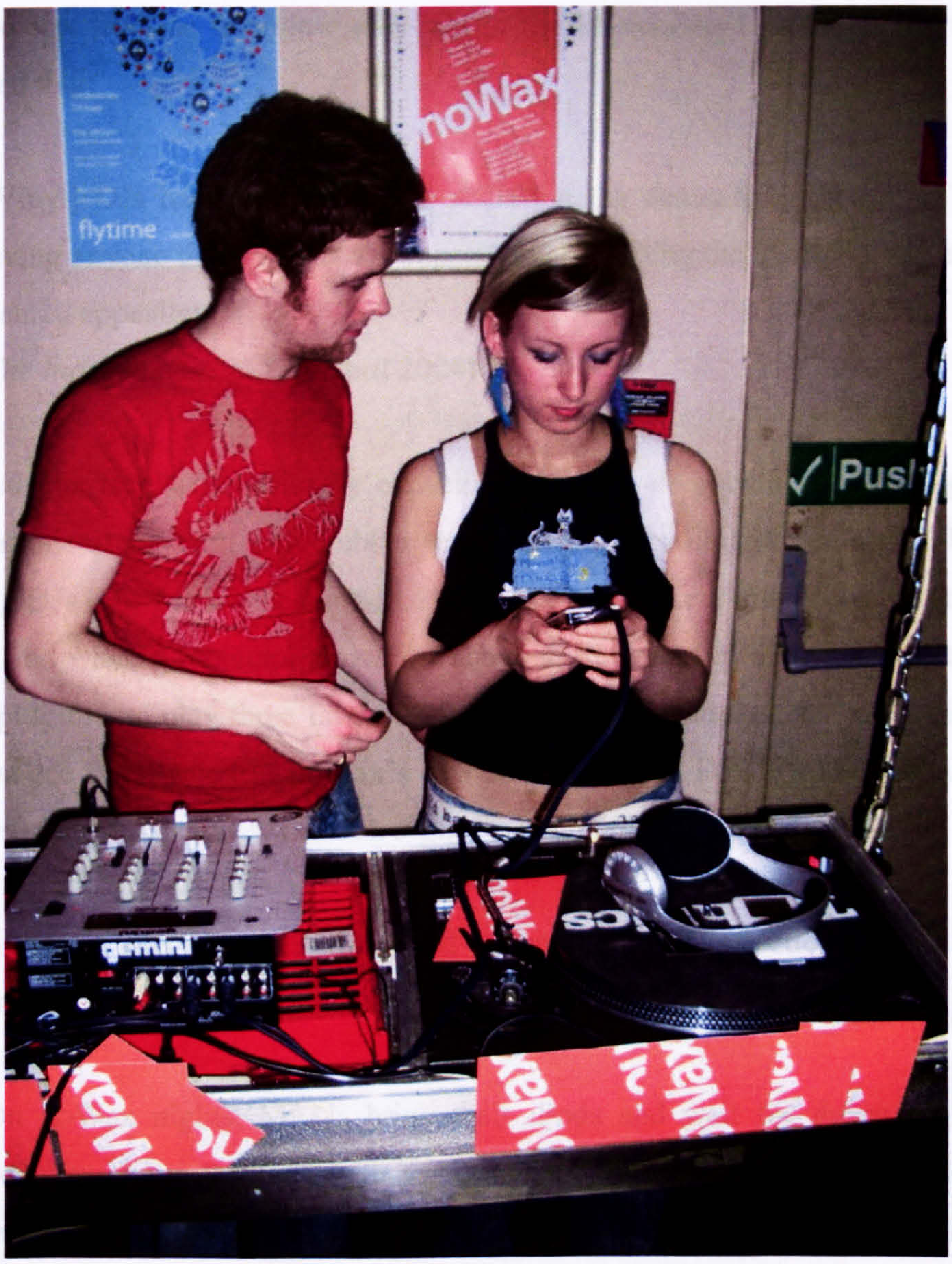

Figure 7.29: MP3Js interfacing at a noWax event in Leeds (image supplied by Charlie Gower at noWax)

The noWax phenomenon radically transforms the centralised, performative, isoloated, and lauded figure of the DJ[40]. The noWax event demarcates a space and time in which clubbers are 'reassembled' and 'disassembled' (Haraway, 1991: 162) as DJs through their interface with the iPod. The iPod then is an example of reassembly through a complex imbrication of interfaces (Haraway, 1991, see chapter 4).

[40] For more on how 'new digital technologies…threaten current DJ practices' see Farrugia and Swiss (2005)

In an excerpt from an interview with one of the Manchester event organisers it was suggested that:

> '[Vinyl] DJs have some amazing skills but the democratic thought of not having anyone there who is the superstar DJ deciding the course of the night seemed appealing.'
>
> (*The Independent*, 24th of April 2004)

The iPod interface's user-friendly capacities enable a democratic re-ordering of the nightclub hierarchy with any clubber temporarily performing the role of DJ. These 'budding DJs – or MP3Js as some like to be known – take a numbered ticket as they walk in and when a projector above the sound system flashes their number it is their turn to plug in and play three favourite tunes.' (*The Independent*, 24th of April 2004). This practice is reflected in noWax's branding: 'Want to DJ?...Take a ticket...Wait your turn...Play your tunes' (*noWax digital music guide no. 57*, 2005).

This process of *plugging-in* is described in the following reflections on the noWax experience:

> 'On noWax nights, MP3Js bring their iPods and wait for the automated projector above the DJ booth to flash their number. Then they plug-in a Tascam XS-3 and mix three songs back-to-back against another MP3J. noWax is a public competition very similar to 'Rap Battles', al la Eminem's movie *8 Mile*.'
>
> (J. Love, http://www.methodshop.com/mp3/articles/mp3j/mp3j.shtml, accessed 29th of Novemeber 2005)

noWax
Want to DJ?
Take a ticket
Wait your turn
Play your tunes

Figure 7.30: The noWax logo/branding (image taken from noWax newsletter used with permission from Charlie Gower at noWax)

The role of the MP3J is not solely restricted to those with the capital to purchase an MP3 player, in some instances, such as New York's APT nightclub (see figure 7.31), the interface system is changed so that 'anyone can play their own seven-minute set from two iPods which act as a jukebox.' (*The Independent*, 24th of April 2004). This, it would seem, offers an even greater level of *democracy to the dancefloor*. As this illustrates, noWax events are not the only iPod interfaced gatherings of this type, in addition to the APT event another similar event is the Playlist digital DJ night (www.ipod-dj.com) in north London, which 'allows punters their Warholian 15 minutes of fame as a superstar DJ in which they plug in their iPod, press play and await the crowd's reaction.' (*The Observer*, 5th of June 2005).

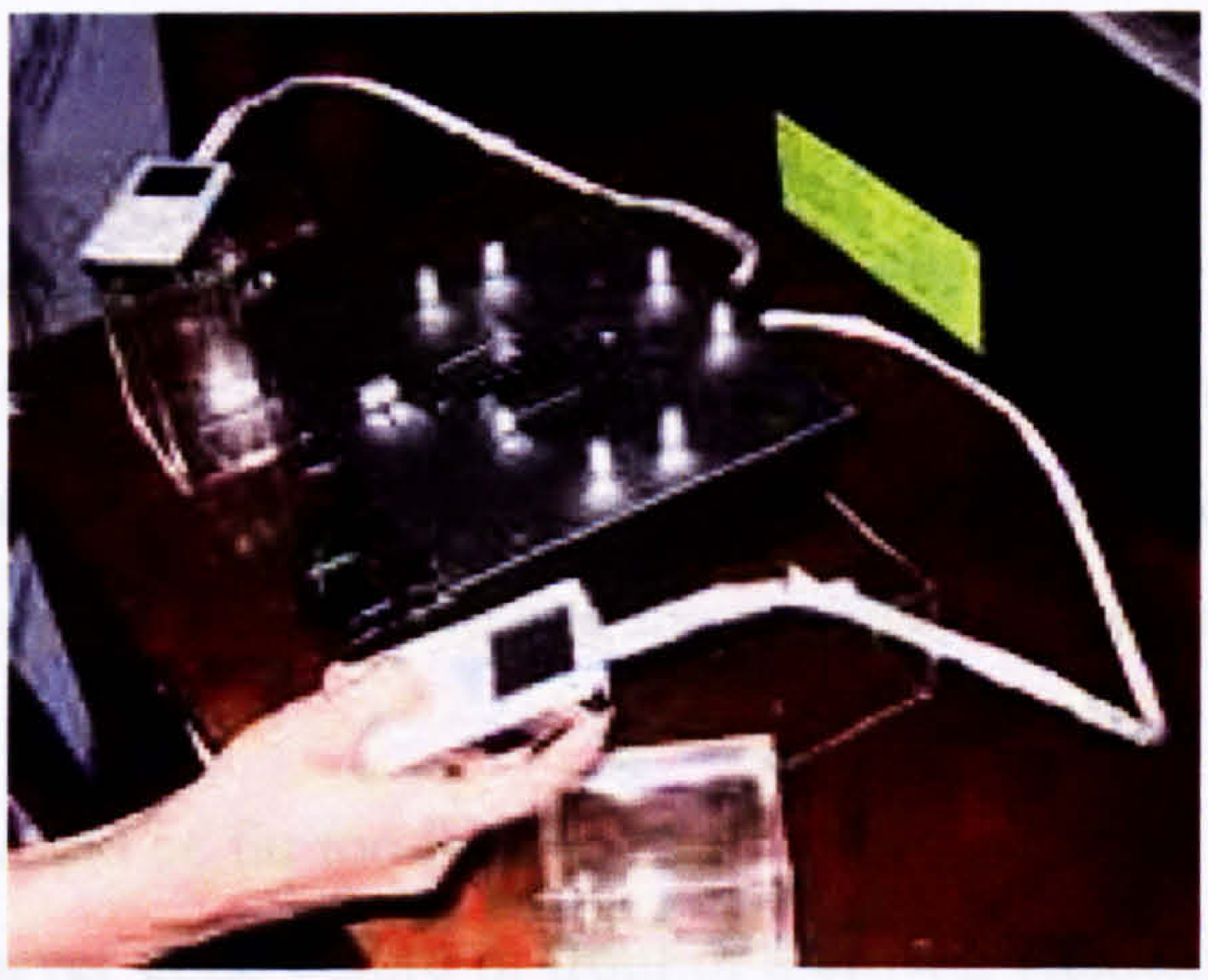

Figure 7.31: A photo of the iPod and record decks taken an APT event[41].

However, despite this egalitarian and utopian rhetoric or ethos of sharing, democracy, and the collapse of hierarchical divides, there are some levels of technological affordances (Hutchby, 2001, see also chapter 4) that prevent the MP3J from entirely replicating the performance of the conventional DJ. The affordances of the iPod are reported as 'limitations' which, in this case, is simply that 'you can't speed up music like DJs can on their double record decks.' (*The Independent*, 24th of April 2004), or that 'DJing with an iPod doesn't really work with house music because you can't

[41] This photo is taken from http://www.methodshop.com/mp3/articles/mp3j/mp3j.shtml ,accessed 26th of November 2005.

beatmix yet' (*The Guardian*, 7th of January 2004)[42]. In an interview conducted with Charlie Gower, noWax's co-founder, it was suggested that the restrictions of the technology, its simplicity and user-friendliness, were in fact what makes noWax possible and accessible. When asked if the iPod technology restricts the event he responded:

> 'Yes and no. Currently there isn't any hardware (that I have seen) that can allow proper MP3 mixing. Now while at noWax you can't mix, this can be an advantage. Having Djed (with vinyl) for many years I know that having tunes doesn't make you a DJ...If at noWax we had crazy gadgets to allow the pitch of the song to be altered, or a touch sensitive disc, to allow scratching then can you imagine the dreadful noise you would hear as the public with no mixing practice try to mix with little success.'
> (Charlie Gower, noWax cofounder, Appendix 3)

It is the very user-friendly capacities of this simple interface that enables these events to occur as open and accessible events ordered by MP3Js rather than the DJ. Gower links this back into the practices and tacit knowledge formations of the conventional nightclub DJ, which, in line with the hierarchies of the nightclub, place the DJ in a position of intimidatory authority inhibiting the practices of the amateur MP3J:

> 'most people would be far too frightened to come up and try to do something that they had never done before in front of a crowd. Remember the best Hip Hop DJs practice for hours and hours everyday.'
> (Charlie Gower)

[42] In terms of this issue of beatmixing and affordance, Raj Panjwani, noWax cofounder and event organiser suggests a solution: 'I can't believe that Apple haven't thought of the whole MP3Jing idea. All they need to do is add software to allow beatmixing and scratching on the iPod – for example, a split screen function. And although iPod DJing will never eclipse vinyl, it does mean artists won't have to carry boxes of records around – the bane of any DJ's life.' (*The Guardian*, 7th of January 2004). This is perhaps an example of the 'shaped by and shaping' formulation of Hutchby (2001: 453), Mitchell's (2003: 39) 'construct' and 'constructed by' and Haraway's (1991: 177) question about 'who makes and who is made'? (Haraway, 1991: 177).

In this distinction between lay (the amateur MP3J) and expert (the practiced DJ) Gower identifies a key distinction in terms of the development potentials of these technologies. He suggests that:

> 'While I think noWax doesn't need these things digital music does need them. For many DJs, having everything digitally would be very advantageous.'
> (Charlie Gower)

So while these complex mixing and effect technologies would not necessarily extend or enhance the aesthetic experiences of a noWax event, they are viewed as necessary for expanding the range of affordances and possibilities for the experienced expert digital music performer[43].

However, in terms of the noWax event, and suggesting that appropriated technologies place some unwelcome limitations on the event, Gower adds that:

> 'The only thing that would be useful for noWax would be having some kind of control which could EQ [equalise] the music and keep all the levels even as all the different generations of iPods and different players have different volume ability.'
> (Charlie Gower)

Clearly there is an issue here not so much of affordance as of reproductive standardisation. The requirement is for systematised standardisation across devices of different manufactuers to ensure that the flow of sounds around the nightclub is equalised to fit a standard set of reproductive criteria associated with volume[44].

The MP3 player interface clearly sets 'limits', affordances, that are seen here to 'frame' some aspects of 'agentic action' (Hutchby, 2001: 444). This raft of technical criteria are accompanied by the more performative, and somewhat nostalgic, issue that

[43] This suggests a separation of popular and avant-garde forms of digital music performance.
[44] The noWax website (www.nowax.co.uk) contains links to software packages which enable MP3 player owners to increase the volume potential of their MP3 players.

a 'DJ spinning vinyl creates a sense of theatre that cannot be replicated by an iPodder fiddling with a dial.' (*The Independent*, 24th of April 2004), or, as J.Love puts it in online article about MP3Js, 'Which would you rather pay money to watch: a DJ sitting behind a laptop/iPod pushing buttons, or the real deal spinning vinyl and rocking that cross fader?'[45]. A more detached interpretation of the actions of the DJ would suggest that there is perhaps little difference between the 'theatre', practice, or spectacle of the switches of the iPod and the switches of record decks. Perhaps this issue of performance is related more closely to the collapse of the hierarchical and messianic figure of the DJ rather than being directly related to the affordances of the technology itself[46].

On this issue what is particularly interesting is that the images of various noWax events reveal that the MP3J operating the iPod is stood over a pair of DJs record decks (see figure 7.29 for example). The DJs record decks still define this space, or demarcate this zone (see chapter 6) and its occupant. The record decks here are an example, to some extent, of what Hayles, borrowing from archaeological anthropology, calls a *Skeuomorph.* A skeuomorph is 'a design feature that is no longer functional in itself but that refers back to a feature that was functional at an earlier time.' (Hayles, 1999: 17). Here the record decks refer back from the MP3J to the DJ, they are merely a part of the noWax event 'design', and as such could be argued to be actively 'smoothing the transition between one conceptual constellation and another.' (Hayles, 1999: 17).

5.3 Playing to the crowd

noWax events are constructed as democratised cultural events. Charlie Gower, cofounder of noWax, suggests, in explaining his reasons for setting up noWax, that 'in the past the DJ plays the music to the crowd and with noWax the crowd plays to the crowd. It's all inclusive, for everyone...[the] antithesis of elitist music clubs and bars.'

[45] http://www.methodshop.com/mp3/articles/mp3j/mp3j.shtml, accessed on the 29th of November 2005.
[46] It would seem that the death knell is sounding on the age of the DJ as well as the professor (Lyotard, 1999). The question then is this: 'can the digital age sweep away these highly-paid DJs and replace them with citizen DJs?' (http://news.bbc.co.uk/1/hi/entertainment/4696191.stm, accessed on the 29th of November 2005). There is some evidence to suggest that the DJ is not *dead*: 'I like the idea of asking a celebrity DJ to come and select a few tunes to start an event off.' (noWax organiser, *The Independent*, 24th of April 2004). The spectre of the DJ hangs over the *democratised* dance floor.

(Charlie Gower). As the music is inscribed on the digital music file so the private music collection is *inscribed on the (time and) space of the noWax event.* We can see illustrated in this example that it is 'interfaces that enmesh humans into integrated circuits.' (Hayles, 1999: 46). Any noWax clubber, provided they have access to an MP3 player and the venue, may be reassembled as digitalised 'DJ', or MP3J, for the duration of the pre-programmed and limited selection of songs[47]. The noWaxer can 'envision herself or himself as a posthuman collectivity, an "I" transformed into the "we" of autonomous agents operating together to make a self.' (Hayles, 1999: 6). In this sense noWax, and its powerful rhetoric of democracy, posses the 'infectious power' required to give '"we" a performative dimension.'(Hayles, 1999: 6). What does seem to be clear is that this reported death of the DJ and the rise of the MP3J, the sites of 'polymorphous interfaces' (Haraway, 1991)[48], might be thought of in terms of the 'transition' highlighted by Haraway from the 'comfortable old hierarchical' structure, the DJ (in the pulpit style DJ booth) and the assembled clubbers, 'to scary new networks' (Haraway, 1991: 161) of the MP3J and the digitalised clubber[49]. The recontextualisation of music collecting and reproduction practices is central in this transition.

[47] Charlie Gower, noWax co-founder and organiser, observes that at these events 'people get more drunk throughout the night as they occur in bars...Because of this the music starts mostly with safe choices and as the night progresses people take more risks. All kinds of music are played. Country through Electro to Metal.' (Charlie Gower, Appendix 3). This eclectic playlist is supported by the list of songs played at various venues and presents club culture studies with some questions. Often club cultural events are organised around genres indie nights, house nights, rock nights, goth nights, etc. The noWax event has no such generic restrictions in place, it is a pastiche of various cultural forms, possibly this is a result of the ability to transport greater amounts of music to be accessed, it may even be connected to a wider collapse of conventional genre categories and the organisation of club or you th cultures around these genres. Perhaps this is a reproductive version of the stylistic morphing phenomena discussed by Barry Sandywell and myself (2005). It is possible that it is not only artists and performers who are morphing between genres as a result of digital technologies but also that collecting and reproductive practices have also been transformed by the accessibility potentials of MP3 players. This is an area for future investigation.

[48] Multiple music systems, amplifiers, and speakers, controlled through the iPod interface. This is in addition to interfaces with other interrelated technologies, digital audio and visual signals, other clubbers, and possibly other digitally controlled systems such as air conditioning, water temperatures, cooled drinks, etc.

[49] This is a kind of club-cultural capital (Thornton, 1995) inscribed on the spaces of the venue and the cyborg bodies within it. In this sense at the noWax event 'culture not only flows from the environment into the body, but also emanates from the body into the environment.' (Hayles, 1999: 200).

6. A theory of iPodding

In a recent interview Jonathan Ive, Apple's industrial designer, remarked that 'From early on we wanted a product that would seem so natural, so inevitable and so simple you wouldn't think of it as having been designed.' (*GQ*, August 2005 issue: 158). Ive proceeds by developing a more genealogical and interdependent foundation to this image of the imitation of nature:

> 'We are unique in that we have an OS [operating system] as well as hardware...On top of this, the components were coming into alignment. We had jukebox software, and hard drives were getting smaller, so it was design and technology coming together in a perfect way. We made the iPod as simple as we possibly could, especially on the inside. It really annoys me when people say that simplicity is a style, because it's not, it's not a veneer. Simplification is one of the most difficult things to do. Also, for the iPod to be successful it has to be part of a complicated system – it has to be hooked-up to a computer of some sort, plus it needs all the software. The iPod just navigates and retrieves data. In a way, the interface became the icon of the product.'
>
> (*GQ*, August 2005 issue: 158)

The iPod, or any MP3 player, in this sense, is a gateway or a portal into a simulated (Baudrillard, 1983), mobile, and digital music collection (or networks of music collections). The iPod, as Ive indicates, is merely the interface, a means of retrieval, for this invisible technological and cultural archive[50]. As Ive suggests, it is this interface that has become the 'icon' or 'iconic' and as such conceals a vast, complex, and enmeshed array of cultural and technological appropriations beneath or behind an auratic[51] 'veneer' of 'simplicity'. The interface, the MP3 player, is merely the visible

[50] I distinguish here between a music archive and a music collection. A music archive is a more systematic and official database of music, a music collection is individualised and non-official, although it may be equally structured and ordered. The collection is usually domesticated and may relate to issues of the self or of identity, the music collection in this sense is a cultural archive. The music archive is data bereft of meaning, information without incorporation.

[51] Walter Benjamin defines aura in terms of a sensory or aesthetic experience of a particular time and space. He describes this auratic sensation in the following terms: 'If while resting on a summer afternoon, you follow with your eyes a mountain range on the horizon or a branch which casts its shadow over you, you experience the aura of those mountains, of that branch.' (Benjamin, 1999: 225)

dimension that conceals these other aspects behind a veil of fetishised simplicity and user-friendliness. The apparently neutral, natural, un-designed, and liberating potentials of the interface offer forward a veneer within which (often concealed) dominant systems are inscribed onto the technology and incorporated in its embodiment (Hayles, 1999). This is illustrated in the diagram below (see figure 7.32). The zero on the vertical axis (the horizontal axis) represents the *veneer of simplicity*.

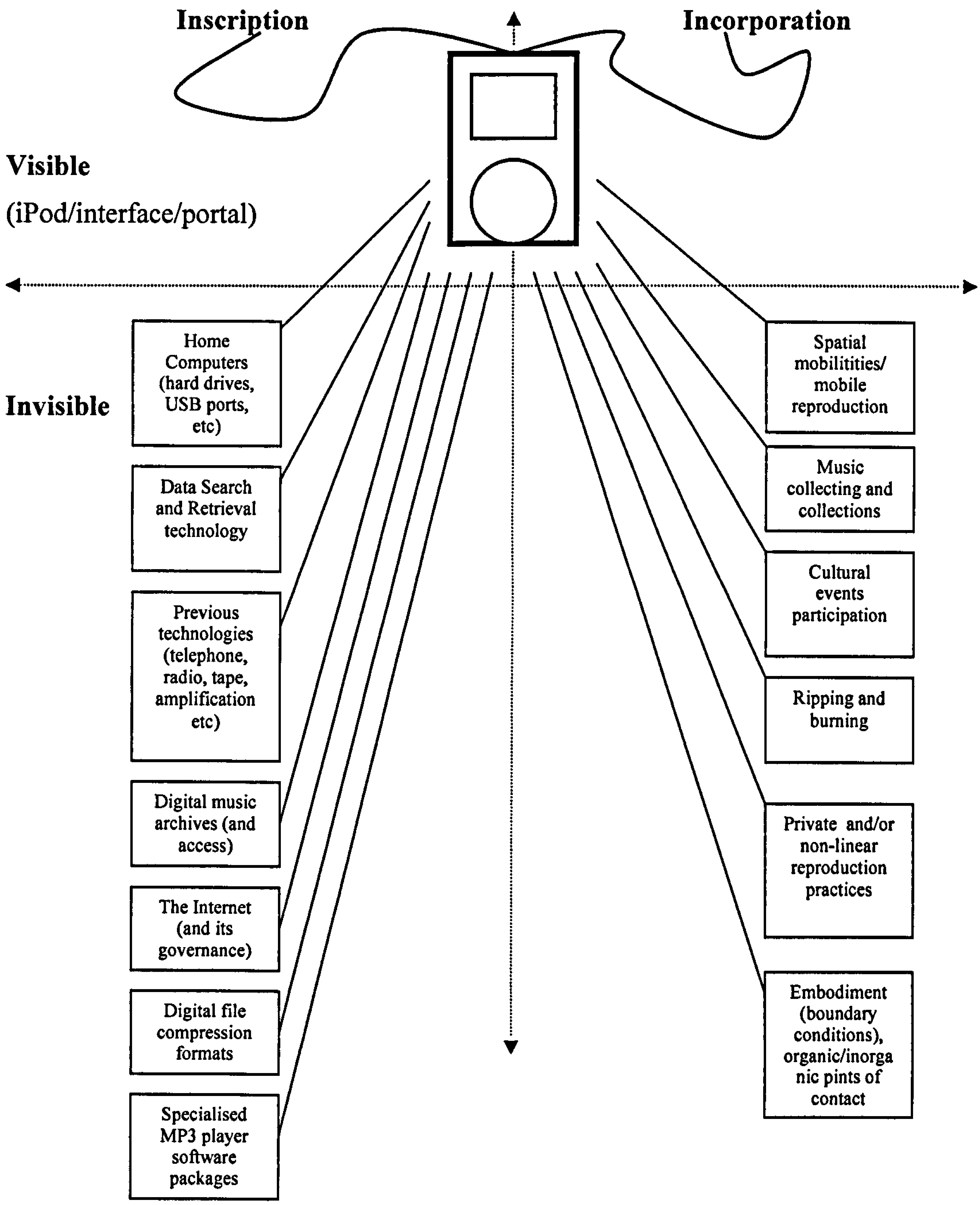

Figure 7.32: A diagrammatical representation of the 'iconic interface' and the 'veneer of simplicity'

Apple's own theory of the iPod may then be allied with Hayles' theory of inscribing and incoporporating practices in order to create a general theory of MP3 player appropriation or 'iPodding'. Inscription and incorporation can be defined most simply in the following terms:

> 'Incorporating practices perform the bodily content; inscribing practices correct and modulate the performance. Thus incorporating and inscribing practices work together to create cultural constructs.'
> (Hayles, 1999: 200).

The interface is the embodiment of material inscriptions that modulate performance, and the site of the incorporation of the material interface in the flow of everyday life. The interface is the focal point of the 'action that is encoded into bodily memory by repeated performance until it becomes habitual.' (Hayles, 1999: 199). For this reason the diagram above illustrates the interface as the most visible element of the complexity of associated technologies and practices interconnected as inscription and incorporation. From this it is possible to 'triangulate between incorporation, inscription, and technological materiality to arrive at a fuller description.' (Hayles, 1999: 207).

If we take the example of music collecting, then the systems of *music archiving* and retrieval can be understood as inscriptive, whilst *music collecting* can be understood as incorporative. In others words a music archive becomes a music collection when incorporated into the everyday mundane practices of individual agents. The music collection is a 'habitual' embodiment or 'performance' of the music archive. The music collection is an archive or music with particular understandings, practices, rituals, and identity forming properties attached to it.

For Hayles it is possible to 'complicate and enrich the tension between embodiment and the body by juxtaposing this tension with...inscription and incorporation' (Hayles, 1999: 298). Hayles 'envisions these two bimodalities acting in complex syncopation with each other.' (Hayles, 1999: 198). It is this complex syncopation structured around and through the MP3 player interface that is illustrated in figure 7.32[52].

With the focus upon the interface as the site of tension between inscription and incorporation we may find that through a sense of otherness the 'particularities of an incorporating practice emerge out of the abstraction of inscription.' (Hayles, 1999: 199). Hayles also remarks that:

> 'When changes in incorporating practices take place, they are often linked with new technologies that affect how people use their bodies and experience space and time. Formed by technology at the same time that it creates technology, embodiment mediates between technology and discourse by creating new experiential frameworks that serve as boundary markers for the creation of corresponding discursive systems. In the feedback loop between technological innovations and discursive practises, incorporation is a crucial link.'
>
> (Hayles, 1999: 205)

Indeed, the iPod, and the digital mobile music collection, can be linked to how people experience space and time. Embodiment or incoporation is essentially a moment when technology is created, that is it becomes a technology through its interpretation as a technical artefact, it is given a meaning (or multifarious meanings) (Kirkpatrick, 2004), whilst simultaneously having implications for how we understand, describe, and activate our bodies. Furthermore, the MP3 player, and particularly the iPod, is clearly tied into discourse led experiential frameworks. Take for instance the *iWar*, the *iPod generation*, and the representation of the music collection in the iPod advertising. This rhetorical construction and practice are mutually constituted. To illustrate this point, utilising a related music reproduction example, Hayles argues that:

---

[52] Further to Hayles contention that 'when the focus is on inscription, the particularities of incorporation tend to fade from view' (Hales, 1999: 199), it is also possible to argue that when we focus upon the *interface as icon(ic)*, and the *veneer of simplicity* that it cultivates, both inscription and incorporation fade from view. That is unless we re-illuminate these practices by reconsidering the interface as both a site of inscriptive and incorporative practices.

> 'When voice was displaced onto tape, the body metonymically participated in the transformations that voice underwent in this medium. For certain texts after 1950, the body became a tape-recorder.'
> (Hayles, 1999: 211)

The challenge now is to see if the body becomes an MP3 player in (media) discourse formations. The findings of this chapter suggest that this is a possibility that needs empirical examination.

To summarise, the iPod, the iconic interface, is a material embodiment or focal point of the 'dance between inscribing and incorporating practices.' (Hayles, 1999: 193). This focal point is a product of both discourse based experiential frameworks that act as boundary markers for practice, the materiality of its design, and the appropriation or incorporation of the device in everyday practice.

To further illustrate this 'dance' (Hayles, 1999: 193) between inscription and incorporation we may return here to the specifics of the noWax case study, it is through the appropriation of MP3 player, an incorporative practice, that the noWax event is realized as 'a music night which substitutes the DJ and his van full of vinyl with iPod owners who have all just walked in with entire record collections in their pockets.' (*The Independent*, 24th of April 2004). Indeed, the noWax event, with its networked and democratised dance floor, is an example of 'inscribing and incorporating practices' working together 'to create the heterogeneous spaces of postmodern technologies and cultures.' (Hayles, 1999: 206). At these noWax events information is materialised as informatics, for information 'like humanity, cannot exist apart from the embodiment that brings it into being as a material entity in the world; and embodiment is always instantiated, local, and specific.' (Hayles, 1999: 49). It is within these localised cyber-cultural events, nodes in extended networks of cultural appropriation, that we find the material details of boundary constraints and boundary conditions unfolded in everyday practices. And as such it is in these localities that we may locate the intersection or complex interplays between bodies, information and materiality.

7. Conclusion

> 'ownership is the most intimate relationship that one can have to objects. Not that they come alive in him; it is he who lives in them.'
> (Benjamin, 1999: 69)

This chapter by no means captures all of the reconfigurations and recontextualisations associated with the rise of MP3, MP3 players, and MP3 culture. Indeed, it only touches the surface of possibilities, particularly as these devices converge with visual reproduction technologies (video screens, digital cameras, etc) and mobile communication technologies (mobile telephones, palmtop computers, etc). The mobile music device and the city space is perhaps a future area for research, as are the intricate details of the collecting practices of the 'iPod generation'. However, this chapter has gone some way in beginning to analyse and conceptualise this cultural shift. It identifies that music is reconfigured from physical to virtual cultural artefact in the rhetoric and practices of the digital age, although the extent of this shift is yet to be determined in any quantitative sense. And second, that music, extending the possibilities of previous mobile music reproduction devices such as the audiotape based personal stereo, has spatially recontexutalised music by transferring or transposing music, and private music collections, upon urban and rural public spaces. It is perhaps the quantity of music that may now be carried, as a result of the compression of music, that is the key transformation here. Entire music 'collections' have been mobilised as the music file has been miniaturised. The immovable music collection of the recent past, even of the first age of digitalisation and the compact disk, has been replaced with the digitally compressed mobile music collection.

I have suggested here that we can understand the MP3 player as an 'iconic interface' that creates a 'veneer of simplicity' concealing or largely rendering invisible these reconfigurations and recontextualsiations as embodied in everyday mundane routines and practices. The naturalised and simplified interface conceals the complex interplay of rhetoric, technologies, and practices that constitute and construct music collecting and reproduction. As Ive himself claimed, the iPod was designed to imitate nature, and it is perhaps the normalising or naturalising rhetoric of the digital age that has rapidly embedded these practices within everyday life and thus created a sense of their invisibility in mundane and routine practices. The rapidly escalating appropriation of these devices, indicated by recent sales figures, suggests that the digital rhetoric of naturalisation and reconfiguration as exemplified by the iPod advertising campaign described above has some ideological effect on the understandings of music and music culture in the digital age.

It is worth noting that this chapter indicates that these reconfigurations and recontextualisations of music collecting and reproduction practices are not simple or complete but are complex and chaotic. MP3 technologies illustrate that socio-technological developments are 'never complete transformations of sharp breaks… without exception, they reinscribe traditional ideas and assumptions even as they articulate something new.' (Hayles, 1991: 6). In line with this the sources drawn on here indicate that digitalisation is not an instant and complete movement or reconfiguration of collecting and reproduction practices (from physical to virtual). The evidence suggests that virtual and physical cultural artefacts operate together (CDs with MP3s for example). As such, in the case of the digitalisation of music collecting and reproduction practices there is evidence to support the claim that 'periods or epochs do not succeed but implicate one another, do not replace but supplement one another, are not consecutive but simultaneous.' (Poster, 1996: 21).

It can be argued from this that digitalisation, the appropriation of digital music technologies in everyday practices, has reconfigured and recontextualised music collecting and reproduction practices within certain boundaries or limitations, some technological and material, others are based upon embedded understandings of cultural artefacts and everyday routines. In other words, the digitalisation of music reproduction practices cannot be reduced or simplified to the reconfiguration of analogue to digital or the recontextualisation of music from the private to the public spaces of everyday life. Rather we see here complex interconnectivities between these spheres relating to knowledge about these systems, embedded understandings of music, the identity forming potentials of cultural artefacts, and material technological affordances. Or, in other terms, we see here that the digitalisation of music and music culture is the product of a complex dance between inscriptive and incorporative practices concealed beneath the 'iconic interface' and its fetishised simplicity, naturalness, and user-friendliness, thus cultivating an auratic 'veneer of simplicity'.

Chapter 8: Downloading culture: the technological and rhetorical construction and ordering of musical appropriation in the digital age

Chapter contents

Chapter abstract

Recent years have seen a radical increase in the appropriation of music from internet sources. Indeed, it would seem that music theft, previously understood as the deviant acts of piracy and bootlegging, has been rhetorically reframed as sharing (or file-sharing). This has resulted in what might be referred to as the music downloading phenomenon. The scale of these transformations, resulting in reworking of the singles chart, music retailing, high profile legal cases, etc, highlights the significance of this phenomenon for sociological investigation. This form of musical appropriation via the internet, in the form of downloaded digital music files, has escalated dramatically over recent years. This has resulted in an array of legal and moral conflicts around ownership and digital rights management. This chapter, which is informed by recent theoretical debates on contemporary capitalism and the commodification of knowledge, draws upon structured interviews with MP3 users, newspaper and magazine articles and Music Industry publications. From these sources it identifies ways in which music downloading has been constructed and ordered through the music industry's rhetorical and technological responses to the perceived and projected lost revenues. These lost revenues are often directly connected to the rise of the uncontrolled downloading of cultural artefacts. The chapter is constructed around six sections. Following a brief introduction concerning property in the digital age, the second section provides a theoretical background for the chapter by drawing on theories of 'informational', 'digital', or 'soft' capitalism and the commodification of knowledge. It then focuses upon the specifics of digital music culture and on the general themes of the relations between music and the internet. Following these introductory sections I then look first at the rhetorical construction of these conflicts, in section four, followed by the technological ordering of appropriation, in section five. I conclude by offering a model of the rhetorical and technological construction and ordering of the music downloading phenomenon. The central argument is that music, as a form of knowledge, is a central commodity of the digital age and as such is protected by the music industry through particular and reflexive formulations of digital rhetoric and technology.

1. Introduction

> 'A typical download from a legitimate service using broadband connection would take less than 2 minutes.'
> (BPI, 2005: 16)

> 'The unauthorised distribution of music over the internet is against the law. It infringes the legal rights of artists and record companies. And it's bad for music.'
> (The British Phonographic Industry (BPI) website, section on illegal file sharing, http://www.bpi.co.uk/, accessed 10th of January 2005)

> 'Piracy is theft – pure and simple. Whether it's Jamelia or a jobbing musician, the artist suffers. We owe it to them to make sure they get a fair return for their creativity, flair and inspiration. The Government supports the principle of proportionate legal action against the worst offending uploaders.'
> (Arts Minister Estelle Morris in BPI, 2005: 31)

It has recently been argued that the 'role of property is changing radically' (Rifkin, 2000: 3) and that the implications of these changes are 'enormous and far-reaching' (Rifkin, 2000: 3). The question then is exactly how has the role of property been transformed? What are these enormous and far-reaching implications? For Rifkin one of the key implications of the information age and the digitalisation of property is that 'ownership is steadily being replaced by access.' (Rifkin, 2000: 4; see also chapter 2). Indeed, the social sciences appear increasingly concerned with questions of information access, exclusion, and the discussion of digital divides[1]. These are equally pertinent questions for a sociological analysis of the digitalisation of music, particularly as we now find issues of ownership, access, property, and digital rights management played out across innumerable legal, moral, and economic conflicts (see Jones, 2000; Breen & Forde, 2004; Leyshon et.al. 2005; Spitz & Hunter, 2005;

[1] See for example the projects in the current ESRC e-Society Programme at www.york.ac.uk/res/e-society, accessed 9th of February 2006.

McLeod, 2005; Beer, 2005a; Rodman & Vanderdonckt, 2006; Hesmondhalgh, 2006; and Ayers, 2006)[2]. As such these are pressing issues for this thesis.

In this chapter I argue that the digitalised appropriation of music, embodied in the recent rise of music downloading, needs to be seen in the context of wider questions of information capitalism, ownership, and property rights. To this end this chapter focuses exclusively upon the study of the technological and rhetorical formulations that construct and order music downloading in the context of *digital* or *information capitalism* and the *commodification of knowledge* (see Thrift, 1997; Lyotard, 1999).

With this objective in mind the chapter focuses specifically on the conflicts surrounding the recent music downloading phenomena. Following this brief introduction, the second section acts as a theoretical prologue that considers theories of capitalism as a framework or contextual backdrop for the discussion of music downloading. Then, moving toward an application of these theories, the third section introduces the themes emerging from the relations between music and the internet. In sections four and five I then look in turn at the rhetorical and technological construction and ordering of music downloading. The fourth focuses upon the rhetorical construction of specific socio-legal conflicts relating to music downloading. The fifth section reframes music as a form of commodified knowledge and then examines the process of encryption as a way of protecting knowledge and organising cultural access and appropriation. The encryption of culture is a process that might be thought of as technological boundary construction, or zoning (Lessig, 1995), and commodity protection. The final section then combines these illustrations and concludes by offering a model of music downloading as technologically and rhetorically constructed and ordered by the rhetoric and technology that has emerged in response to the possibility of lost revenues and uncontrollable musical appropriation.

2. What about capitalism? A theoretical prologue

Nicholas Gane has recently argued that there:

[2] It is noticeable that much of this literature has been published in the last two years, thus reflecting the recent emergence of these phenomena.

'is currently a tendency in cultural studies literature to analyse the technical form or content of new media technologies in isolation from the general structural dynamics of capitalist culture'
(Gane, 2003: 430)

There is an opportunity in the well-known and high profile legal and economic conflicts of the digitalisation of music, embodied in music downloading and file-sharing, to prevent the perpetuation of what Burrows has described as a 'strange amnesia about the functioning of capitalism' (Burrows, 2005a: 464). Music downloading as an emerging social and cultural phenomenon presents an opportunity to focus in on the material instantiation of the 'adverse effects of the heterogenous networks we call capitalism' (Thrift, 1997: 29), which, according to Thrift, 'seem to be pressing in on us, in ways which may well presage more uncertainty and insecurity for everyone' (Thrift, 1997: 29). The purpose of this chapter therefore is to introduce (some of the) concrete details concerning capitalist structures and functioning in terms of the digitalisation of music.

The key point here is that we should avoid treating 'technology as a domain in itself that brings important changes to cultures and societies without ever really being part of the structural basis of either.' (Gane, 2003: 431). Lyotard's writings are of particular value here for he 'does something quite different to most other media theorists: he looks at the way in which new digital technologies aid or even promote the commodification of knowledge, and, with this, culture more generally.' (Gane, 2003: 431). This has echoes of Theodor Adorno's much maligned post-war assertion that 'cultural entities typical of the culture industry are no longer also commodities, they are commodities through and through' (Adorno, 2003: 100). For, Adorno argued, what he describes as the culture industry, 'transfers the profit motive naked onto cultural forms.' (Adorno, 2003: 99). In this sense capitalist systems and structures are inscribed upon the art form and culture is thereby commodified. Both Lyotard (1999) and Adorno's (2003) works identify the *standardisation of culture* – based upon the achievement of efficiency and profitability through the pursuit of conventions or standards – as a consequence of the processes of mediation symptomatic of increasingly technologised forms of capitalism. As such, for Lyotard, 'given this emphasis on efficiency and performance, the ultimate goal of the system is to be frictionless, something that can only be achieved through elimination of all noise; of anything that slows down its operation or anything that is different in principle to itself.' (Gane, 2003: 437). Lyotard puts this in terms of the pursuit of a performativity equation in which the maximum outcome is achieved for the minimum input (Lyotard, 1999: 46). For Lyotard the question has now famously shifted from 'Is it true?' to 'what use is it?' or 'is it saleable?' (Lyotard, 1999: 51). In this sense the issues that I have discussed in the previous chapters do not exist outside of the structures of capitalism. To be democratised, for example (see chapter 6), is not to escape the flows of capitalism, it is merely to have some form of purchase (or perceived purchase) amongst these flows.

This process of commodification, for Lyotard, is directly linked to the development of new technological systems, with the database the most significant amongst these. Indeed, Lyotard argues that 'technological transformations can be expected to have a considerable impact on knowledge.' (Lyotard, 1999: 4). This impact takes the form of commodification and the instigation of power structures around systems and patterns of knowledge ownership and efficiency – with knowledge formation and ownership being legitimated through performativity. As knowledge becomes *the* commodity of global capitalism – a sentiment we see repeated regularly in party political rhetoric of "flexible", "skilled", and "knowledgeable" British workforces operating in the "global economy" – the efficiency of this knowledge in itself becomes a form of legitimation and justification. Lyotard argues that where once the skills of the storyteller gave knowledge its power, we now see narrative and deterministic forms of scientific knowledge, the product of established moves within language games, finding legitimation in their efficiency or performativity and thus taking priority and dominance (in opposition to *paralogical* or non-deterministic and pluralistic forms of postmodern knowledge). The important point here is that for Lyotard knowledge is *the* commodity of globalised information capitalism.

Taking this issue of capitalism further, it is worth noting that according to Thrift, as a result of the 'cultural turn' in the social sciences:

> 'Capitalism can be generalised out to an all-pervasive cultural formation, usually through its migration into the symbolic realm. Capitalism can be elevated into something so self-evident that it can be brought on whenever a connective explanation is called for. Or capitalism becomes a reading, which can then be made into a transcendental haunting, both everywhere and nowhere.'
>
> (Thrift, 1997: 29)

The problem for Thrift is that capitalism is 'acknowledged' but more often than not turns out to be an 'empty foil for the cultural turn' (Thrift, 1997: 29). The question then is how we may integrate a rich notion of capitalism into a study of the digitalisation of music and music culture? An issue that is not simply resolved.

One possibility is to look further at the issue of the commodification of knowledge, and in particular at Thrift's (1997) 'soft capitalism'. Soft capitalism, echoing Lyotard's position, is founded upon a 'cultural turn' in capitalism mirroring the 'cultural turn' in academia. Thrift's conceptualisation of soft capitalism is based upon the notion that 'theoretical developments now routinely leak across the old boundaries between academia and business, thus helping to produce a new form of capitalism' (Thrift, 1997: 31). Indeed, this approach to capitalism resonates with Lyotard's emphasis of the centrality of knowledge as a commodity in contemporary or postmodern forms of capitalism. For not only is capitalism now based upon the commodification of knowledge, but also 'business has become more *knowledgeable* in a turbulent and constantly fluctuating world.' (Thrift, 1997: 30). It would appear that knowledge is not only *the* commodity of the digital or information age, it is also the currency or model around which business organises or defines itself. We see this, for example, in Apple's attempts to reconfigure the music collection in the Apple iPod advertising described in chapter 7, or in the attempts made to design the iPod so that it appears to be 'un-designed' or 'natural' (see chapter 7). Here what appear to be reflexive reconfigurations of cultural forms illustrate an attempt on the part of business or industry to *theorise culture and technology*. This at once is an application or expression of theoretical knowledge on behalf of Business and an illustration of the commodification of knowledge in action.

Having said this, the rise of soft capitalism should not, according to Thrift, be thought of in terms of complete knowledge formations or broad patterns of consensus:

> 'Soft capitalism, like other forms of capitalism, is shot full with tension and contradictions. Thus the rise of soft capitalism brings with it the opportunity for new kinds of resistance and subversion...associated particularly with the rise of electronic telecommunications technologies and with the development of the appearance of consensus.'
> (Thrift, 1997: 51)

In line with the sentiments of a series of writers, including Haraway's (1991) 'infidel heteroglossia', Urry's (2003) 'complexity theory', Lash and Urry's (1987) 'end of organized capitalism', and Lyotard's (1999) 'paralogy', Thrift is suggesting that, despite the organised appearance of capitalism:

> 'We need to move away from the comforting nostrum that we can contain the world in theories, and realise that these theories are not just about seeking out new knowledge but also about telling stories about an uncertain world which can, however briefly, stabilise that uncertainty, and make it appear certain and centred.'
> (Thrift, 1997: 51)

The challenge then is not to attempt to contain or describe away complex phenomena, but to focus on specific details within the global flux of capitalism. For Thrift the focus then should be upon the tensions and contradictions evident in soft capitalism, and to identify and exemplify, where possible, uncertainties and conflicts, within particular theoretical conceptualisations that do not claim to be definitive.

I will begin this examination of the *uncertainties* and *conflicts* of the digitalisation of music and music culture, and more specifically music downloading, with an overview of the fragmentary and polarised understandings of the relations between music and the internet.

3. Music and the internet

'We want to increase consumer awareness of the legal implications of file-sharing. We want to introduce new legitimate (online download) services. If these are not working, then there has to be a degree of enforcement'
(Andrew Yeates, director general of the British Phonographic Industry, *The Independent*, 14th of January 2004)

'Digital distribution marks a fundamental transformation in the economics of the music industry. The emergence of a viable commercial retail model for downloads, increasing broadband penetration and advances in mobile phone technology increase the potential consumer base for recorded music, and provide significant incremental revenue opportunities.'
(Deutsche Bank on EMI, *The Independent*, 9th of April 2005)

'The internet presents the record industry with opportunities and threats in equal measure and the UK music industry is halfway through a dramatic transition.'
(BPI website, section on illegal file sharing, http://www.bpi.co.uk/, accessed 10th of January 2005)

The relationship between music and the internet is a site of perceived possibility and volatility (Breen & Forde, 2004). Dystopian stories, or 'cyberpanic rhetorics' (Sandywell, 2006: 43), of music theft, illegal downloads, unresolved court cases, and anti-piracy technologies, are now prominent. Conversely, utopian stories of the creation of real-time music composition, globalised collaboration and dissemination, music's increasing accessibility, the regeneration of music collecting, and the development of virtual music communities (that transcend the problems of time and space), have also become prominent forms of media discourse. As Sandywell has identified:

'these responses reveal a bipolarised field of reactions: on the one side we have supportive responses by those who viewed the new technologies as instruments of liberation and progress (technologies of freedom that 'change

life'); on the other side we find discourses predicated upon fear and distrust (the new technologies undermine traditional institutions, reinforce existing inequalities, and so on).'
(Sandywell, 2006: 44)

These competing utopian and dystopian rhetorical formulations have been woven into the conceptualisation and ideological representation of the relationship between music and the internet (Sandywell, 2006; Hand & Sandywell, 2002). The internet has been constructed and reconstructed as a paradoxical space of democracy and control, creativity and constraint, art and cognition, truth and deviance. These complex rhetorical formulations, which are appropriated through innumerable communications streams[3], have, like the technologies to which they are attached, become embedded in the practices of everyday life[4] (see chapter 7).

The emergence of the internet has created a number of questions concerning the ownership of cultural artefacts in general and music in particular. We can expect these questions to unravel further over the coming years as capitalism attempts to 'conquer …its final frontier…in the wired geography of cyberspace, through the corporate colonization and commodification of the virtual and the imaginary.' (Sandywell, 2006: 45). The development of forms of music that are no longer exchanged as physical cultural artefacts has had profound implications for the ways in which music is appropriated or obtained. These transformations relate to that fact that the digitalisation 'of data tears both cultural artefacts and sensory experiences from their moorings in physical time and space.' (Gane, 2003: 442). The transformation of the processes and practices of the appropriation of music in the digital age, and what might be referred to as the music downloading phenomenon, exemplifies this *tearing* of cultural artefacts.

3.1 Commodification and digitalisation

[3] Mark Poster describes the contemporary pervasion of media streams, advertising, and consumption in his essay 'Consumption and digital commodities in the everyday' (2004)
[4] For more on the embedding of technology in everyday life see Pinch & Trocco (2002), Sandywell (2004), Galloway (2004), and Sassen (in Gane, 2004).

It has been argued that recorded music is always-already a commodity (Adorno, 2001; Adorno, 2002). Once Edison captured sound on his yet to be titled phonograph in 1877 (Kittler, 1999) music was potentially transformed from a commodity that was restricted to the purchased 'live' event in the moment of the concert hall or printed music scores, to the reproducible archives of the recording. Once the musical form is scratched or inscribed upon the disc, magnetised on tape, or digitalised on the CD, it is commodified and the necessities of commodification seep backwards into its design, construction, performance, and production.

When defined by the physical cultural artefact the ownership of the music falls in two directions, the ownership of the original, or master recording, and the ownership of the reproduced version inscribed on the artefact. The properties of the physical cultural artefact define ownership. When music is exchanged as a physical artefact ownership can be clearly defined[5]. These definitions and boundaries of ownership of the commodified musical form become problematic and blurred as digitalisation affords the shift from physical cultural artefact to virtual cultural artefact.

It is here that the spread of internet technologies have added an immovable question mark to the ownership of music. The MP3 file[6], for example, can facilitate the transfer of music between 'owners' without the exchange of a physical artefact. Music can now pass virtually between the *hands* of its *owners*. The purchasing and ownership of the musical form has been called into question by the digitalised practices of music uploading (placing music on the internet for others to consume) and downloading (appropriating music from the internet).

It seems that the music collection, as previously discussed in chapter 7, has now been conceptually reconfigured from stacks, racks, shelves, and boxes, to virtual stacks,

[5] "That is my CD?", "Can I borrow your minidisk?", "who's is that record?", etc. We may also consider the demarcation of ownership in the contemporary record store defined by the security tag on the record and the alarm system by the door. Here the shop space defined ownership anything inside this space or zone belongs to the retailer. The definition of theft is relient here upon these spatial factors, the removal of these objects from the demarcated zone (shop floor) constitutes theft.

[6] According to the BPI, there 'are three main dowload formats – MP3, WMA and AAC. MP3 is the best-known. It's unprotected and can be played, or converted to play, on any digital music player. The WMA format can be played on most handheld players, plus the popular Windows Media Player and Real Player. AAC is the only format iPods and iTunes will support, though MP3s and unprotected WMA files can be converted into AAC.' (BPI, 2005: 17)

racks, shelves and boxes contained in the computer hard drive. This is not to say that these virtual musical 'objects' have eclipsed the previous collections based upon the disc and spool. Rather it is to say that significant numbers of people are turning toward the virtual collection, or at least are operating a virtual collection in conjunction with their heavy and rigid physical collection (see chapter 7). Evidence of this shift can be found in the recent and dramatic rise in revenue being achieved from legal internet downloads, the BPI website reports that in 2005 26.4 million singles were legally downloaded, an increase of 357.3% on the 5.8 million sold in 2004[7], and the development of a legal internet music download sales recorded in the 'Official UK Download Chart' which 'was launched on September 1st' (BPI, 2005: 12). According to the British Phonographic Industry's (BPI) report on music downloading and piracy, 'On average, 40,000 different individual titles are downloaded each week in the UK' (BPI, 2005: 12), and, illustrating the rapid growth in this market, 'this compares with 7,000 at the beginning of the year [and] sales in the final week of 2004 [which] topped the 300,000 mark – eclipsing physical singles for the first time.' (BPI, 2005: 12). This culminated in February 2006 with the one-billionth worldwide legal music download[8] (*The Independent*, 25th of February 2006). It is this context of escalating mass appropriation of music through internet sources in the form of music downloads that forms the focus of the remainder of this chapter.

4. Conflicts and cyberpanics: digital rhetoric and the construction of downloading culture

> 'For what else is this collection but a disorder to which habit has accommodated itself to such an extent that it can appear as order? You have all heard of people whom the loss of their books has turned into invalids, or those who in order to acquire them became criminals'
> (Benjamin, 1999c: 62)

[7] http://www.bpi.co.uk/index.asp?Page=news/press/news_content_file_966.shtml, accessed January 10th 2005

[8] 'An unsuspecting 16-year-old from Michigan made history on the iTunes website by downloading Coldplay's "Speed of Sound" – which cost him 99 cents. The landmark purchase edged record companies closer to a new era where online sales threaten to overtake sales of CDs in shops.' (The Independent, 25th of February 2006). In fact this has happened in April 2006 with the recent single 'Crazy' reaching number one in the sales charts on downloads alone before being released on CD format.

> 'Music, like movies or any other form of creative content, is intellectual property, it belongs to someone and if it's stolen someone gets hurt, whether that's the artists or employees whose livelihoods depend on it, or the companies who invest in music and make it available to fans.'
> (Eric Nicoli, Chairman of the EMI Group, in BPI, 2005: 31)

> 'In June 2003, US record companies' association the RIAA announced that for the first time, individuals would face legal action for uploading music files to the internet. In March 2004, IFPI announced that there would be legal actions in Europe. To date thousands of cases have been brought against serial uploaders worldwide.'
> (BPI, 2005: 8)

The music downloading phenomenon cannot easily be categorised amongst the musical practices of the past. Music appropriation has come to be defined by its dominant medium – the record – the transformation of the medium now means that new studies and conceptualisations are required in order for us to begin to understand and define the emerging digital epoch (see Jones, 2000), particularly as 'internet technologies like Napster and mp3.com are seen as undermining the commodifying mechanisms of the culture industry.' (Sandywell, 2006: 55).

The responses of the British music industry music industry, represented by the British Phonographic Industry (BPI), resonate with Sandywell's (2006) recent work on cyberphobia and cyberpanics. In this work Sandywell identifies that in general a 'recurrent response to the impact of the internet and World-Wide Web upon everyday life is to see digitization in invasive and monstrous terms.' (Sandywell, 2006: 44). This type of dystopian position described by Sandywell is found in the causal link or direct correlation implied between the practices/technologies of music downloading, and particularly music file-sharing, and the volume of music sales implied by the music industry.

To illustrate this point it is worth considering first the music industry's definition of file-sharing. The British Phonographic Industry (BPI) define music file-sharing as:

> 'a means by which individuals can make files on their personal computers available to others to download via the internet. This is illegal when copyright material is made available without the permission of the rightsholders; which, in the case of sound recordings, are the record companies that created them.'
> (BPI, 2005: 31)

It would seem from this that it is possible that the movement from physical to virtual cultural artefacts, the second age of digitalisation, has implications not only for the practice of music collecting but also for the way in which the ownership of music is perceived. For it would appear that digital music theft in the form of music file-sharing[9], has far exceeded the possibilities and impact of bootlegging, piracy, and shop lifting[10]. As one respondent (Appendix 2) claimed:

> 'Yes, I do download it for free. Yep. I don't justify it, it's just theft...It doesn't matter to me that it's theft. You're not stealing a physical thing, you're not having to sneak it past a security guard or hide it under your jacket.'
> (MP3 user D)

Here we see that the removal of the physical aspects of ownership have facilitated or legitimised this type of theft as a form of practice, a kind of acceptable theft.

Music theft in the digital age is constructed in media and industry discourse as instant, global, and shameless (Probyn, 2004). The perception of theft is transformed by this

[9] All of this is not to ignore the previous and ongoing presence of traditional forms of music piracy and bootlegging, but with these previous forms there was always a necessity for a physical cultural artefact. The Internet has rapidly accelerated the illegal sharing of music far beyond the distribution possibilities of the pirate copy and the bootleg, and as such has far greater consequences, or perceived consequences, for the record industry. I will now focus upon the various legal conflicts that have emerged from these digital transformations.

[10] This is not solely limited to file sharing over the internet. The compressed nature of the MP3 file has enabled individuals to process and sell CDs of pirated materials. In one of my previous workplaces one individual would sell CDs containing illegally obtained MP3 files. These CDs rather than containing one album contained whole collections of albums. Indeed on of the CDs for sale contained every number one single since the commencement of the singles chart in the 1950s. These CDs could easily be compiled using a home computer fitted with a CD writing device (now standard in most home computers).

movement from physical to virtual cultural artefacts. As Sandywell contends, it is a 'well-known problem...that many forms of cybercrime are not regarded as criminal by online users. Downloading texts for research or entertainment is not seen as theft (just 'borrowing' software rather than buying it is seen as normal behaviour).' (Sandywell, 2006: 52). Downloading is either not regarded as theft, or, it is regarded as theft but with diminished consequences.

It would seem that *theft*, in the case of music downloading, *has been rhetorically reconfigured as sharing.* In the case of file-*sharing* the uploader, the dealer, is not distributing for a profit but is uploading the virtualised products of digital culture for no apparent financial gain. This is an altruistic form of theft; it is *virtually theft*[11]. Here we see that as 'border-dissolving media, information technologies are not simply technical machines, but communication forms that actively reconfigure social relations and public consciousness.' (Sandywell, 2006: 44). Theft is reconfigured or re-defined as sharing and virtual theft in the digital age – music piracy and bootlegging is rhetorically reframed as file-sharing.

4.1 Causality and legality

Before exploring these issues in greater detail it is worth first returning to the perception that digital music technologies have been directly responsible for a decline in music sales. On this point it is possible to argue that a line of causality has been forged between digitalisation, music appropriation, and the documented reduction in the sales of physical music formats. This then reveals the 'anxiety' on the part of the music industry 'that audio and multimedia piracy will be normalised with a consequent massive reduction to corporate profits.' (Sandywell, 2006: 52). In response to this it seems that the music industry has attempted to initiate a kind of cyberpanic (Sandywell, 2006) concerning large-scale moral collapse (the rise of remorseless online music theft) and the resultant demise of creative progress ("the reduced funding of music's grassroots"), the vulnerable artists (who the music industry assume carry some sort of emotional purchase with the consumer) are touted by the industry as "the ones who suffer" or as the victims of these crimes (see for

[11] Intended in both senses.

example BPI, 2005). Here we see that like 'moral panics more generally, cyberpanics are imaginary in their origin but very real in their consequences.' (Sandywell, 2006: 49).

Specific ICTs and individual music file-sharers (cybercriminals) are identified as the focal protagonists in these cyberpanics. We find for example that in some instances the iPod is directly blamed for a drop in record sales:

> 'The growth in the number of iPod owners goes hand in hand with the decline in sales of CDs, according to recent figures. British CD sales are following the trend in the United States, dropping from £2.11bn in 2001 to £2bn last year.'
> (*The Independent*, 14th of June 2003)

These links between the emergence of digital technologies (and practices) and the reduction in music sales have also been suggested in the reporting of figures from the BPI which indicate that in the first quarter of 2003 illegally copied music rose by over a third and spending on records fell by 13% (*The Independent*, 5th of July 2003). And, according to the International Federation of the Phonographic Industry (IFPI), in Japan alone an estimated 235 million CDs were unlawfully burnt in 2002 (*The Independent*, 5th of July 2003). The IFPI, in 2004, also argued that 36% 'of users of file-sharing networks said that they bought less music as a result' (The Independent, 8th of October 2005). In addition to this, on the 29th of May 2003, BBC radio *Five Live* broadcast a discussion on music collecting practices in response to a reported 43% year on year drop in singles sales which it spoke of in relation to the music collecting practices of young people.

It was as late as April 2005 (see BPI, 2005: 18) when the BPI's official singles chart began incorporating *legal* music downloads. Indeed, the music industry has moved powerfully yet relatively slowly to stem the perceived tide of lost revenue in the face of the increasing appropriation of digital music formats via the internet. These losses, linked directly in the music industry rhetoric to *digital piracy*, are estimated by the British Phonographic Industry to be around £20.5 million a year, and to be rising by 40% a year (*The Independent*, 5th of July 2003). This illustrates that these losses are perceived to have been severe, as are the possible losses that are predicted by financial analysts if the industry does not react 'effectively'[12]. For example, in 2000 it was predicted by:

> 'Stock-market analysts Stanfird C Bernstein...that the impact of the internet will mean that the recording industry will be receiving extra profits of $180 million a year by 2003, rising to as much as $500 million if an encrypted format for delivering downloads emerges as an industry standard.'
> (Mewton, 2001: 27)

In light of this *call for encryption* it is the music industry's response to the perceived threats made upon property, ownership, and profitability that I would like to momentarily consider.

If music file-sharing is defined as 'the activity of trading files with other users over the internet', and that users 'trade files by downloading (to obtain them) and uploading (to distribute them)' (BPI, 2005: 2), if downloading 'is done for free, from an unauthorised source, it is likely that it has been done illegally.' (BPI, 2005: 2). However, despite the prominence of music downloading in these reports, according to the BPI, the act of uploading is considerably more serious.

To clarify this point, uploading occurs where an:

> 'internet user allows other internet users access to their digital music files. This is commonly done using file-sharing programs. The uploader is effectively distributing music illegally on the internet. This act is unlawful regardless of whether or not the music was acquired illegally or legally.'
> (BPI, 2005: 2).

The *distribution* (uploading) of the music rather than its *reception* (downloading) is deemed to be the significant criminal act. To increase awareness of this the BPI conducted a marketing campaign involving leafleting in libraries and public buildings.

[12] In 2003 'the online music industry generated £46m. Within five years it's expected to leap to £1.85bn.' (*NME*, 3rd of January 2004)

As part of this awareness campaign the BPI also directly 'instant messaged' known illegal music uploaders to warn them that their activities were illegal (BPI, 2005: 9).

In terms of legality and ownership the BPI argue that music file-sharing, and particularly uploading music, contravenes the Copyright, Designs & Patents Act 1988 (BPI, 2005: 3). For music file-sharing 'runs counter to':

- Section 16, which reserves to the owner exclusive rights to copy and to communicate their works to the public;
- Section 20, which says communication to the public includes 'the making available to the public of the work by electronic transmission in such a way that members of the public may access it from a place and at a time individually chosen by them'' (BPI, 2005: 4)

The music industry over the last three to five years, in association with other multinational organisations, has constructed internet infrastructure designed to capture revenues (internet stores, subscription services, and royalty retrieval software). The current position, despite the digital rhetoric of speed, instantaneous global actions, accountability and perfect surveillance, took a relatively significant period of time to develop (in the context of acceleration and the compression of time and space).

During this period a number of court cases and legal issues have been contested whilst these legal sites, and legally morphed (Sandywell & Beer, 2005) versions of previously illegal music downloading sites (see the description of Napster below), were developed and marketed. Indeed, there now exists a vast array of music downloading opportunities. These fall roughly into two categories, (1) sites from which music files may be purchased online either through subscription packages or payment for individual music files, and, (2) file-sharing sites where music may be "shared", these are known more broadly as person-to-person (P2P) sites, software, or networks. In terms of the first category, as well as Apple's own www.itunes.co.uk and Microsoft's entertainment/msn.co.uk, and the internet download branch of highstreet music retailers such as HMV (www.hmv.co.uk), Virgin (www.virgindigital.com)[13], and Woolworths (www.woolworths.co.uk), there is also the legally updated subscription-based Napter site (www.napster.co.uk), and sites by previously non-music related globalised organisations such as CokaCola (www.mycokemusic.co.uk), Tesco (www.tesco.com), and the Easy group (www.easymusic.com). There are also a series of other download sales sites which are often characterised by the genres of music that they specialise in such as Emusic, (www.emusic.com), Wippit (www.wippit.com), Tune Tribe (www.tunetribe.com), Bleep (www.bleep.com), City16 (www.city16.com), Playlouder (www.playlouder.com/dowloads), and Karmadownload (www.karmadownload.com). As well as these official and ordered sites there are also the less controlled and more disordered, interactive and legally contested P2P file-sharing networks[14], such as Kazaa (www.kazaa.com), Gnutella (www.gnutella.com), Soulseek (www.slsknet.org), and Limewire (www.limewire.com), MP3 search engines, such as All The Web (www.alltheweb.com), Singing Fish (www.singingfish.com), and MP3Search (www.mp3search.com), and MP3 blogs[15], such as Fluxblog (www.newflux.blogspot.com), Scissorkick (wwww.scissorkick.com), and Never Came Home (www.nevercamehome.blogspot.com). Many of these sites appear regularly in various music download guides (for example see *Q*, September 2004 issue, *Q*, September 2005 issue, and *The Independent*, 2nd of September 2005, amongst innumerable others). This is evidence of the recent proliferation of music downloading opportunities and of the technological re-ordering of music appropriation in the digital age. I will now focus upon the specific conflicts that this r-ordering of musical appropriation, embodied in the music downloading phenomenon, has created.

Various stories have now emerged about the legal conflicts surrounding the emergence of the digital music compression format and music downloading. The

[13] The launch of the HMV and Virgin digital music online stores was reported as a 'download war' in which record stores were going 'head-to-head' (*The Independent*, 30th of August 2005).

[14] P2P software allows the downloading of other peoples music files, hence music file sharing. Although this vision of open and accessible music collections is limited somewhat by the risk of viruses and corrupted files (*Q*, September 2004 issue: 89).

[15] Short for web logging. This is an internet site on which an individual or collection of individuals make regular postings. This is similar in some senses to an online diary that is openly accessible. These sites list selections of songs which may be downladed.

American rock band Metallica are often referred to in relation to this coverage as they have reportedly spoken and acted against illegal music file-sharing activities. Indeed, it was Metallica who filed a lawsuit against the music file-sharing internet site Napster in 2000 (*Q*, September 2005 Issue). In this instance these musicians, amongst the highest selling in America's music history, were acting against the file-sharing community on behalf, we are led to believe, of musicians and the industry in general. Indeed, the legal actions taken by the music industry in response to music downloading can be roughly separated into two categories: the industry versus the individual file-sharer and the industry versus the music file-sharing network. I will look at these in turn.

4.2 Music industry versus the illegal uploader (but not the downloader)[16]

In 2004 it was reported in the NME that illegal downloading represented half of the music downloaded from the internet (*NME*, 3rd of January 2004). The resultant

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[16] It is worth noting at this juncture that the conflicts depicted across various media cannot be understood in terms of a homogenous music industry working together to defeat the illegal music downloader, but these conflicts are also constructed as occurring within or between industry insiders. Competing industry led internet download sites and services, as well as other digital music technologies, are often reported in terms of their direct competitition with one another. Often new services or technologies are compared with, or contrasted against, those of Apple (with reference to either the iPod or iTunes), see for example the Apple vs. Microsoft MP3 player 'iWar' described in the previous chapter (see also *The Guardian*, 13th of September 2004). The Guardian also reports further conflicts between Apple and Tesco[16] (*The Guardian*, 8th of November 2004); Apple and Yahoo!, as illustrated in the following passage:

> 'The battle for control of the nascent music download market today stepped up a gear as internet giant Yahoo! announced that it had agreed to buy US music software company MusicMatch in an £89m deal.
> (*The Guardian*, 14th of September 2004)

And, more recently, Apple and Sony (*The Guardian*, 19th of August 2005); and, Apple and the music retailer HMV (*The Guardian*, 2nd of September 2005). Furthermore, in line with some of the other examples listed above, various organisations are reported as operating in collaborative teams in order to aggressively gain market share from Apple, this is illustrated in the following passage:

> 'HMV has teamed up with Microsoft to combat Apple's dominance of the digital music download market, launching its own service to bring downloads to the mainstream music buyer.'
> (*The Guardian*, 2nd of September 2005)

It would seem that Apple, perceived to be the dominant name in digital music downloading and reproduction technologies, is pitted against or situated in conflict with an *Other* in media discourse. These articles are often constructed around a notion of war, a race, a battle, a competition, a conflict. A larger sample could perhaps be used to examine this conceptual competition in more detail. Particularly as these aggressive attempts to claim market share are played out over the coming years.

'aggressive'[17] legal actions of the Recording Industry Association of America (RIAA) were reported as causing something close to panic or paranoia[18] amongst music file-sharers[19]. For example, according to *GQ* magazine, in response to a letter from a reader who was concerned about their own illegal music downloading practices, during the period September 2003 to March 2005, the Record Industry Association of America 'successfully sued more than 6,000 "illegal downloaders" for alleged copyright infringement' (*GQ*, March 2005 issue: 79). Indeed this fear of prosecution through surveillance of internet activities appears to be guiding the practices of music downloaders. As one respondent claimed when asked about whether they illegally downloaded music for free:

> 'No. Two reasons really. First, and probably most, I would be concerned about doing this in case of prosecution, I've seen quite a bit on telly and in the paper about students being prosecuted for being involved in this. Second, I do see it as a form of theft, and for some reason I don't like stealing, not sure why, I don't really have a problem with other people doing it it's just that I wouldn't. Like I wouldn't buy pirated films, or illegally copied books or anything. Having said that I did buy a bootleg tape once from a record fair so I suppose I have done it, but I suspect that no-one knows about that, not much chance of getting caught with that one. Also I often make tapes for friends and family members for birthdays and that, which involves me copying songs from different CDs onto tapes, I expect that that is a form of theft. So maybe it's the fear of being caught that's the problem, this seems more likely to happen with internet file-sharing than making a tape up.'
> (MP3 user A)

Clearly the reporting of the 'aggressive' legal actions of the music industry against the illegal appropriation of music by individuals has implications for practice, although the scale of these implications is not clear. A further respondent when asked about

[17] Taken from The Guardian, 4th of April 2004.
[18] Take for example the sense of paranoia in the following response: 'I don't know if it is, I think its illegal [whispered], illegal. I don't know because this Limewire thing, I don't even know. Don't tell anybody. (MP3 user I)
[19] It is worth noting here that the RIAA were also involved in attempts to hack into file sharers systems to take action against them. This was accompanied by an attempt to rhetrocially rework the notion of hacking so as to render it legal. A full description of this case can be found in Lin & Beer (2005).

whether they participated in music downloading also indicated a sense of fear of prosecution that acted as a boundary to their involvement:

> 'No. I use my work computer so I don't want the change in bandwidth to be registered with IT. It's ok to download because you are only downloading one or two files so I won't look suspicious. The only reason people get caught is because there is a massive bandwidth from their machine. That's what I've heard anyway. You get into more trouble for uploading than for downloading, also I don't understand whether your computer is at risk or not when uploading.'
>
> (MP3 user D)

There is a clear and reflexive attempt here to navigate around legal conflict and the risk of prosecution by participating in music *downloading* but not *uploading*. And there is also noted here a sense of risk of computer viruses associated with the opening up your computer to a file-sharing community. This was also the reason why another respondent chose to cease music downloading activities altogether:

> 'When I originally started, I downloaded 15-20 songs for free, and my computer ended up with a lot of viruses. So from that point on I've always purchased files off an accredited site. If I could guarantee it would be virus free I would download for free.'
>
> (MP3 user C)

The fear of prosecution coupled with a fear (or inconvenience) of contracting computer viruses appear to be restricting or ordering music uploading and music downloading practices. Here we see in these accounts that the construction of music uploading and downloading as risky or dangerous appears to replicate the dominant media accounts.

However, other accounts indicate that rather than fear of prosecution being a barrier to practice it is instead the practicalities of file-sharing that act as a deterrent:

> 'No, no fear, no security fears or anything like that. I'm big into my computers and I can solve those kind of problems. I think its mainly because I've wanted that bandwidth to go in the other direction for other things rather than having that constantly sharing stuff.'
> (MP3 user L)

Rather than fear of prosecution built up in response to the coverage of aggressive legal actions it is the slowing down of the computers functions that deters people from actively engaging in the illegal exchange of music files. As a further respondent claimed when asked if he would participate by sharing his own music files:

> 'No I don't think so. Because it slows down my connection I guess. Downloading I don't really understand it to be honest, you get a lot of viruses. To stop anyone getting control of my computer by just sort of limiting it, I kept the software running briefly while I'm downloading one track.'
> (MP3 user J)

Rather than an open practice of sharing across a homogenous community of file-sharers we see here that the network is only accessed briefly in order for music to be obtained. This practice was also found in the following response to the same question:

> 'Yeah because I think they do it automatically from Limewire, so if you download something you can choose how many people can access your computer, if you see what I mean so if you've got a file. I don't really actively put anything out there ever, because otherwise it can make your computer really slow if you've got millions of people downloading your files. I think it automatically does it, I don't choose to do it.' (MP3 user I)

It would seem that in these cases the dominant rhetoric of aggressive legal action against individual file-sharers does not have direct implications for the practices of these individuals. The question then is why this dominant rhetoric does not seem to have implications for practice? The answer appears to be that the MP3 users interviewed (Appendix 2) perceived other individuals to be downloading more than them, and as such they are safe from prosecution:

> 'We've downloaded episodes from lost as well. That makes it sound like we download loads, but I don't think we do in comparison to some.'
> (MP3 user I)

Due to the perceived moderateness of their downloading practices MP3userI feels safe from prosecution. When asked about fear of prosecution she responded:

> 'No because we don't download that many, I don't think we do, and I don't really think so because so many people do it.'
> (MP3 user I)

There is a sense here of safety in numbers amongst these MP3 users. They compare their own downloading activity levels against the perceived activities of others:

> 'I guess it's the thing that so many people do it. And it's not like I'm downloading huge amounts. So I get the feeling I'll probably be alright.'
> (MP3 user K)

Despite the legal actions of the music industry these individuals feel safe from prosecution because of the number of people that they perceive to be downloading music, many of which they assume to be downloading greater quantities of files than them and are at greater risk of prosecution. As such they see the likelihood of being caught as insignificant. In these accounts we see that rather than the dominant rhetoric being the sole deterrent influencing music file sharing activities it is rather technical reasons that act as a deterrent to music uploading. Respondents were either unclear on how to do this or they didn't wish to do it as it to would slow down the functions of their computers. In contrast to music uploading, music downloading is depicted by MP3 users as having little consequence, fear of prosecution, or sense of guilt, resulting from the perceived scale of music downloading and by a detachment from the 'victim'.

What then are the details of these conflicts between the music industry and the individual music file-sharer? In response to the failure of legal cases against some of the leading file-sharing internet sites such as Kazaa and Gnuttella, The International Federation of the Phonographic Industry (IFPI) switched its focus to specific individual music file-sharers, this process began in America with the actions of the RIAA, and in October 2004 it was reported that the IFPI was beginning the process of suing 28 people in London and more than 400 across Europe (*The Independent*, 8th of October 2004). Jay Berman, the IFPI Chairman, argued at the time that 'finally we are at the point where the law has to be enforced. People who love music should buy it online and not swap files illegally.' (*The Independent*, 8th of October 2004). It is notable in this statement that the 'love of music' and the associated promotion of shame are used here as a tool to compliment the fear of prosecution.

In 2005, following this flurry of legal activity, the first conclusions of such cases in Britain were reached[20] which resulted in 23 British 'internet users' agreeing 'to pay record companies a total of £50,000 compensation after admitting distributing music illegally through file-sharing on the internet.' (*The Independent*, 5th of March 2005). These were the first cases to be 'tackled after the BPI won a High Court order forcing internet service providers to hand over details of people alleged to have repeatedly given away tracks for free' (*The Independent*, 5th of March 2005). Following this court case, and in contrast to the IFPI chairman, Geoff Taylor, General Counsel for The British Phonographic Industry, took the opportunity to emphasise the legal deterrent rather than shaming those involved:

> 'We hope people will now begin to get the message that the best way to avoid the risk of legal action and paying substantial compensation is to stop illegal file-sharing and to buy music online, safely and legally'
> (*The Independent*, 5th of March 2005)

[20] In March 2005 'BPI announces settlements in the UK's first filesharer cases, with twenty three of the individuals paying an average of £2,000 and two individuals paying £4,500. The BPI announces that it intends to commence legal action against a further 31 individuals.' (BPI, 2005: 18). This was then followed in August 2005 when the following statement was made: 'The battle against filesharing is set to go to court for the first time, as the BPI announces that it is to issue proceedings against five alleged uploaders. The BPI announces that it has settled 60 of the 88 cases it has launched so far. In the US, the entertainment industry winds its case against p2p service Grokster.' (BPI, 2005: 18).

More recently systems of industrial cross-collaboration have arisen in order to battle copyright theft. For example, in October 2005 a 'coalition of companies' from music, film, software and pharmaceutical industries was formed with the intention of mutual cooperation against piracy (*The Guardian*, 5th of October 2005). This group, titled *Business Action to Stop Counterfeiting and Piracy* (BASCAP), which included EMI, Vivendi Universal, and GlaxoSmithKline, amongst others, aimed to stem this perceived lost revenue occurring as a result of digitalisation across a number of social and cultural spheres. This illustrates both the scale of concern and anxiety of issues of digital rights management (DRM) that have occurred across a range of industries.

In light of the reporting of these legal actions, and the attached and overwhelming concretisation of the direct causal link between music downloading and lost revenues, the possibility of a hiatus arises between the perception of revenues lost and the actual reported figures[21]. Dominant rhetoric would have us believe that music downloading is directly responsible for drops in CD sales and loss of record company revenues, this is a causal link that is perpetuated in media discourse, and in the reports of industry bodies. Take for example the British Phonographic Industry's (BPI) report on 'Online Music Piracy' (BPI, 2005), which draws reference to nineteen separate research projects that have investigated the causal link between music downloading and the reduction of sales of other formats. Not surprisingly 17 of the 19 suggest a strong causal link, the other two studies, which suggest opposing results, are at least partially dismissed by the BPI. The evidence supporting the BPI's assertion that 'illegal file-sharing has been a key factor in the record industry's 22% worldwide sales declines between 1999 and 2004' (IFPI cited in BPI, 2005: 4) appears to be overwhelming in light of the conclusions of this 'reputable third party research' (BPI, 2005: 4).

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[21] In the dominant rhetoric of the digital age, led by the reporting of figures by the music industry, the digital downloading of music from the internet then becomes *the* reason for reduced profitability. However, an example has emerged which suggests that the perception of the lost revenue may exceed the impact of digitalisation in practice. Take for example, and this would need far greater examination and is only suggested here as a possible case in question, the recent reporting of the record label EMI's profits during 2005 in *The Guardian* newspaper. On the 30th of October 2005 it was reported that 'web downloads put EMI profits off track' (*The Guardian*, 30th of October 2005). Then on the 16th of November 2005 it was reported that 'upbeat EMI busts profits forecasts' (*The Guardian*, 16th of November 2005). This then suggest, although only with the limited scope and certainty that may be drawn from a single example, that there may have been a void created by the dominant dystopian rhetoric between the perceived implications of music downloading, and the actual documented revenues generated. There is some support here for a call for cross collaborations between sociology and economics to discover the details of this hiatus between the perception of the implications of downloading for the music industry and the economic viability of these perceptions.

In this instance the 'reality' of this causal link is not such a central issue as it is clear that this has come, in the rhetoric of the music industry in particular, to be both the *cause and consequence* of a drop in music industry revenues. I wish merely to highlight here that it is possible that other factors may have contributed to this reduction in sales, for example, the proliferation of alternative media (DVD, video games, digital radio, music television, etc), issues of personal finance, the rise of polyphonic ringtones, a cultural shift away from music centred youth movements, amongst many other possibilities. The causal link between music downloading and a reduction in music sales, which is prominent in the reporting of actions against individual music file-sharers, in most probability carries some level of validity, however, it is problematic to take this causal link as a pre-given, for there are certain to be other factors involved[22].

In these depictions or representations of digitalised music distribution and legal conflicts by the industry against individual music file-sharers, there is evidence to support Sandywell's contention that these dystopian descriptions are informed by an image of 'promiscuous information flows' that create 'an anarchical theatre for antinomian agents with subversive intentions: cyberspace is imagined as a site of dangers perpetrated by disembodied intruders and anonymous agencies.' (Sandywell, 2006, 50). It is perhaps through this understanding of cyberspace and in this context of anonymity and disembodiment that theft becomes victimless and inconsequential, or at least detached as *criminality-at-a-distance* (Sandywell, 2006: 51), and therefore is imagined as a less destructive, dangerous or damaging practice. As one respondent put it:

> 'I know its illegal but I don't really see it as theft, who are you stealing from? They're still going to sell loads of CDs and you are still going to like the band, and if you listen to them on the internet its good promotion, you listen to them on the internet and you download the song and you really like it, and then you might go and buy the CD.'

[22] There has also been a reverse causal link made between litigation and the decrease in illegal music downloads which I suggest we should treat with equal caution. The BPI's report (2005: 10-11) refers to three studies that suggest that a reduction in illegal file sharing is a direct result of legal actions taken against file-sharers.

(MP3 user I)

So although this is seen as illegal it is not seen as theft because its has no conceivable consequence for the victim. Similarly we see this detachment or crime at a distance in the following extract:

> 'Technically yes, it is stealing, I see it as a different level of theft to stealing a car or handbag, I've never really thought of the consequences. The person you are stealing from is so obscure that the harm involved does not seem as real.'
>
> (MP3 user C)

In response to this image of the 'obscure' victim, it is possible to see in the industry's rhetoric (BPI, 2005), and also in the rhetoric of those attached with the music industry (see also BPI, 2005), as an attempt to *re-consequentialise the act of cyber-theft* through the construction of a cyberpanic (downloading is immoral and will inevitably destroy the music industry and, therefore, music itself by removing funding for artists).

However, as a corrective to the imagery of detached and shameless music theft it is worth noting that amongst these accounts are examples of what might be labelled *self-regulation.* This may be evidence of some level of attachment between the downloader and the artist of a sense of shame and awareness of consequence (although it is impossible to link this in any direct sense with the industry's attempts to re-conseqeuntialise music downloading). For example one respondent claimed:

> 'If there's a lot of music I like I buy the CD because I just feel bad. But I never pay for downloading because if I'm going to pay for it I'd rather get a CD…I also have the view at the moment because I'm not earning anything it doesn't matter. But I never do loads of tracks from one artist, I take it into consideration I guess.'
>
> (MP3 user J)

This issue of personal finance and connection with the recording artist also appears in the following account:

> 'When I'm earning, and as I earn more, I have no problems buying CDs, the problem is that I think that they are too expensive; I don't think there's good enough music to warrant £15 on a CD, that's my personal view...What I definitely do is I download, for example, System of a Down album, they were absolutely awesome, and I loved it so much that I went and bought it, because they are a band that do fantastic music so they deserve to have my money. But if its crap, rubbish, and they do one song that's awesome that's tough luck I'm afraid I've downloaded that and I haven't paid for it.'
> (MP3 user L)

Here we see music downloaders actively and reflexively regulating their own downloading and purchasing practices. If they feel a connection with the artist, or that the artist needs or deserves their money, and if they have spare capital, they buy a CD (rather than a purchasable MP3).

It would seem that the music downloading cyberpanic rhetoric has some influence on the practices of music appropriation, but perhaps more importantly, it legitimates or justifies the music industry's 'aggressive' legal actions taken against individual music file-sharers and against file-sharing internet sites such as Napster. Moving attention from the individual file-sharer to the file-sharing community, I will now focus upon the industry's actions against music file-sharing networks and particularly the legal morphing of Napster.

4.3 Music industry versus the music file-sharing network: the legal morphing of Napster

To expand these socio-economic and legal issues further I will focus briefly on the well-known example of Napster (see also chapter 3). Napster was founded by Shawn Fanning in 1999 from which time it received a significant amount of attention in the popular media resulting in its construction through a variety of 'contested' discourses (Spitz and Hunter, 2005). As a result of the prominence of these contested depictions of 'users' and 'critics' (Spitz & Hunter, 2005: 178), Napster became the single highest profile brand amongst these emerging music file-sharing technologies. The 'music lawyer' Conrad Mewton describes Napster as 'the most prominent of several controversial software applications that allow you to search the internet for MP3 files which match your specified criteria.' (Mewton, 2001: 34). This is made possible because:

> 'MP3 files contain not only the music but also details of the artist, record company, track duration and all kinds of interesting information about the track in question on what's known as the ID3 tag, which enables Napster to select the MP3 files relevant to you. It has a phenomenal archive to choose from because, unlike other MP3 websites, Napster doesn't actually store any of the files itself. Instead, it acts as a conduit, allowing users across the globe to access each other's private collections. Lawyers refer to this process as "peer-to-peer networking". By this they mean that users are swapping their MP3 files from one PC (or "peer") to another, without the need to go through a central server. The point is, MP3 files are neither stored on, nor downloaded from, the Napster servers.'
> (Mewton, 2001: 34)

This peer-to-peer technology, such as the Napster conduit, acts as a portal into the music collections of other music file-sharers. As such, like the MP3 player, these networks are software based retrieval devices that enable access to and appropriation of archives of music.

Mewton, writing whilst the Napster legal case was in the process of unfolding, observed that 'Napster's producers have been locked in a legal conflict with the RIAA' (Mewton, 2001: 35) and that the:

> 'RIAA's argument is that Napster facilitates piracy by enabling and encouraging users to share MP3 files that they have already downloaded onto their hard drives. The problem is that many of these files have been downloaded illegally, without payment to the copyright owners.'
> (Mewton, 2001: 35)

Napster, therefore, in the words of the RIAA 'has created a haven for music piracy on an unprecedented scale' (RIAA in Mewton, 2001: 35). This led to an:

> 'initial court ruling (given by district judge Marilyn Hall Patel) – that the major record companies and publishers represented by the RIAA be granted a preliminary injunction against Napster – was therefore encouraging for the worldwide record industry, as it was the first time that there had been a court ruling determining that the copyright rules that apply in the real world also apply in the virtual (online) world.'
> (Mewton, 2001: 35)

There have now been a number of developments in this case since this initial ruling was made. Napster was closed down when a US court ruled in July 2001 that it had indeed broken copyright law. The BPI reports this in the following partisan terms:

> 'Soon after its launch in 1999, millions of Napster users were sharing hundreds of millions of music files. Falling foul of US copyright laws, and faced with lawsuits from the US recording industry it was shut down in 2000...Since then, Peer-to-peer technology has evolved allowing users to swap files without the need for a central server, using programs such as Kazaa.'
> (BPI, 2005: 8)

Following the closure of Napster, Roxio, a software company, purchased Napster's name and assets (*The Independent*, 21st of May 2004). Then in 2004 Napster reopened as a legitimate music download site. This new legally morphed or recrafted version of Napster re-launched in the UK after it 'signed up with five major record labels – BMG, EMI, Sony, Universal Music International and Warner Music International – and a number of independent firms to offer a catalogue of 500,000 tracks for sale over the internet, rising to 700,000 within a month.' (*The Independent*, 21st of May 2004)

Following this legal battle with the RIAA, Shawn Fanning, the founder of Napster, has been involved in creating a piece of software, called Snocap, that identifies digital music tracks shared online and acts to collect royalties for the copyright (*The Guardian*, 4th of December 2004). For 'although Napster was stamped out, other peer-to-peer networks such as Kazaa and Grokster still flourish' (*The Guardian*, 4th of December 2004), this Snocap software is intended to 'legitimise online file sharing' (*The Guardian*, 4th of December 2004). Indeed, Sony BMG and the music file-sharing site Grokster, were reported to be considering developing a site called Mashboxx, which would use Snocap as its system for retrieving royalty payments (*The Independent*, 20th of November 2004). The development of Snocap suggests that future developments in online music appropriation may well continue along the two distinct lines of music file-sharing, on the one hand, and subscription services and internet stores on the other[23], but that in the future both may be controlled to ensure that piracy and theft is minimised. The question that will then be faced once this controlled 'zoning' (Lessig, 1996) of the internet is complete concerns how individuals will avoid or subvert these restrictions to continue the practices of music piracy. How will they get around the copy limitations written into these technologies?

To summarise, what seems to have become clear is that the early stages of this second age of the digitalisation of music and music culture (the rise of MP3) have been defined by narratives of economic, political, and legal conflict as a result of the reconfiguration of musical reproduction, ownership, and legal boundaries (see chapter 7). We see that the prominent discourse surrounding Napster 'brought considerable recognition to copyright laws, creating a negative legal discourse in which consumers operated' (Buchanan, 2006: 15). The additional discourse of 'aggressive' legal actions by the industry against individual music uploaders had a similar effect. It is probable that these (and other unforeseen) economic and legal conflicts will continue to be

[23] Illustrating the ongoing legal conflicts of the second age of digitalisation it is worth noting that two further high profile legal battles unfolded around the same time as the Napster case. The first was the RIAA vs. Diamond Multimedia Systems in 1999, in which the RIAA aimed at preventing the distribution of a portable MP3 player on the grounds that it 'encouraged mass unauthorised duplication of music, without payment to the rights holders' (Mewton, 2001: 156), the RIAA lost this case. And the RIAA vs. MP3.com in 2000, in which the RIAA attempted to remove the facility on MP3.com for custom made compilations to be downloaded from the site. MP3.com was found to be in breach of copyright. This case was settled by MP3.com licensing this music from BMI (Broadcast Media Inc.) (Mewton, 2001: 156). Indeed, the most recent entry concerning these legal issues in the British Phonographic Industries' 'UK Digital Music Timeline' (BPI, 2005) indicates the ongoing nature of this cyberphobia (Sandywell, forthcoming) by identifying a number of recently and partially resolved legal conflicts. For example, the September 2005 entry records that there were 'two more key court rulings in the music industry's battle against illegal peer-to-peer; with Kazaa ruled illegal and a criminal conviction...against the Taiwanese Kuro p2p service.' (BPI, 2005: 18)

played out over the coming years as the tensions of digitalisation spread further across music and into other cultural fields. We can perhaps imagine similar conflicts in art, literature, and film[24]. However, in light of these general conflicts and complex rhetorical constructions and practices, it is the question of the technological control of access to cultural forms that I shall consider further in the following section.

5. Protecting digital commodities: the technological ordering of musical appropriation

In this section, and in response to the music industry's construction of music downloading as unrestrained large scale cultural theft, I will consider how, in addition to the development of legal music downloading internet sites, technologies are being used to create boundaries (Lessig, 1996) that protect digitalised musical artefacts. I will begin by focussing upon the definition of music as a form of commodified knowledge, and then upon the process of encryption that creates or protects material boundaries between cultural artefacts and appropriators.

5.1 Music, information, knowledge

> 'The primary qualities of information are flow, disembeddedness, spatial compression, temporal compression, real-time relations. It is not exclusively, but mainly, in this sense that we live in an information age.'

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[24] It is worth noting, whilst considering the wider questions of digitalisation, that the issues tackled here are not solely limited to music and its appropriation. Recently it has been reported that the issues encountered in relation to music downloading, are not restricted to this particular cultural sphere. For example, music is now used as a point of comparison, or as a conceptual tracer, for other cultural spheres, including film (*The Guardian*, 30th of October 2005) and literature (*The Times*, 5th of November 2005). Indeed we now see the emergence of cross-cultural directives such as the *European Union's Directive on Copyright and Distribution in the Information Society*, which indicates that the issues of digitalisation are in no way limited to music, and that many of the issues that I have discussed so far in this thesis will face other cultural spheres over the coming years. We may even situate these debates amongst wider issues of internet governance and access, indeed, this would provide a useful focus for extended work in this field. Take for example the continuing issues of ownership. In the popular media we also find coverage of the issues of the ownership of internet space as well as its content. It should not be forgotten that music, although in some instances appearing frivolous and insignificant, is a part of this global network of technologies, capitalist systems and structures, control and surveillance, and the commodification of knowledge. Continuing some of the debates about internet based censorship through the prevention of access to particular spaces on the internet (*The Independent*, 8th of November 2005) *The Independent*, for example, framed this debate within the dualism of ownership and censorship (*The Independent*, 16th of November 2005), or indeed, censorship through ownership.

(Lash, 2002: 2)

In the previous chapters music has been spoken of as a form of digitalised information. Here, when considering the rise of 'soft capitalism' (Thrift, 1997) in the context of the conflicts of ownership and access described above, the issues of the boundaries of knowledge ownership in the form of intellectual property rights, digital rights management, and copyright, become increasingly salient.

Music may be understood to be a form of knowledge in the sense that it is a set of practices, understandings, and material formulations, as produced, reproduced and appropriated in the praxis of everyday life. The question then arises: what are the relations between knowledge and information, and how are these relations instantiated in terms of music and music technologies? In its simplest sense we can perhaps conclude that knowledge and information are inseparable entities, knowledge is a type of information and information (or access to information) a type of knowledge. Perhaps knowledge is a particular type of information upon which we project particular sets of legitimised and hierarchical meanings. We can perhaps proceed then by concluding that music is both knowledge and information.

To this end the MP3 file, and the compression of music described in chapter 7, can be understood as a concrete example of the 'reduction of quality to quantity [that] comes [from] a transformation of both the form and content of knowledge itself.' (Gane, 2003: 435). With the digitalisation of music and digital compression formats, 'not only is knowledge translated into information, but this information reduced to 'bits' that are easy to send, receive and thus process.' (Gane, 2003: 435). Digitalised forms of information – information gathering, information accumulation, information access, and information formation – are compressed forms of knowledge handled as codes, data, and bits. It would seem that it is this process of compression and the miniaturisation (Haraway, 1991) of knowledge to byte-sized pulses of information that 'tears' cultural artefacts 'from their moorings in physical time and space.' (Gane, 2003: 442). In the case of MP3 we see the compression of music as a process of miniaturisation and of the translation of music (a type of knowledge) into information[25]. This is comparable with Thrift's notion that in business as in academia there is a 'need to transform information – of which there is a surfeit – into new knowledge.' (Thrift, 1997: 30).

For Thrift what is important is the type of knowledge and institution that emerges from the rise of soft capitalism. For there is a:

> 'need to construct supple institutional structures, capable of innovation in order to react swiftly to change. In both academia and business the increasing commodification of knowledge has only pointed to the value of knowledge which cannot be commodified, and especially to the value of practical knowledge, knowledge that cannot be written down and packaged.' (Thrift, 1997: 30)

The music industry for example has had to remain supple to react to the projection of lost revenues and the danger of file-sharing. As such it has responded and adapted structurally to the transformations of music appropriation practices.

The study of the digitalisation of any cultural field or form requires the detailed examination of the exact ways in which it limits access to artefacts or codifies culture. These represent the material embodiments of the reactions to protect threatened forms of commodified knowledge. Perhaps we can begin this process by taking one of the prominent technological solutions to the ubiquitous issue of intellectual property rights and use this as a concept for attempting to understand the implications of capitalism and the commodification of knowledge/culture.

5.2 Commodification, digital compression, and the encryption of culture

> 'At stake is a disinformed information society. The key to understanding this is to look at what is produced in information production not as information-rich goods and services, but more or less as out-of control bytes of

[25] It is apparent that as it removes the rough edges digital music compression technologies, such as MP3, reduce quality into quantity

information...Information production involves an important compression, indeed several important compressions'
(Lash, 2002: 2)

'To deter illegal copying, online music stores usually sell MP3 files with built-in restrictions on how you can use them. This practice is called Digital Rights Management (DRM)...For example, data inside the file might limit the number of computers or devices on which you can play the song, the number of times you can copy a song onto CD, or even how many times you can play a song at all...Say you download an album and then decide you'd like it on CD. If DRM restrictions don't allow this, you won't be able to copy the songs to CD – despite having paid £8 or £9 for the download. We think it's fair use to make copies of songs for your personal use – to listen to it in the car, say – though, strictly speaking, it is illegal.'
(*Which Guide to MP3 players*, 2005: 4)

It is possible to think of MP3 and the music downloading phenomenon in terms of the unpredictability of models of chaotic 'emergence' and the 'strange attractor' (Urry, 2003). Urry identifies that a consequence of what he calls the 'flowingness of time' is that 'minor changes in the past are able to produce potentially massive effects in the present or future.' (Urry, 2003: 23). Indeed the development of MP3 as a broadcast medium in 1991 is an example of the hypothetical beating of the butterfly's wings causing an unforeseen storm (Urry, 2003: 23). For in the case of the MP3 format we see complex and non-linear effects emerging from this initial moment. At this initial moment of emergence it would have been 'impossible to predict...the consequences...of [these]...localized actions.' (Urry, 2003: 24). The conflicts of the digitalisation of music and music culture 'emerge from, but are not reducible to, the micro-dynamics of' (Urry, 2003: 25) the MP3 digital compression format. In this sense MP3 emerges as a kind of 'strange attractor' (Urry, 2003: 27) in that it is a central point from which a loss of equilibrium has unravelled unconstrained by the boundary restrictions of negative feedback and so is set spiralling in unpredictable and unforseen directions. MP3 began in 1991 as an open and unencrypted file transfer format that some ten to fifteen years later afforded the significant transformations I have described in the appropriation of music and the various cultural and legal transformations attached to these transformations. Clearly during this moment of innovation would these complex and chaotic developments could not have been foreseen or predicted.

It seems that the open and unencrypted properties of MP3 have afforded the practices of music uploading and downloading resulting in these forms of legal and economic conflict over intellectual property rights, copyright, and ownership. As discussed in chapter 7, as music is digitally compressed, its code, becomes encrypted (for example Liquid Audio) or unencrypted (for example MP3). Therefore digitalised music, or at least digitally compressed music files, fall into either one of these two categories. Perhaps we can begin to reformulate a study of digitalised culture that talks in terms of *encrypted* and *unencrypted* cultural forms, or the *encryption of culture*. This then has built into it a sense of the saliency of copying, protection, compatibility, commodification, and, most importantly, accessibility, in the digital age. Rather than the democratisation of culture it is possible to think instead in terms of encryption as the material processes and boundaries of accessibility and digital rights management (DRM), or what Haraway referred to as 'boundary conditions' (Haraway, 1991). It is within this process of encryption that we find the structures of capitalism and ownership etched or inscribed on the cultural form, or, to extend the coding metaphor, woven into the cultural code.

In the introduction to this chapter I suggested, based on a series of contemporary writings on capitalism, that the commodification of knowledge and culture is the defining characteristic of contemporary capitalism. It is understandable then that if knowledge and culture are the commodities of capitalism in the digital age that these are protected by capitalist systems, structures, and organisations. As a result we now see protective codes written into cultural artefacts so as to limit unrestricted cultural appropriations.

What then is encryption? In terms of music downloading Mewton claims that 'Encryption technology, such as the use of passwords or watermarking, allows players to recognise and play only legitimate music files, or allows only a limited number of copies to be made (usually one) before the temporary password is withdrawn.'

(Mewton, 2001: 210). Indeed, music files when purchased and downloaded from the internet often now have copy restrictions built into them.

In computing terminology encryption is defined as the 'processing of a message by a sender in order to render it unintelligible to other than authorized recipients.' (*Dictionary of Computing*, 2004: e-book). The digitally compressed music file or any digital file, can, therefore, be understood as an informatized message passed between sender and recipient. This message can *only* be accessed by its *intended* recipient. In the case of music, a digitally compressed and encrypted music file can only be reproduced by individuals defined as intended recipients[26].

Encryption is the outcome of the practice of Cryptography which can be defined similarly as the 'coding of messages so as to render them unintelligible to other than authorized recipients.' (*Dictionary of Computing*, 2004). There are a number of 'techniques...for the conversion of the original message, known as plaintext, into its encrypted form, known as ciphertext, cipher, or code' (*Dictionary of Computing*, 2004). Digital files, or digitalised cultural artefacts, when encrypted, are transformed from a plaintext form to a ciphertext version. Indeed, it may prove useful to think of plaintext files, in some instances, in place of *originals* or *the original.*

What we can be conclude here is that digitalised culture falls into two categories, it is either plaintext, an uncencrypted state, or ciphertext, an encrypted state. The Oxford *Dictionary of Computing* continues:

> 'In a simple cipher system, for example, the sender and recipient hold identical copies of a secret key, and also an algorithm with which they each generate identical pseudorandom bit sequences. During encryption the sender modifies the plaintext string by combining it with the pseudorandom sequence to produce the ciphertext; the ciphertext is then transmitted. The recipient performs the reverse process with an identical pseudorandom sequence and the received ciphertext to recover the plaintext.'

[26] This of course opens up a series of questions about the reliability of these encryptions and the possibility of keeping out unintended recipients, these are questions that would require the luxury of a dedicated study of encryption, cyberterrorism, and hacking in praxis?

(Dictionary of Computing, 2004)

Encrypted digital files have pseudorandom[27] bit sequences written-in and as such are codified into ciphertexts. Only the intended recipient with access to the software to unlock these encrypted files holds the access 'key' to this 'locked' code and the encrypted cultural forms it opens-up. The plaintext form when unlocked is recovered or extracted from the mutated ciphertext version[28].

This technical process can then be used to conceptualise the digital culture as always-already embedded in soft or information capitalism and the attached commodification of knowledge (and culture). Below is a list of how these related categorisations of culture may be separate[29].

Encrypted Culture	**Unencrypted Culture**
Closed	Open
Non-permeable (resistant)	Permeable (non-resistant)
Defined ownership	Ownership unclear/transferable
Non/limited compatibility	Widely compatible
Profitable/efficient	economically inefficient
Controllable	Uncontrollable
Fixed/rigid	Fluid/malleable
Ordered	Chaotic
Inaccessible	Accessible

Figure 8.1: Differentiating encrypted and unencrypted culture

Here we see capitalism and the protection of commodified knowledge, embodied or exemplified in the technological practice of encryption. This is a concrete or material consequence or product of digitalisation and the rise of soft capitalism. Indeed, it is

[27] Pseudorandom 'Mimicking randomness. A deterministic process, which cannot in principle be random, may nevertheless exhibit properties of randomness. It may therefore serve as a surrogate random process, in which case it is called pseudorandom.' (Dictionary of Computing, 2004)
[28] Although it would appear that the file remains in ciphertext (and so remains protected) but is read or interpreted in its plaintext form.
[29] We may understand unencrypted culture to be the other, to be the cultural form that has yet to be encrypted.

interesting that as the possibilities of instant global distribution emerge that the affordances of digital compression technologies also facilitate the restriction of distribution. This highlights a tension between the possibilities of digitalisation and the control of these possibilities. We see this transposed as a tension between encrypted and unencrypted culture and between intended recipients, non-recipients, and, to add a third category, un-intended recipients.

If we accept that contemporary capitalism is defined by the commodification of knowledge and culture, then encryption is an attempt to protect these digitalised commodities by mutating their forms so that they may only be accessed by intended recipients. There are possibilities here for further conceptualising and studying cultural forms in the digital age, particularly if we aim to further consider the question of digital rights management (and possibly cybercrime). Encryption is a resistant boundary fencing off cultural forms from unintended recipients, however, we must also consider the cybercriminal or cyberterrorist's ability to open-up encrypted culture for the 'cybercriminal does not carry a skeleton key, but the encryption devices that unlock the codes of e-commerce, e-politics, and e-culture.' (Sandywell, 2006: 44). The unintended recipient may be understood as the cybercriminal trespassing across or dealing in encrypted culture.

To this end *encryption forms material boundaries demarcating and ordering digital divides*. We are constituted by lines of encryption as intended recipients, non-recipients, or unintended recipients of digitalised culture and knowledge. Each individual is a site of complex imbrications of innumerable combinations of these three categories dependent upon various social, financial, and cultural positionings. Encryption can be thought of as a material structure ordering a 'fragmenting society into wealthy enclaves of the information rich and ghettoes of the information excluded.' (Sandywell, 2006: 55). If social citizenship has, as Burrows and Ellison argue, been recast as engagement (Burrows and Ellison, 2004: 332), then it is possible to think of encryption as an extension of the barriers of access that confront those who have limited opportunities for access to ICTs. For even when access is gained those without capital are unlikely to be 'intended recipients' of digitalised culture and so will solely have limited access to predominantly unencrypted cultural formations (often leading to cybercrime). As such engagement, and therefore citizenship, is limited to, and dependent upon, access to encrypted cultural artefacts and the label of intended recipient.

6. Conclusion

> 'A new generation of computer-literate music fans have grown up who seem to believe that music on the internet is in the public domain and do not understand why on earth music should be paid for'
> (Andy Ross, Managing Director of independent label Boss Music, in BPI, 2005: 33)

> 'Innocent or intentional, illicit downloading represents a kind of global shoplifting spree which no business can sustain.'
> (Lavinia Carey, Director if the British Video Association, in BPI, 2005: 33)

The digitalisation of music and the music downloading phenomenon – specifically music compression formats, internet based distribution, and the openness of MP3 – appears to have created a series of conflicts around the lines or boundaries of ownership, property and access, many of these conflicts remain ongoing[30]. Take for example the ongoing legal battles of P2P technologies and music file-sharing. What is clear is that digitalisation has caused, or is perceived to have caused, problems and unresolved questions around intellectual property rights, digital rights management, and the ownership of music. The reportedly high instances of illegally obtained digital music files indicates that a removal of the necessity for the exchange of a physical cultural artefact has to some degree redefined *theft* as *sharing* in the digital age. Being conservative it can be concluded that theft has at least shifted its definition toward a

[30] It is also worth noting, in terms of future research in this area, that apart from the well publicised issues of music file sharing there are also now further unexplored legal issues emerging concerning the international governance of cyberspace and a series of Russian music download internet sites which offer music downloads at very low prices. These Russian music download sites such as All of MP3 (www.allofMP3.com), RU music club (http://club.mp3search.ru), and MP3 Spy (http://mp3spy.ru/en), may well form the focal point of an international legal conflict over the issue of music ownership, sales, and downloading rights. It has been reported that the International Federation of the Phonographic Industries (IFPI) has concluded that in the case of the site All of MP3, 'the site is unlicensed, but it has escaped prosecution because Russia's copyright laws are so outdated.' (*The Independent*, 2nd of September 2005). It would seem that the boundaries of the nation state still carry some significance in the global economy. This low-cost importation of digital goods is certain to provide future conflicts and instigate legislative reconfigurations.

form of acceptable and open sharing of culture that has the capacity to radically alter appropriation and collecting practices.

It is clear that digital technologies have afforded the illegal appropriation of music on an unprecedented scale. However, to merely assume that this is directly connected with reductions in the sales of other physical music formats is problematic. We now need to build these elements – the redefinition of theft and the causal links between music downloading (particularly illegal file-sharing) and the reduction in music sales – into a broader study of music appropriation practices in the digital age.

In 1996, reflecting on the early stages of the construction of 'cyberspace', Lessig made the following observation:

> 'In its present design, cyberspace is open, and uncontrolled; regulation is achieved through social forces much like the social forms that regulate real space. It is now unzoned: Borders are not boundaries; they divide one system from another just as Pennsylvania is divided from Ohio.'
> (Lessig, 1996: 1408)

Perhaps we are now seeing a shift in 'design' from open to controlled cyberspace zones (combinations of open and closed spaces), that are demarcated by combinations of 'social forces' and material 'boundaries'. Cyberpsace, to use Lessig's terminology, is in the process of being 'zoned' through the rhetoric (social forces) and technological developments (material boundaries) of the music industry. It has taken this period of time, and the perception of significant lost revenues attached to the music downloading phenomenon, to stimulate technological (material boundaries, infrastructures, and forms of surveillance) and rhetorical (cyberpanics, 'aggressive' legal activities, the forging of causal links) responses and reconfigurations.

Indeed, it can be seen from this chapter that the music industry has taken a series of interrelated actions to stem the tide of perceived lost revenues resultant from the music downloading phenomenon, and particularly the disorder and uncontrollable practice of music file-sharing on person-to-person networks. As described here, these can be roughly separated into the categories of *technology* and *rhetoric*[31]. On the side of technology we see attempts to construct internet based infrastructure the affordances of which control the appropriation of music – encryption is the device around which boundaries are maintained – aligned with the development of music downloading stores, such as Apple's www.itunes.com, music subscription sites, such as the legally morphed Napster, and the emergence of new loyalty obtaining software packages such as SnoCap. Related to this technological restructuring we also see the formation of a kind of digital rhetoric that can be argued to legitimise these technological developments, particularly in terms of the efficiency and performance objectives of the technological developments, and to control and order practice (through fear and shame). To refer back to Lyotard and the opening passages of this chapter, this can be understood to be a form of legitimation through performativity (Lyotard, 1999). These technological actions are defined as efficient in capturing revenues and necessary to prevent the ongoing spiralling of immoral activities and the destruction of music and the music industry[32]. We also see this rhetoric legitimising 'aggressive' legal actions taken against file-sharers and file-sharing sites, which, when reported, become a part of the rhetoric and depiction of music downloading and file-sharing. Within the construction of this music downloading 'cyberpanic' (Sandywell, 2006) we see forged a causal link between the rise of music downloading and the reduction in music sales. This reveals the complexity of the interplay within and between these rhetorical and technological constructions and orderings. A

[31] By separating technology and rhetoric here I am not reverting to an instrumental definition of technology (see chapter 4). Rather technology, as practice, discourse/rhetoric, and material artefacts, may be thought of as rubbing against economic, political and legal rhetoric. That is rhetoric that is not necessarily concerned directly with the definition of particularly technologies or with the specifics of how they are used. The separation here between technology and rhetoric is a simplified version of a complex and chaotic set of relations between various rhetorical positions and socio-technological phenomena. This is an attempt to think of technology as occurring and being defined by rhetoric that may not be directly technological. As with Hayles (1999), this is an attempt to think of the social as accompanying and complicating the technological.

[32] These rapidly unfolding conflicts suggest evidence that 'Highly branded and fast-moving consumer goods also share informational qualities in their ephemerality, their quick turnover, immediate impact and quick movement. They too spin out of control of subjects in their movement through global networks.' (Lash, 2002: viii). For Lash the result of this rapid transformational flow of information is that we find the time and space of critical reflection has been 'swallowed up' (Lash, 2002: vii). Indeed, there is literally no time (or space) for reflection or criticism within these constant flows of information. Here the legal conflicts and rapidly growing download figures are almost impossible to gather and reflect upon. As the details gathered here show, and as further details proliferate on these issues, the growth and consequences of music downloading and uploading is dramatic and ongoing. These stories of the digitalisation of music and music culture are complex and in a state of constant flux.

diagrammatical representation of the findings detailed in this chapter is summarised in figure 8.2 (see below).

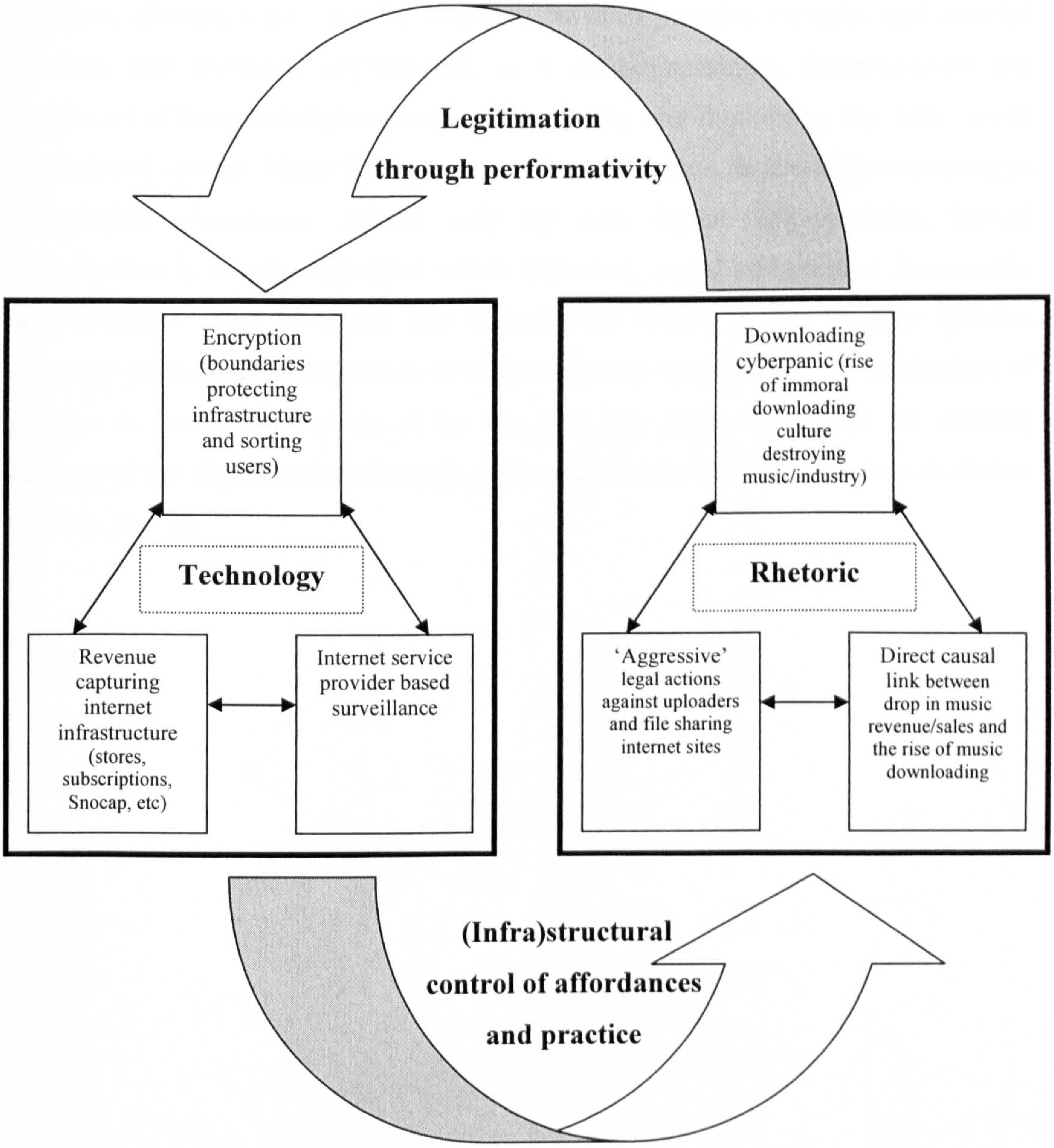

Figure 8.2: A diagrammatical representation of the technological and rhetorical construction and ordering of the music downloading phenomenon

In one sense this model depicts the attempts made by the music industry to protect music as a form of commodified knowledge. These interrelated technological and rhetorical formulations constitute complex constellations of understandings and material boundaries that act to construct, organise and order the appropriation of music in the digital age.

This model, as with the previous discussions of the zones of music production and the reconfiguration of music reproduction through the incorporation of the MP3 player interface, illustrates the complex interplay between practice, rhetoric, and material artefacts that constitute digitalisation as a multidimensional, heterogeneous and mobile set of interrelated phenomena implicated by and implicating the wider social and cultural context. These findings suggest that rather than digitalisation occurring as a technical phenomena defined only by new digital functionalities, instead digitalisation is deeply embedded within historical, social and cultural frameworks and structures. This is to say that digitalisation occurs in the tensions between everyday practice, the affordances of digital material artefacts, and the projections of practice in the digital rhetoric of the age. It is this issue, along with the defining features of the digitalisation of music and music culture, that I will explore in further detail in Part III.

Part III: Conclusion: findings and futures

Abstract

Part III, 'findings and futures', draws together the analyses and illustrations from Part II to inform a central argument and to suggest possible future pathways for further research and investigation. It begins, in chapter 9, by identifying the central argument of the thesis and then by highlighting the three defining features of the digitalisation of music and music culture. Finally, in chapter 10, I close the thesis by identifying and describing a range of possible theoretical directions that may be useful for further investigations into digitalisation and, more specifically, the digitalisation of music and music culture.

Chapter 9: Findings: the defining features of digitalisation

Chapter contents

1. Introduction: findings and central argument

To introduce this conclusion I would like to begin by clearly stating, in general terms, the findings of this thesis. A brief list outlining the findings of this thesis would include the following:

i. Digitalisation is a complex and ongoing social process.
ii. Digitalisation is *not* a complete movement from an analogue to a digital era.
iii. Digitalisation is constructed in the interplay between material artefacts, rhetoric/discourse, and everyday practices.
iv. Digitalisation affords a range of reconfigurations and recontextualisations.
v. Miniaturisation, non-linearity, and cultural archiving are prominent defining features of digitalisation.

The history and case studies in Part II of this thesis illustrate that digitalisation, the appropriation of digital technologies in everyday practices, should not be thought of as complete or discrete movement from an analogue to a digital era. Nor, despite the two ages of digitalisation identified in chapter 5, have we made a complete movement between a first and second age of digitalisation. Digitalisation is not a homogenous displacement of the new in place of the old, of the digital superseding the analogue, or of the movement from physical to virtual spaces and artefacts. Rather digitalisation represents a heterogeneous and complex interweaving of the old and new, the analogue and digital, and the virtual and physical, in the routines and mundane practices of everyday life.

Digitalisation leads to new incompatibilities, inconsistencies, and systems problems – defined here as *digital clicks*[1] (chapter 6) – as well as new possibilities, interactivities, and connections. This thesis illustrates that digitalisation is both a complex and ongoing social process. This approach to digitalisation rejects the utopian or futurist notion of the digital eclipsing the analogue, or of the perfect compatibility and

[1] It is possible to imagine a sociology of digital clicks that asks the question of how and in what way digital inconsistencies and incompatibilities impinge upon social and cultural processes.

functionality of digital technologies, and instead draws attention to the issues of financial and technical affordance, nostalgia, warmth, tactility, familiarity, materiality, spatiality, embedded understandings, and everyday mundane practice. It is therefore problematic or perhaps premature to argue simply that 'everyone is deserting analog machines in favour of discrete ones' (Kittler, 1999: 19). Rather the analogue and the digital – as well as the first and second ages of digitalisation – implicate each other. Indeed, the analogue and digital implicate each other in two distinct ways. First, we see evidence of remediation in the emergence of digitalised versions of analogue technologies. This process is highlighted most clearly in chapter 6 with recording studio software creating virtual representations of analogue mixing desks and tape recorders. Second, we see a more material mixing of old and new technologies, where digital and analogue technologies operate together in everyday practices and in populating everyday spaces, the recording studio is a particularly good example of this (see chapter 6).

We see from these findings that digitalisation, as Sassen argues (2002; chapter 2), is not about digital technologies as distinct from the social and cultural. Digitalisation is instead an ongoing social process embedded in organisational, community, and economic structures. Digitalisation is not, at least in this instance, a pursuit of technical progression and progress, it both constitutes and is constituted by wider social and cultural phenomena. In terms of the findings of the individual case studies this digital embeddedness is illustrated by the ways in which the environmental and organisational aspects of the recording studio impinge upon musical practices and the appropriation of digital music production technologies, by the reconstruction, redefinition, and reconfiguration of musical artefacts in the MP3 player advertising and marketing rhetoric, and by the corporate or industry led organisation and ordering of music downloading. All of these examples illustrate the embeddedness of digitalisation in its social and cultural context.

Digitalisation then is not just a technical phenomenon. Rather it is a social and cultural phenomenon constituted within, or constructed by, a complex interplay of digitalised rhetoric, digitalised material artefacts, and digitalised practices. Take for example the complex construction of music downloading, the reconfiguration of the music collection, or the projection of home studio software packaging as examples of this interplay between artefacts, rhetoric, and practice. This is not a case of rhetoric, such as advertising or marketing imagery, determining practice or the appropriation of technologies. This is a chaotic and unpredictable process with various unforeseeable outcomes requiring accounts and images of everyday spaces and routines. The concrete outcomes of these interplays between rhetoric, practice and material artefacts may be understood as the zoning of music production (chapter 6), the reconfiguration and recontextualisation of music reproduction (chapter 7), and the construction and ordering of musical appropriation (chapter 8). Each of which illustrate the material instantiations that constitute digitalisation as a material cultural process and look beyond digitalisation as an entirely technological phenomenon.

This thesis reveals that these interplays afford a series of reconfigurations and recontextualisations. A brief summary of some of the various reconfigurations and recontextualisations identified in this thesis are detailed in the table below (figure 9.1).

Spheres of music culture	Reconfigurations	Recontextualisations
Production	The practices of sound production, processing, and editing through virtual and non-linear digital systems. The movement toward virtual studio software rather than physical mixing desks.	The rise of the home recording studio. The movement of the functionalities of the recording studio from professional to domestic spaces. The increase in access to software based virtual recording studio software packages.
Reproduction	The rise of digital music compression formats reconfiguring the physical properties of musical artefacts and the music collection. The transformation of the relations between body, culture, and space.	Extending the work of the personal stereo, the MP3 player enables large quantities of music to be carried and accessed across everyday spaces. The private music collection moving out into public spaces through the mobile interface or portal.
Appropriation	The redefinition of theft as sharing. The movement toward internet based music appropriation.	Instant global re-distributions of compressed music files across decentralised media networks.

Figure 9.1: A brief overview of the reconfigurations and recontextualisations identified in this thesis.

Despite the complexity and dynamism of these reconfigurations and recontextualsiation it is possible to identify unifying properties that may be understood as the defining features of the digitalisation of music and music culture. Three of the most prominent of these defining features are *miniaturisation,* the compression and increased mobility of cultural forms, *non-linearity,* the development of systems for cultural production and reproduction that afford the removal of boundaries of linearity, and *cultural archiving,* the storage and retrieval of digitalised libraries of cultural artefacts accessed through various interfaces or portals. These features are emergent, mobile, and fragmented, and as such are open to rapid and radical reformulation. Digitalisation is not a fixed term with stable properties, its defining properties, as highlighted below, are open to reworking as the implications of digital technologies continue to unfold. Digitalisation in this sense may be thought of in terms of the dominant rhetoric of social theory in the sense that it is fluid, liquid, and defined by a complexity of interdependent cultural and technological flows.

I will conclude the findings of this thesis by looking in greater detail at each of these three emergent and defining features of the digitalisation of music and music culture.

2. Defining feature I: miniaturisation/miniaturization

It is clear that technologies, and particular mobile ICTs, are being 'miniaturised', 'shrinking', or 'downsized' (Mitchell, 2002). Consider for example the dramatic and rapid reduction in size of mobile telephones over recent years, or, in the case of music technologies, the shrinkage of mobile music reproduction devices (see chapter 7). However, miniaturisation is not just about technologies 'getting smaller' (Branwyn in Burrows, 1995: 3). As this thesis illustrates, various forms of miniaturisation are occurring. As well as the reduction in size and weight of various music technologies, which is most clearly illustrated by the movement from synthesizers, such as the 1955 RCA synthesizer, that filled entire rooms, to mobile synthesizers, such as the MiniMoog of the 1970s, to the virtual synthesizers described in chapter 5. This represents a general movement from 'heavy' to 'light' technological and cultural formations (Bauman, 2000). Miniaturisation is to *make light of culture*, to reduce mass and thus render mobile. In addition to this material shrinkage of technologies we also see two further forms of miniaturisation: *compression* and *convergence*.

Compression is a digital process in which information is reduced in size to enable its storage and transfer. MP3 is the most notable of the digital music compression formats. However, we may also think of the compression of the recording studio into the virtual home recording studio software package. Here the complex materialities of the recording studio technosystem are compressed onto the CD and installed into new spaces creating zones of music production. Indeed, all of the digitalised phenomena described in Part II of this thesis indicate a movement toward miniaturisation in the form of digital compression reducing the size of their informational-material properties – take for instance the virtualisation of the recording studio (chapter 6), the reduction in size of digital music files through MP3 compression (chapter 7), and the internet transfer of these downsized artefacts (chapter 8).

The second issue of convergence has not been explicitly covered in any great length in this thesis, however, it can be seen that with integrated home recording studio software packages converging a variety of music production technologies into one interface, and the convergence of mobile telephone and MP3 technologies, that convergence is a key feature of the digitalisation of music and music culture. For example, Thrift notes that an:

> 'example of nascent local intelligence is provided by wearable computing which has begun to develop strongly in the last five years as a means of providing computing that is always ready and available by virtue of being present in items of clothing...Though commercial wearables will at first consist of...little more than bulky multipocketed jackets able to contain various pieces of electronic kit, the future might be very different,'
> (Thrift, 2005: 162)

Reflecting the MP3s convergence with sunglasses (see chapter 7), these 'cyberjackets' and other 'smart clothing' will undoubtedly contain some form of integrated MP3 player opening up music to the mobilities of 'wearables'. Furthermore, more 'recently it has become possible to create computationally active textiles which are able to weave circuit substances into cloth' (Thirft, 2005: 162), thus further miniaturizing and mobilising various ICTs as they become a part of the fabric of our environment.

From this it would seem that in general terms it is possible to think of digitalisation as an ongoing process of the miniaturisation of technologies, of information, and of culture, a process that might be thought of as compressing not only time and space but cultural artefacts and practices. It is perhaps possible to proceed by thinking of cultural artefacts as compressed or miniaturized as they are stored, in turn, in greater quantities upon devices which are themselves getting smaller.

The illustrations in Part II of this thesis indicate that digital miniaturisation creates or affords a range of mobilities or mobility types. It is clear that as cultural artefacts get smaller they become more mobile. It is possible to separate these mobilities into three distinct mobility types: *spatial mobility*, *transferability*, and *reformulation.*

Spatial mobility is the movement of music collecting and reproduction practices across and through various spaces. As music moves first from a physical to a virtualised digital format, and is compressed to reduce the size of these files, music may be stored in ever-greater quantities. As such music may be carried in greater volumes (see chapter 7) around public spaces. These digital music reproduction devices or portals, such as the MP3 player, are 'eminently portable' (Haraway, 1991: 153). Miniaturisation in these terms enables archives of music to be mobilised around everyday spaces. Compression as such is a process of *music-made-light.*

Transferability is the movement of music around globalised networks of information and communication technologies. Here miniaturisation in the form of digital compression of music files affords the transfer of music across the internet, thus enabling the music downloading phenomenon described in chapter 8. It is the reduction in the size of the digital music file that has enabled this to occur rapidly. Simply even large digital files are problematic to store and transfer, it is the movement toward compressed cultural artefacts that enables the cultural flows of digitalisation, or of the digital or information age.

Finally, reformulation, which, although not as directly related to miniaturisation, is a consequence of the miniaturisation of recording studio processing technologies into virtual formats and the digitalisation of the music file. This form of mobility enables music to be manipulated, transformed, altered after the point of recording. In this sense music as a material cultural artefact has mobile properties and boundaries, it is not a fixed or rigid artefact. Remixing is a good example of this mobile form of the 'original' that may be reformulated and its individual constituent parts isolated and altered. We also see now the emergence of technologies such as Autotune that allow sections of recorded music to be re-tuned, this is a virtual movement of the original as digitalised code from one point to another thus altering the output. Perhaps most significant here is the software plugin described in chapter 6 which may distort, transform or mutate the mobile original into new unrecognisable forms.

In terms of sociological concerns what are the implications of miniaturisation, and particularly the miniaturisation of culture? Exactly how has 'miniaturization...changed our experience of mechanism' (Haraway, 1991: 153)? Has 'Miniaturization...turned out to be about power' (Haraway, 1991: 153)? These are illuminating questions that ground miniaturisation in questions of power structures, exclusion, and social division, thus realigning the imagery of miniaturisation from the ever more convenient vision of advertising rhetoric to the sociological concerns of social implication. This is to shift the analysis away from its definition by powerful marketing agendas of convenience and the shared conquering of time and space in a hyperbole of leisure time and cultural engagements, toward issues of what Haraway described as the 'informatics of domination' (Haraway, 1991). It is clear that as technologies become miniaturised they become rapidly normalised or naturalised into everyday routine, this is illustrated by the rapid uptake of MP3 players discussed in chapter 7. As these technologies become a part of the everyday it is worth now considering how the power structures of which they are apart impinge upon our bodies, practices, and understandings. It is perhaps these questions that need to be considered within future research. One possibility here would be, for example, to consider the ways in which the mobility afforded by the MP3 player, as an extension of the properties afforded by the personal stereo, enables a form of social withdrawal. This would be to investigate how the 'management' of the soundscape (Bull, 2000), impinges upon social or communicative spaces as people withdraw themselves from these interconnectivities as they move around urban environments.

3. Defining feature II: non-linearity

The digitalised technosystems described in this thesis may be described as deeply complex. Non-linearity is often understood as a central property of these types of digitalised complex systems (see Lash, 2002: Urry, 2003; Hayles, 2005a). Non-linear systems are often understood as unpredictable in that they 'exhibit nonlinear behaviours that typically cannot be described by equations having explicit solutions' (Hayles, 2005: 5). What Lash describes as 'technological forms of life' are, therefore, non linear, that is they are 'less linear than 'mosaic'.' (Lash, 2002: 21). These mosaic forms are formed in 'patched' (see chapter 5) together interactions that form multidimensional structures of interdependent systems and interactional constellations.

For Lash, 'communications are increasingly [occurring] via non-linear and discontinuous 'ports'.' (Lash, 2002: 20). It is the movement between these ports that is non-linear, to 'move from port to port is to move, not in a straight line but to hop about, to move discontinuously.' (Lash, 2002: 20). Clearly the examples of the digitalisation of music and music culture in this thesis, and particularly those described in relation to music downloading in chapter 8, support Poster's (1996) vision of a 'second media age' of non-linear and decentralised distribution networks or broadcast models (see chapter 2). Music file-sharing is a clear example of such a network of discontinuous distribution, which, rather than the movement of information from the few to the many, is based on multidirectional and interactive communications and distributions. In this instance legal conflicts then result from this multidirectional and un-regulated cultural sharing and, as Poster predicted, this shift appears to have problematised cultural ownership. Non-linearity, however, has penetrated far beyond models of distribution and into everyday practices. So although non-linear forms of communication are prominent with implications for music culture, non-linearity has greater scope than this abstraction would suggest. Indeed, non-linearity is not just a process of networked and interactive communications, non-linearity is a digitalised lifestyle choice, a way in which to produce and reproduce culture.

As this suggests, non-linearity is often used to understand chaotic global communications systems (Urry, 2003; Lash, 2002), however, in the examples described in this thesis we can see that the *non-linear potentialities* of digital technologies come to be concretised in everyday practices. For this reason I take non-linearity here as a form of everyday practice that is an extension, concretisation, or ordinary realisation of the global complexity context (Urry, 2003). Rather than non-linearity being used to describe unpredictable emergence, global chaos, or models of distribution, it is non-linearity that is itself unpredictably emerging as a way of producing and reproducing cultural forms. Non-linearity itself is emerging as a non-linear cultural turn. This everyday and technologically afforded non-linearity is perhaps a microcosm of global complexity and chaos (Urry, 2003).

What, then, are these everyday non-linearities? The most prominent that arise in this study are non-linear forms of music editing (production) and non-linear forms of music reproduction. Beginning with the former, chapter 6 describes non-linear editing, which is identified by the music technicians interviewed as a key transformation in music production (technologies and practices). This digital form of editing allows the editing process to be completed through non-linear channels or tracks of music. Each element may be individually accessed, copied, transferred, manipulated, etc. This process replicates the cut-and-pasting practices to which we have become accustomed in our use of computer word processing packages and the internet. In terms of non-linear reproduction, chapter 7 describes systems for accessing music that in some instances are randomised, with devices selecting songs at random from across entire archives, or by selecting individual tracks from across archives, both of which are non-linear in that they transcend the boundaries of linearity. Reproduction is activated here across these archives rather than being limited to the boundaries of conventional albums or linearity of what Adorno calls the 'scriptal spiral' (see chapter 7), the linear etching of the music onto the disk. Mobile music reproduction devices, such as MP3 players, afford rapid selections of musical tracks, through various controllers. This scrolling and selection process may be thought of as a material instantiation of wider non-linear systems.

Having said this, it is non-linear and decentralised systems of music file-sharing that is perhaps the clearest example of non-linear digital systems impinging upon everyday music practices. Yet it is also possible to see non-linearity impinging upon everyday production and reproduction practices. It is in this non-linearity in the everyday that we see played out wider issues of discontinuity, complexity, and the recontextualisation of cultural production and reproduction. In other words, by focusing in upon everyday musical practices it is possible to locate material or concrete examples of the implications of wider social and cultural phenomena such as non-linearity.

4. Defining feature III: cultural archiving (and retrieval)

According to Abdelmajid Hammoum:

> 'To say archive is to refer not only to the masses of witnessing, but also to a place, a physical and social space. The place is where both the inclusion and exclusion of discourses happen that provide the framework for the historiographic operation. This is the domain not of history or historiography, but rather of a distinct discipline called *archiving*.'
> (Hannoum, 2005: 128)

For Hammoum, archiving is distinct from history. Archiving is a process of accumulation, typified for Featherstone (2000) by Benjamin's (2002) accumulation of Paris arcades ephemera during the 1930s, whereas history is more selective, it chooses and privileges selected memories over others. Archives are open to being searched through attendant cataloguing systems, where possible, and 'are made of a multiplicity of sources, voices. One could borrow the expression of Bakhtin and say they are polyphonic.' (Hannoum, 2005: 128). The pursuit of the *library of voices or sounds* described in the history of synthesis in chapter 5, continued in the accounts of the contemporary recording studio described in chapter 6, may be thought of, appropriately enough, as a *polyphonic archive*.

As I have described, cultural archiving, in its digitalised form, is a product of miniaturisation facilitating particular forms of storage and retrieval. Of course the archiving of culture is nothing new. However, as Part II illustrates, everyday practices are embedded within archives from which items are selected from catalogued menus[2]. Take for instance the MP3 player as containing a selected and stored archive of music, or the product of communal archives of music taken from file-sharing networks like Limewire or Kazaa. These archives 'facilitate...multiple entry points and non-linear associational jumps across the material' (Featherstone, 2000: 173). These digitalised music archives are then non-linear and non-hierarchical in form, a product of hypertext. This is not to say that they are neutral to power structures but that pathways through these archives need not follow order but can jump between and across pathways and categories.

On the issue of hypertext Featherstone argues:

> 'A key aspect of the electronic search and research process is the use of hypertext. In contrast to the ideal of memory as a store into which one descends to pull things out, hypertext works on a less hierarchical more lateral view of knowledge as the links between data.'
> (Featherstone, 2000: 175)

Again this image of hypertextual and non-linear archiving resonates with file-sharing networking, a hypertext archive constructed through a community of archivers or archives, that is both non-linear and non-hierarchical.

Here cultural archiving is used to represent the construction of often virtualised cultural repositories that may be accessed and searched through database led technology or by moving between hypertextual linkages. Digitalisation is then defined by the processes of archiving and retrieval, a product of miniaturisation and non-linear technologies, that has taken the 'route of data storage and accessibility, and the operativity of information.' (Lyotard, 1999: 47). This *operativity of information*,

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[2] Featherstone points out that to 'carry out research in the archive one needs to make a catalogue, a system of classifying the data or materials which has some ordering function and helps us deal with the problems of selectivity and navigation' (Featherstone, 2000: 174)

embodied in the activities of archiving and retrieval, is a process that is prominent in music production, reproduction and appropriation. From the libraries of sounds in music production practices, embodied in the use of recorded sounds in music production, or the mobile retrieval and reproduction of music through MP3 player interfaces, the archiving of cultural is a process that defines digitalised practices. The pursuit of increasing memory capacity for sampling technologies, described in chapter 5, and the development of increasing memory capacities for MP3 players described in chapter 7, are consequences of this process. Memory affords greater cultural archives to be constructed; it is the space in which virtual storage occurs[3]. The greater the memory the greater the database, library, or polyphonic archive. Featherstone argued in 2000 that we were 'faced by the digitalisation of culture' which 'promises enormous gains in the speed and mobility of access to information' (Featherstone, 2000: 166). This image of cultural speeding-up, and more significantly, the mobilising of culture through digital archives, appears to be in keeping with the findings of this thesis[4].

Indeed, attached to the issue of archiving is a range of highly significant questions concerning collective memory, storage, access, historiography, cataloguing, selection, etc. These questions directly associate the archive with questions of power and domination, as well as decisions about what knowledge is and who owns it (Lyotard, 1999). The archives and archiving detailed here also open up questions about what archives are, who constructs them and where and what they store. These questions define what might be thought of as the 'architecture of the archive' (Featherstone, 2000: 165). On this issue it is even possible to think of *cities* and *human bodies* as forms of archives (Featherstone, 2000) in that these have histories etched upon them, they are types of 'cultural repository' (Featherstone, 2000: 163). The accumulation of cultural repositories, and the 'drive towards empowerment through miniaturization' (Featherstone, 2000: 165; see also Hand 2005), leads to 'a city of data...of vast

[3] Although I find it hard to find any support here for Kittler's contention that 'Once storage media can accommodate optical and acoustic data, human memory capacity is bound to dwindle.' (Kittler, 1999: 10)

[4] Featherstone also asks 'who will archive cultures in the future – the state, or the corporations, or the public?' (Featherstone, 2000: 167). The examples in this thesis would suggest that a combination of these is most probable, particularly with the continued practices of music file sharing as an example of the public building up shared archives of music, alongside the more ordered systems of the music industry and retailers.

databases containing all culture's deposited wealth, where every document is potentially available, every recording playable and every picture viewable.' (Featherstone, 2000: 165-166). However, within this are 'electronically protected no-go areas' (Featherstone, 2000: 166) determining access and restricting movements through the identification of intended and unintended recipients (see chapter 8). Again we are returned to the polarity of utopian and dystopian images of the democratising and de-democratising potentials of the internet (Hand & Sandywell, 2002), this time played out on the issue of access. It is possible that the musical archive, stored upon the MP3 player for example, may even be used in future as a research tool. For these archives represent issues of access, choice, taste, identity, and, perhaps most importantly, may be thought of as material instantiations of the processes of globalisation.

It is highlighted in this thesis that these cultural repositories far 'transcend the capacity of each of their users.' (Lyotard, 1999: 51). Take for example music file-sharing networks that operate around collective archives of music that are constituted by the collections of each networked member of the community. Clearly these are archives of units that exceed each users own collection but that may be accessed to transfer-in, or download, any piece of music hosted by the network. Furthermore, the previous chapters indicate that cultural archives, or libraries of sounds, are deeply embedded in everyday practices and as such may be described as '"nature" for the postmodern man.' (Lyotard, 1999: 51). Or, rather, nature for the digitalised human. Take for instance the recording practices described in chapter 6 in which the technicians' accounts describe processes of accumulation of sampled sounds taken from recorded sounds and from the recording of 'natural' sounds. Or the systems of retrieval of music from music downloading sites or mobile music reproduction devices. Both of which may be understood as portals or interfaces into archives or libraries of sounds from which tracks are accessed and reproduced.

With digitalisation and its defining feature of cultural archiving, the saliency of systems of retrieval and accessibility become increasingly salient. For this reason I highlight here the importance of interfaces (see chapters 2 and 4) and interfacing as areas for further investigation. Within this the notion of searching (as a non-linear practice), search criteria, and (dropdown) menus become important forms or parts of cultural engagement. With archiving comes the issue of cataloguing culture, in this case music culture is associated with bibliometrics. Systems for *finding* cultural artefacts are an important part of practice. This may open up avenues for the study of the organisation or everyday musical practices and the ways in which power structures impinge upon archiving and access (Lyotard, 1999), upon who can find culture and how. Particularly if we consider that archiving and archives, in content, form and retrieval systems, may impinge directly upon or constitute identity (Poster, 1996), space and place (Burrows et.al., 2005) and the body (Featherstone, 2000).

A final point to consider with regard to the archiving of culture is how these archives are associated with memory, which 'has been the object of an abundant literature in the last three decades.' (Hannoum, 2005: 123). In addition to the use of music to reflexively stimulate memories (DeNora, 2004), a practice that occurs through the retrieval of music via various musical archives or collections of artefacts, we may also think of the question of how the content of and access to archives may rebound upon memory and consciousness. As Kittler argues, with the rise of recording technologies of various types 'cultures have become reconstructable' (Kittler, 1999: 7) to a far greater degree. We may recall particular 'memories' from these recorded archives to reveal or reconstruct something of the past. However, in the case of memory, and cultural archiving in general, it is perhaps the everyday aspects or retrieval and cultural memory that are of most interest. It is possible, as Featherstone argues, to open up conceptions of archiving:

> 'Rather than see the archive as a specific place in which we deposit records, documents, photographs, film, video and all the minutiae on which culture is inscribed, should the walls of the archive be extended and placed around the everyday world?'
> (Featherstone, 2000: 170)

The archive need not take on the ordered and formalised properties of a library, consider for instance the disordered archiving of the music file-sharing network[5], but rather that the archive may be a part of the everyday world, embedded in the time and

[5] Where the same song may be found several times with slight variations on the title.

space of everyday life. The buildings around us, our bodies, as well as our culture are all archives of the past, but that now these archives are also systematised – searchable, accessible, standardised – by digitalisation. Archives themselves become a part of everyday cultural access and engagement. MP3 players are just one amongst a number of such archive and retrieval based digital devices. As such these archives are apart of the everyday world and are transforming it from within. Cultural archives are not housed in buildings such as libraries and museums, they are a part of the material aspects of our everyday worlds in the sense that they are inscribed upon our bodies and environments and are also accessed via portals in our pockets, in our homes, at our workplaces, in our cars and bags.

The point here is that digitalisation has seen a significant shift in forms of cultural archiving, toward non-linear and non-hierarchical forms of searchable archive, constructed by various agents and organisations, which may be accessed via mobile portals. If, as Featherstone claims:

> 'Shifts in archival technology do not merely change the form within which culture is recorded, but very much influence the future content of the archive by changing the conditions under which culture is produced and enacted.' (Featherstone, 2000: 180)

then the question that this opens up for future consideration concerns exactly how the movement toward these types of cultural archive have impinged on cultural production, reproduction and appropriation, and with what consequence for places, identities, and bodies. We see already that music is being produced through archival technologies, in the form of accumulated libraries of sampled recordings (see chapter 6). We also see that culture is enacted across different spaces in different ways through its compression into MP3 (see chapter 7) and that the construction of communal archiving in the form of file-sharing has drawn upon the non-linear digital archive to facilitate large scale music theft (chapter 8)[6]. The question now is how exactly these archives constitute and are constituted by digitalised practices, and how these archives may be reconstituted through sociological research to capture the

[6] There are further questions, for example how is music designed for the MP3 or the polyphonic mobile telephone ringtone?

implications and properties of wider social and cultural systems, structures, and transformations.

5. On the fluidity, liquidity, and flows of music culture

Of course the defining features highlighted above are interconnected, for example cultural archiving and non-linear practices are not possible without miniaturisation, and cultural archiving is not possible, in the form described, without non-linear systems. It is also clear that these three defining features do not represent the limit of the implications of digitalisation: accessibility, complexity, democratisation, non-destructive originals, remixing, could all have been explored as defining features or themes of digitalisation. This is to say that although miniaturisation, non-linearity, and cultural archiving are identified here this is not to say that these are the sole defining properties of digitalisation or that these are fixed properties closed off from reformulation.

At the opening of this thesis, in my discussion of contemporary social theory's attempts to describe the digital age, I identified a dominant metaphor in the literature, namely the fluid/liquid/flows metaphor. It would seem from these findings that, afforded by the pursuit of miniaturised and non-linear practices and technologies, the digitalisation of music and music culture demonstrates the 'liquid' properties of 'lightness', 'mobility and inconsistency' (Bauman, 2000: 2). As such we can perhaps describe contemporary music and music culture as liquid. Furthermore, we see that music and music culture, 'cannot easily hold their shape' (Bauman, 2000: 2) as digitalisation reconfigures and recontextualises various aspects of music production, reproduction and appropriation. In this sense it would appear that the liquid, fluid, flows metaphor is indeed an appropriate one for describing the phenomena outlined in this thesis. However, the problem here is one of accuracy. To adopt the liquid metaphor is to move out from the exact terminology or processes of digitalisation to reach an approximation of vast and complex practices and process. The problem is not so much that talking of music culture as liquid is too abstract or that it is axiomatic, it is rather to say that it removes some of the essence or material detail of digitalisation.

For example, if we take the process of compression as a case in question, then compression, as a material process of miniaturisation, is not in itself a property of liquids as described by Bauman (2000). So to describe this in these terms loses some sense of the materiality of compression as a process of digitalisation. I would argue, therefore, that it may be better to conceptualise these digitalised cultural phenomenon in terms of these material processes, such as compression, encryption (see chapter 8), archiving, editing, remixing, and to use these material process as concepts in themselves. We can talk therefore of the remixing of culture, the encryption of culture, the compression of culture, etc. By utilising these material processes and transforming them into concepts social theory may be attached more closely to material processes and practices. As such the dominant metaphor of liquidity, fluidity, and flows is useful in capturing complex sets of digitalised techno-cultural processes and practices but that these may be thought of as conceptual repositories or reservoirs constituted or filled by a range of concepts constructed through the identification of interrelated material phenomenon. For example, it is possible to work out from issues such as inconsistency and unpredictability toward there material instantiation, take for instance the discussion of *digital clicks* in chapter 6. This then grounds the fluid or liquid metaphor in material processes and reveals new concepts based upon the materiality of everyday practices. This is to interrogate the properties of liquids, fluids and flows and to attach these properties to specific material processes and practices, creating new concepts and angles for investigation. The challenge is to look beyond or inside these dominant metaphors and to identify and conceptualise these constituent material properties of digitalisation – a sociology of digital clicks, for example. I hope that this thesis makes some contribution to this project.

6. Conclusion: digital terminology?

To reiterate, this study is intended to form a part of an emergent body of literature on what I have labelled the digitalisation of music and music culture[7]. As such its findings are intended to create possibilities for future developments rather

[7] Music technology is an area of investigation that has still received little attention from sociologists. Indeed, much of the literature used to inform this thesis, and particularly the literature review in chapter 3, was written by academics who are not recognised as sociologists. The rise of *cultural informatics* (see chapter 1) presents an opportunity for prolonged sociological investigations of the implications of new and emergent digital music technologies.

representing concrete and definitive statements about digitalisation. One of the key problems here is the terminology used to describe these processes. For instance, the problem with the term digitalisation is what it suggests, its discursive baggage. Digitalisation as a term implies transition and the movement between two distinguishable eras – the opposite in fact to the findings of this thesis. It also suggests that we may easily identify cultures, technologies, and spaces that have been digitalised. This is not always as straightforward as might be imagined. Take for example the similarity in the appearance of the analogue and digital mixing desks pictured in chapter 6.

If we choose to continue with digitalisation as an analytical category, term, or as a concept used to represent a particular ongoing social transition, then a reflexive and critical approach is paramount in order to avoid the trap of unguarded utopianism (or even dystopianism) (see Thrift, 2004; Hand & Sandywell, 2002). It is also expected that over the coming years that digital technologies will become further embedded in mundane routine so as to become invisible (Galloway, 2004; see also my argument in chapter 7). The question then is can digitalisation as a concept be of any use in illuminating or making visible these concealed technologies, systems and structures? Can study of digitalisation create opportunities to address major sociological questions around social exclusion, control, identity formation, gender, etc, or will a focus upon digitalisation act to further conceal these issues in the seductive gloss of user-friendliness and digital empowerment. The problem with digitalisation as a point of focus is that it may distract the analyst from the bigger questions to which sociology must attend (see Eagleton, 2004; Webster, 2005). It seems that it is the possible usefulness of digitalisation in opening up sociological questions that is the question that requires attention. It is possible that by aligning the study of digitalisation with the study of capitalism (see Thrift, 2005; Burrows, 2005) that the chances of opening up new perspectives on key sociological questions are optimised. If we consider digitalisation to be constituted by material artefacts, rhetoric, and practice, then it is at this intersection that we see capitalism creating theories of itself (Thrift, 2005), that power (Sassen, 1999), dominance (Haraway, 1991), and division (Nettleton, et.al., 2004) are played out, that agendas are set, that digital technologies are marketed, that systems of social and technological control are formulated. These then are the questions that need further consideration with regard to the study of digitalisation.

What is perhaps the greatest problem facing research in this area is how to perform sociological investigations of digitalisation, or how to move from technical to sociological questions.

Indeed, in light of the findings outlined above, what is now needed is further detail and greater scope[8]. To keep up with the issues of functionality but to further embed digitalisation and the digitalisation of music and music culture in the broader questions of globalisation on one hand, and the intricacies of everyday life on the other. This requires research programmes that enable aspects of digitalisation to be studied on local and wider scales as both local and global, that develop further the questions of technical details and local appropriations within broader social and cultural contexts. Informed by the analytical problematic of digitalisation outlined at the opening of this thesis, and the findings of this thesis, what is now needed is an ongoing research programme that studies digitalisation across various contexts.

I will now conclude, in the following chapter, by exploring a range of possible opportunities for the future development of research into digitalisation and, more specifically, into the digitalisation of music and music culture.

[8] Clearly further interviews and observations are needed to enhance and support the findings of this research.

Chapter 10: Futures: alternative theoretical possibilities for future research into the digitalisation of music and music culture

Chapter contents

1. Introduction: the future?

It is clear that the remit of this research only allows for a restricted range of investigations into what are vast and wide ranging technological and cultural phenomena. Here I have taken only one particular route by focusing upon the digitalisation of music and music culture. Its seems pertinent in this instance, considering again the emergent state of the (study of the) digitalisation of music and music culture, to pose the question of future research and in particular which theoretical approaches and perspectives may offer opportunities for further research in light of the findings detailed in the previous chapter. These directions, considering the recontextualsing effects of digital technologies, should be geared toward capturing digitalisation across various contexts. To this end I will close by briefly considering five of the many possible theoretical directions that may prove fruitful for these future investigations into digitalisation and particularly into the digitalisation of music and music culture.

The directions highlighted below are as follows: *cosmopolitan sociology*; *the study of everyday life*; *complexity theory*; *spatial informatics*; and *posthumanism*[9]. This theoretical overview of potential areas for development aims to introduce new possibilities whilst also building upon themes and issues that emerge from the previous chapters. The aim of which is to begin to sketch out new possibilities for developing and enriching research into digitalisation that addresses the requirements and properties of digitalisation outlined in the previous chapter.

One of the central problems with this thesis is that in adopting an information materialist approach it does not really get at key sociological questions, issues of engagement, citizenship, globalisation, exclusion, division, etc, tend to be sidestepped

[9] As a further suggestion Nigel Thrift's non-representational theory may now illuminate new possibilities for study. Toward the end of 2006 Thrift's book on this subject, *Non-Representational Theories*, will be published by Routledge, this is likely to present a number of opportunities for extending the project of the study of the digitalisation of music and music culture. Thrift describes non-representational theory in the following terms: 'In particular non-representational theory is concerned with attempting to hone existing practices and invent new ones that can provide performative counters to the prevailing notions of what constitutes knowledge and creativity, how the world is being commodified in new ways, and the increasingly fine macerations of space and time that both allow these developments to take place and spur them on.' (Thrift, 2005: 10). This may be seen as an extension or broadening out of the spatial turn described below.

in favour of technical detail. With this criticism in mind, the theories outlined below all offer opportunities for more sociologically orientated investigations of digitalisation. These then illustrate possibilities for a more sociological informed and critical research programme or programmes that reveal the extent of the implications of digitalisation and the details of its social and cultural 'embeddedness' (Sassen, 2002).

2. Cosmopolitan sociology

Central to what might be called the 'cosmopolitan turn' (Gane, 2004), the cosmopolitanism 'revolution' (Beck, 2002), or the 'revival of interest in cosmopolitanism' (Featherstone, 2002b: 1; see also Savage et.al., 2005: 181-202) is the work of Ulrich Beck (Beck, 2000; 2002; and 2006). Beck's work has come to inform a range of fragmented approaches to, and perspectives on, cosmopolitanism and globalisation (Featherstone, 2002a; Savage et.al., 2005). Cosmopolitanism as a version of globalisation theory is founded centrally upon what might be called global mobilities (Brennan, 1997; Beck, 2000; Urry, 2003). However, Beck argues that globalisation 'happens not out there but in here. It transforms people and places from within' (Beck in Gane, 2004: 146). As such Beck's vision of cosmopolitanism is designed to offset theories of global unification or standardisation by providing a 'methodological concept which helps to build a frame of reference to analyse the new social conflicts, dynamics and structures' (Beck, 2002: 18). Beck argues that rather than being a process of homogenisation:

> ''Globalization' is a non-linear, dialectical process in which the global and the local do not exist as cultural polarities but as combined and mutually implicating principles. These processes involve not only interconnections across boundaries, but transform the quality of the social and the political *inside* nation states. This is what I define as 'cosmopolitanization': cosmopolitanization means internal globalization, globalization *from within*' (Beck, 2002: 17)

A notion of 'globalisation from within' places analytical emphasis on locations within global contexts. For this reason Beck contends that the 'cosmopolitan perspective is related to places' (Beck in Gane, 2004: 147), it is *place focused,* it 'means not being a global player' (Beck in Gane, 2004: 147). Cosmopolitanism is not a theory of 'privileged' travelling elites (Beck in Gane, 2004: 147), rather its concern is with the transformation of places, it is 'rooted...in the sensitivities and solidarities that organize most people's sense of identity and location in the world; it is redefining the local in a translocal perspective.' (Beck in Gane, 2004: 147). The redefinition of the local then has subsequent implications for 'everyday consciousness and identities' (Beck, 2002). Cosmopolitan sociology, as a 'new sociology of place', is not a return to old conceptions of locality which were reliant upon notions of being 'encapsulated', rather 'its new form is to exist as a set of superimposed nodes of multiple global networks.' (Beck in Gane, 2004: 148). In this formulation localities sit upon and are shaped and transformed from within by globalised networks and associated 'new power strategies' (Beck, 2000: 87).

The question then is: what use is a cosmopolitan sociology for the study of digitalisation in general and the digitalisation of music and music culture in particular? Take for instance music downloading in which we see what might be a material example of cosmopolitanization, of the transformation of places and identities through the globalisation of music networks. We may also consider the software and hardware that afford music reproduction and production as being both cosmopolitinized forms and affording the processes of cosmopolitanization as these software repositories act as portals in global cultural networks[10]. The questions around places and identities being transformed from within by the context and power strategies of globalisation and cosmopolitanization seem particularly salient in terms of the new systems of musical appropriation described in this thesis. The benefit of this position is that we may move toward understandings of digitalisation that are more clearly framed in critical sociological questions as both material and localised but within the transformations of structures and strategies relating to broader social phenomena. The music collection suggests itself here as the embodiment of cosmopolitinization, or globalisation from within. It is perhaps then in the digitalised music collection that traces of global process can be found as they act to transform people and places. It is possible then that these collections, and the listening practices captured on these

[10] Take for instance the global distribution networks of www.garageband.com or the exchange of software plugins through internet repositories.

software packages, which often have an ongoing record of the most played musical tracks[11], may be used to get at these global processes of cosmopolitinization in peoples everyday lives.

3. The study of everyday life

The study of everyday life is not a specific kind or type of sociological approach, indeed the study of everyday life represents a wide-ranging and cross-disciplinary set of investigations into a range of topics (Highmore, 2002; Bennett & Watson, 2002; Tulloch & Lupton, 2003; Seigworth & Gardiner, 2004a; Silva & Bennett, 2004; and Bennett, 2005). This broad range of literature shares the tendency 'to place the everyday as the context for its arguments.' (Highmore, 2002: 32) by focusing upon the 'rhythms and routines of daily existence' (Bennett & Watson, 2002: x). However, the study of everyday life is not constructed around a rigid conceptualisation of a unified or shared set of everyday experiences or practices. Everyday life is not a rigid analytical category; rather it is a 'vague and problematic phrase' (Highmore, 2002: 1). This has led in some instances to the reflexive critique of the concept of everyday life as myth that perpetuates particular mythical properties or images of the social (Crook, 1998; Sandywell, 2004a)[12].

Continuing this motif of everyday life studies as reflexive and self-critical, Seigworth and Gardiner, in their introduction to a recent special issue of journal *Cultural Studies* dedicated to the study of everyday life, note that:

> 'the everyday is the groundless ground of lived/living concatenation, conglomeration and visceral cross-referencing – even if one must immediately hasten to add that any mention of the 'lived/living' should not be understood to somehow exclude the unlived, inorganic, incorporeal and non-human in whatever form such matters might take: such is the impetus that fully saturates, through and through, the notion of *life* in the couplet 'everyday life'. Indeed, it's hard to fathom exactly what might fall outside

[11] I would like to thank Roger Burrows for this suggestion of using digital music technologies to design new methodologies, and for capturing taste, preference, etc.

[12] This has led to calls in some instances for the re-alignment of the study of everyday life as the investigation of 'the heterology of ordinariness' (Sandywell, 2004a: 175).

> everyday life since eminently tangible remainderings and immanently fleeting ambiences (and everything in between) provide its building blocks, its cobblestones (and what flows beneath), and the designs on its wallpaper (and what extends beyond).
> (Seigworth & Gardiner, 2004b: 141)

Everyday life as an analytical concept or context is unbounded, it is as much about the relation between the lived and the unlived, the organic and inorganic, as it is about 'life'. This also suggests that everyday life is ubiquitous it fills all realms of experience, and as such may be used as a context or concept for the investigation of any sociological sphere, or for constructing context around the sociology of the mundane.

Ben Highmore situates the re-invigoration of the everyday as an analytical category in relation to its opposition to poststructural and postmodern social thought. He argues that the:

> 'everyday represents some kind of realignment of...loosely defined orientations. The everyday then might operate as some kind of antidote or corrective to what are perceived to be the excesses of poststructuralism, without having to hand back all its (or their) accomplishments.'
> (Highmore, 2002: 31)

Despite operating as its 'corrective', everyday life maintains particular properties of poststructural thought, particularly in the areas of plurality and non-determinism. For this reason Highmore contends that:

> 'everyday life, then, as a specific theoretical orientations has not necessarily required a turning away from postmodernism and poststructuralism...What it has required is a regrounding of such interests in the materiality of culture.'
> (Highmore, 2002: 33)

It is this material grounding that is of particular importance to future studies of digitalisation. As I have suggested in this thesis, digitalisation is located in a material or substantive sense in the context of everyday life, it is constituted by and occurs within everyday practices. It would seem that it is the embedding of technology in these everyday practices that requires attention, the study of digitalisation as a part of the 'active processes of human creation through ordinary interaction' (Silva & Bennett, 2004). With ordinary interaction here being both between humans and between humans and objects. The techniques or methodological strategies of the study of everyday life, including ethnography (Bennett & Watson, 2002), rhythmanalysis (Lefebvre, 1996; Highmore, 2004), and the anecdotal recovery of the mundane (Gregg, 2004; Metcalfe & Game, 2004), may prove useful in capturing the details of digitalisation and making everyday music technologies visible (Galloway, 2004).

4. Complexity theory

Perhaps one of the most significant theoretical paradigm shifts in recent years concerns the shift toward complexity theory in the social sciences (Eve et.al., 1997; Byrne, 1998; Law & Mol, 2002; Urry, 2003; Urry, 2005a; and Thrift, 2005). The 'complexity turn...derives from developments over the past two decades or so within physics, biology, mathematics, ecology, chemistry and economics' (Urry, 2005: 1), and particularly the work of the members of the Sante Fe Institute in New Mexico (Byrne, 1998; Urry, 2003). Complexity theory, developed from 'Chaos theory' (Byrne, 1998: 5), is concerned with 'non-linear relations, with changes that cannot be fitted into a simple linear law taking the form of statement of single cause and consequent effect.' (Byrne, 1998:5). Yet complexity theory is not a return to the postmodern collapse of order rather the 'central point is that in this scientific usage chaos is the precursor of order, not its antithesis.' (Byrne, 1998: 5). This then is a shift from 'reductionist analyses to those that involve the study of complex adaptive ('vital') matter that shows ordering but which remains on the 'edge of chaos' (Urry, 2005: 1; see also Urry, 2003). The order that emerges from chaos, or the 'spatial orderings that arises from injections of energy' (Thrift, 2005: 51), is often described in this literature in terms of 'strange attractors' (Byrne, 1998; Urry, 2003) and the unconstrained and unpredictable spiralling out (Urry, 2003) of emergence as attached to 'real entities' (Byrne, 1998: 5). Indeed 'the idea of emergence' and its understanding as chaotic and complex is 'central...to complexity' (Urry, 2005: 5). In fact it would seem that the understanding of emergence and its properties of unpredictable and chaotic interconnectivity is the guiding project of a complexity approach[13]. It is even possible here to imagine the more extreme software plugins described in chapter 6, and particularly the Madshifter plugin (see chapter 6), which radically and unpredictably transform and mutate the original recording beyond recognition, as offering an opportunity for modelling non-linear, chaotic, and unpredictable emergence.

If we regard music and music technologies to be a part of a series of ongoing 'changes to the very fabric of normal economic, political and social life' (Urry, 2003: 1), then a theory is required that embraces these complex transformations without generalising this to the level of unsubstantiated and totalising cultural change. Digitalisation in this sense may be thought of as a 'set of emergent systems possessing properties and patterns that are often far from equilibrium.' (Urry, 2003: 7). It is possible that the non-linearity and complexity of digitalised culture illustrated in this thesis may be understood through the optic of complexity theory and its focus on the analysis of 'non-linearities'. This seems particularly fitting, as the central aim of complexity theory is to conceptualise, model, and understand non-linear patterns and constellations. For this reason Complexity theory, and its embodiment in mobility theory, may provide further opportunities for investigation, and particularly for conceptualising digitalisation. It is also possible that, as mentioned briefly above, some of the more radical music production devices and software plugins may be used as a model for developing a sociological complexity theory.

5. Spatial informatics: Urban studies, cybercities and the spatial turn

The 'spatial turn' (Burrows, 2005a: 464 and 2005b: 32) can be understood to be a catch-all term designed to connect an emergent field of studies that are centrally concerned with the spatial aspects of social and cultural formations and/or the social and cultural aspects of spatial formations in the information age (Featherstone & Lash, 1999; Graham, 2004; Thrift, 2005; Burrows et.al., 2005; and Burrows, 2005a). This

[13] It is possible that research exploring and advocating the re-emergence of vitalism may also provide a similar yet tangential approach in this area (Fraser, et.al., 2005)

then, in reference to Steven Graham's defining work, is 'a programmatic call for research better able to consider how urban forms are articulating with digital technologies and vice versa, and with what consequences' (Burrows & Ellison, 2004: 322) or a 'more concrete analysis of how digital technologies and urban forms coalesce' (Burrows & Ellison, 2004: 325). This is grounded upon the premise that 'information should not just be thought of as a virtual phenomenon in relation to the built environment' (Burrows & Ellison, 2004: 324).

Burrows and Ellison note that the spatial turn addresses an existing gap at the intersection between geography and the social sciences:

> 'it is probably the case that more has been written about the 'urban' in a metaphorical sense in relation to the sociology of digital technologies than has been written about the concrete interactions that are emerging between virtual spaces and urban places across the globe'
> (Burrows & Ellison, 2004: 321-322)

The spatial turn is concerned with the project of understanding the interweaving of the virtual and the physical in the production of space. It attempts to look beyond metaphorical analytical formulations to understand the informatization of the concrete spaces in which we live. This is the study therefore of what can perhaps be described, to use the terminology of this body of work, as *socio-spatial informatization.*

This is not a futurist or utopian position in which the physical is unimportant in these relations. Instead Burrows argues that:

> 'digital media are not rendering physical places unimportant (the so-called 'end of geography' argument) but rather are structuring and re-structuring the spaces we inhabit and consume in everyday life in vital, but often unseen, ways...these spaces are not simply geographical in nature; they are *social spaces* within which class, culture and identities play out and are situated. The mediation of such spaces by new software sorting technologies is thus a matter of sociological concern, not least because this, in turn,

> transforms the nature of social space, and with this brings changes to both the conceptual basis and lived experience of 'class'.'
> (Burrows, 2005b: 16)

The informatization, which may be understood as the digitalisation of spaces, is responsible for reconfiguring and creating new forms of social exclusion and deprivation:

> 'Those possessing the requisite resources have the potential to be 'engaged' in ways simply not open to others living outside networked space and, of course, the 'physical' consequences of their networked buying power will transform neighbourhoods.'
> (Burrows & Ellison, 2004: 332)

The spatial turn attempts to analyse the 'sorting' of people and spaces in terms of access to information and capital as defined by emergent power structures.

Indeed, what is perhaps most significant in terms of the contribution of the spatial turn may make toward social and cultural theory relates to the embedded notions of capitalism that underpin such an approach. The study of socio-spatial informatization is deeply embedded in the flows of capitalism, for, it seems, space and information, in whatever state of interactive flux, are deeply interwoven with(in) capitalist structures and systems. This embeddedness overcomes the 'amnesia about the functioning of capitalism' that Burrows (2005: 464; see chapter 8) argues has resulted from the previous cultural turn in the social sciences (Thrift, 1997). As such this approach addresses Frank Webster's recent expression of disappointment with regard to the 'common failure of much sociological research on ICTs and Cultural studies to address wider questions' (Webster, 2005: 453), a problem that he suggests can only be addressed through the non-holistic incorporation of 'some notion of the interconnectedness of phenomena.' (Webster, 2005: 454). Socio-spatial informatics perhaps offers an opportunity to address, or has already addressed, this perceived problem. This is particularly true if we think in terms of *space as a commodity*[14] or the

[14] This formulation is based on some brief discussions on the subject with Roger Burrows.

commodification of space[15], in the same way that we might think of the *commodification of culture* (Adorno, 2001) or the *commodification of knowledge* (Lyotard, 1999; Thrift, 1997; and Gane, 2003) and as such is always-already fused with, or situated within, capitalist structures and systems. The focus here is upon the material and concrete values of these commodification processes[16] detailing how 'digital services of various sorts...mesh with other types of urban infrastructural networks' (Burrows & Ellison, 2004: 326). It is this issue of commodification that will perhaps contribute most as the spatial turn unfolds.

Commodification may then be coupled with Burrows' prediction that the:

> 'tension between informatisation processes that facilitate individualised self-sorting and those that possess the power to ascribe identities and access independently of individual 'choices' is likely to be at the heart of much sociological inquiry in the coming years.' (Burrows, 2005b: 28)

Indeed, we find now that, as intimated in the previous chapter, we are surrounded by sorting, retrieval, and archiving devices, MP3 players, mobile phones, various computer interfaces (see chapter 9). The question then is how may we further understand and investigate this tension[17] between self-sorting (at least partially self-determined) and ascription (determined)?

It is possible that the digitalisation of music and music culture may be useful in providing concrete examples that may be used to extend these debates on space, ICTs, engagement, choice, and identity[18]. As discussed in chapters 6 and 7, music

[15] This is not to say that space was not previously a commodity in the sense that it was bought and sold, but rather we see space (and information about space) opening up vast sets of products and services. Space is not in this sense just land and buildings it is an information-product. Those that search for information on spaces are directed toward purchasing opportunities not just for property but for innumerable other buyer opportunities. Indeed, the complex interplay of space and capitalism in the process of the commodification of space requires detailed investigation.

[16] It could be argued that this analytical practice can be found in the work of Walter Benjamin, and particular in his work during the 1930s on the Paris Arcades (2002)

[17] It could be argued that this tension between ascription and self-sorting and the related issue of inert users and intelligent technologies is at the centre of the posthuman debate (see Haraway, 1991, Hayles, 1999, Gane, 2005a,and Gane, 2005b).

[18] See for example Bauman's (2003) liquid or shop around identity and Poster's (1995) subject constitution.

technologies are a part of this intersection of information and spaces[19]. The most obvious example is the use of the MP3 player's re-ordering or management of the soundscape of the city. Clearly this issue of spaces and music technologies is a pressing issue, as is the question concerning the ways in which mobile music technologies interweave with concrete spaces.

6. Posthumanism

Posthuman theory is perhaps the closest of these identified alternative possibilities to an extension of this project. However, this thesis has skirted around some of the more radical, complex and controversial aspects of posthuman theory, some of which may prove useful in extending the scope of research into digitalisation.

Central to the Posthuman approach is Donna Haraway's (1991) work on cyborgs (Gane, 2005b) and more recently the work of Hayles (1999a, 1999b, 2005a, and 2005b) and Pepperell (2005). We may also include within this category the work of Kittler (1999). These recent works take on various positive and negative permutations (see Gane 2005b), yet are all founded upon a similar premise which Hayles puts in the following terms:

> 'Humans are not the end of the line. Beyond them looms the cyborg, a hybrid species created by crossing biological organism with cybernetic mechanism...From the beginning it is constructed, a technobiological object that confounds the dichotomy between natural and unnatural, made and born.'
>
> (Hayles, 1999b: 157)

The central premise of the posthuman approach, for Hayles, is that:

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[19] For example, using geodemographic software, informed by a database information source such as MOSAIC, it is possible to geographically map out MP3 ownership. This type of mapping of different areas or places may be used, in collaboration with other types of qualitative research practices, to reveal various aspects of MP3 player use in everyday life. This will also enable the MP3 player to be studied on more quantitative scale than has so far been achieved. This may also be used to situate MP3 player use in much broader flows of globalisation and cosmopolitianisation (se above). Further studies could cross reference MP3 player ownership with music tastes and shopping practices to explore how these intersect.

'there are no essential differences or absolute demarcations between bodily existence and computer simulation, cybernetic mechanism and biological organism, robot teleology and human goals.'
(Hayles, 1999a: 2-3)

The result of which are reworkable, mobile, material-informational cyborg bodies constituted interpolated by 'flickering signifiers' (Hayles, 1999), the boundaries of these posthuman bodies are permeable and open to reconfiguration (Haraway, 1991; Hayles, 1999). This has the effect of opening up bodies to flows of information as products of dominant power structures and systems, which, for Haraway (1991), flow through our bodies. For Hayles we become posthuman as we are exposed to what she describes as 'flickering signifiers' (Hayles, 1999: 25), the material instantiation of informatics which redefine us as posthuman[20].

Posthumanism is of possible significance in the development of the study of digitalisation and the digitalisation of music and music culture for two specific reasons. First it offers an opportunity for understanding the complex relations and 'boundary conditions' (Haraway, 1991) existing at the membrane between music technologies and human bodies, particularly in the case of mobile music technologies plugged directly into human ears with information filtering directly across inorganic and organic boundaries[21].

The second reason for the possible significance of this approach is what appears to be the emerging 'intelligence' of digital music technologies of various sorts and the increasingly inert user. Take for instance the 'intuitive' recording studio that may be 'configured' to suit practice (described in chapter 6) or the mobile music reproduction device selecting tracks for playback (see chapter 7). As described in the respective chapters, these forms of 'intelligence' are currently only limited and are often products of users own familiarity with the technology (and their own choices) rather

[20] Central to this approach is the question of information and materiality, and particularly the problem of separating information from its material instantiation, that I have already discussed in some length in chapter 5.
[21] It is possible that these may be thought of as musical cyborgs, human bodies enmeshed with music technologies as the sites of interfacing between organic and inorganic matter.

than active intelligence on the part of the technology. However, if for instance we consider emergent digital television systems which monitor and learn the tastes of its users and then makes decisions about programme selection on their behalf. These systems in some recent cases even throw in an occasional programme from different related genres to avoid boredom. It is possible to argue and perhaps predict that this type of digital technology is gaining intelligence and rendering the user increasingly inert (Haraway, 1991), and that this type of technology is highly likely to become incorporated into music reproduction practices. It is possible therefore that posthumanism's focus upon the ordering and power of technologies as enmeshed with humans may provide an opportunity for studying music technologies as they increasingly take decision making processes out of the hands of users.

7. Conclusion: re-imagining contexts

The five theoretical perspectives outlined here offer strategies for more sociologically informed research into digitalisation. Cosmopolitan sociology and complexity theory focus upon the global and emergent aspects of digitalisation, everyday life and posthumanism concentrate on localised relations and interfacing, and spatial informatics operates to understand the geodemographic patterns of digitalisation across a range of geographical scales. These then offer opportunities for studying digitalisation as embedded in global processes and transformations, in the acts of interfacing as constituting communicative and social practice, or/and in the interweaving of concrete places and information[22].

In light of this theoretical overview it would seem that the central problem facing the study of digitalisation, or specifically the digitalisation of music and music culture, is that of *context*[23]. We find in these contemporary theories problematic and complex contexts competing for analytical attention. Where to place the parameters of study? How localised and microscopic? How global and macroscopic? The problem is that digitalisation, as a part of social and cultural transformative processes, globalisation,

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[22] It is possible that these theories can be combined, so for example the focuses upon the localised aspects of the study of everyday life could be given a geodemographic dimension through its combination with spatial informatics. Also, cosmopolitan sociology is, to some extent, understood to be a part of the spatial turn (Savage et.al., 2005), so is already geared toward the focus upon spatial informatics.

[23] Although issues of power are also prominent in these theories.

and the rise of information culture or the information society, occurs across a range of contexts. It happens to people in places, it happens in and across virtual and physical spaces, it is at once global and local, it is networked and individualised, it is communal and detached, it occurs across various time frames, it is both audio and visual, it occurs in the human and in the technology, as well as in the space or interfaces in between. This list goes on.

The theoretical insights in this closing chapter are intended to suggest opportunities for overcoming these problems of contextualisation, they are ways of re-imagining these different contexts of digitalisation in new temporal, corporeal, and spatial senses. It is this re-imaging, or hybridising, of contexts that I present here as the key problem facing further investigations in this area.

It is my view that the theoretical opportunities briefly outlined in this chapter opportune more detailed and sociologically significant insights into how digitalisation as a cultural concept or a social process may be understood in terms of material instantiation situated within global flows, networks, and power structures[24]. This re-imaging of contexts becomes particularly significant as digital technologies continue to spatially and temporally reconfigure and recontextualise aspects of everyday life.

[24] My own preference would be for the study of the digitalisation of music and music culture to take on questions of sociological significance, or to act as an area for the material investigation of particular sociological questions of division, access, gender, identity, etc. It appears that these are neglected areas in music research, particularly with regards to the much-understudied significance of music technologies and music production and reproduction. The detachment of studies into music technologies from key sociological questions opens up a range of possibilities for studies into the digitalisation of music and music culture that reflects broader concerns of social and cultural informatics, the sociology of time and space, identity and culture, access and exclusion, etc. Music collecting suggests itself here as an area for investigation that may be understood to be both material and networked. How is music collecting reconfigured by digital technologies? What are the significances of these reconfigurations for identity, belonging, the definition of domestic and public spaces, the understandings of cultural artefacts, access to cultural archives, etc? Who has access to what and where? Can music collecting be geographically mapped out using geodemographic software? Music collecting then may be thought of in terms of cosmopolitanization (globalisation from within), with implications for place as well as for individual agents.

Appendices

Contents

Appendix 1: Interviews with music technicians

I conducted three semi-structured interviews with music technicians for chapter 6. Two were conducted face to face and transcribed from tape recordings (technicians B and C), the third, for reasons of practicality and timing, was conducted by email (technician A)[1].

As this title technician would indicate, these were all individuals who held knowledge of both the music studio, music technology, and the practices of using the technology to produce music. However, they could all equally have been titled composers, musicians, or producers. The title technician is one given by me rather than by themselves, and is representative of their technical knowledge not their employment practices. The term technician is used here to include the variable and hybridised activities of these individuals.

The three technicians interviewed were selected for their knowledge and experience of using *both* home and professional music studios. This put them in a position of being able to describe distinctions between these spaces. All three musician/technicians were working in music technology at higher education establishments, two from one university and one from a second university. They were all involved in creating their own music as well as assisting in producing the music of other musicians and composers. They were selected and contacted through the information on their respective university internet sites.

The questions asked were based around the subjects of home/professional recording, virtual and physical practices and technologies, problems they encountered, digital functionality, etc.

[1] Although of course some of the opportunities to react in a conversational style to the answers is denied by the e-mail format. Hence it is perhaps problematic to describe an email interview as semi-strcutred.

Appendix 2: Photographs and structured interviews with MP3 users

These photographs and interviews are, for reasons of privacy, were collected independently and are in no way connected. Although both were gathered at the University of York and York St John University College campuses using the same method of identification. People wearing interviews were first asked if they would be willing to be photographed with their mobile music device for this research (permission forms were then signed to this effect). On the second occasion those wearing earphones were asked if they were using an MP3 player, if they answered yes then a brief structured interview was conducted with them. Structured interviews were chosen here for practical reasons. Time was limited for a number of reasons and due to the environment disruption had to be kept to a minimum. Therefore, each interviewee was asked the same set of questions.

Appendix 3: An email interview with noWax co-founder Charlie Gower

After discovering noWax through a newspaper article during the gathering of research materials, I investigated the noWax website and joined their mailing list to get up-to-date information about noWax events. One of the co-founder's of noWax, Charlie Gower, was then contacted by email. He agreed to a short email interview and also supplied me with a series of photographs that he had taken at noWax events. Six questions were emailed to the interviewee concerning the physical experience of noWax, the technical issues and problems faced, and the implications of iPod for the DJ. The exchange took place over the space of two-days in early 2006.

Appendix 4: noWax history written by the noWax co-founders

noWax sprang from the ashes of an excitable conversation between Raj Panjwani and Charlie Gower deep within the offices of Sense Worldwide. Charlie had DJed previously with iPods but was convinced that a more interesting way for DJing with these new bits of kit could be found. In true Sense style twenty minutes later an idea and a strategy were born and noWax began to breathe.

The premise is simple: Anyone who had an MP3 player can come and DJ. This democratic style leads to a wide range of music being showcased on the night. Each MP3j plays three tracks alternatively with another MP3j on the other side of the mixer.

The venue dreambadgjaguarshoes was chosen on the basis that Shoreditch has a plethora of artists and designers, of which nearly all use Macs and therefore by default are likely to have iPods.

noWax took it's first steps on 3rd July 2003 and despite no press or promotion people began to take interest and get involved. Even the elitist vinyl DJs who would come over to condem us for not using vinyl came around to the idea once it had been explained to them.

After five months or so we decided that the only way to really develop the concept was to follow the file-sharing ethos and give the night away. This seemed to be the perfect way to spread the word with minimum effort. So we created a website - www.nowax.co.uk -

We invited anyone who wanted to host a noWax party of their own to get in touch. All they had to do was find a venue and set a date. We then send them the instructions and the bits they need to host a night with the noWax format.

If they want to charge a fee on the door to make some money back, they are free to do so. We don't take a cut. So far this approach has obviously proved popular as we have had noWax nights in Manchester, Cardiff, Leeds, Liverpool, London, Atlanta, Derby, York, Plymouth and Tokyo. We have had enquiries from right across the globe, San Francisco to Lake Garda, Paris to Singapore.

Now approaching it's second anniversary noWax has gone from strength to strength recieving numerous web based articles and mentions as well as pieces in Metro, The Independent and The Guardian. The BBC and MTV have been down to report from various noWax events. We have even had a slot on Swizz radio.

As noWax grew over time, the website took form and expanded. A weekly newsletter was started and sent out to all noWax subscribers. We began reviewing music and commenting on the digital music scene. The brand grew in stature to the point where everyone knew what noWax was. We sold out our first run of noWax T-shirts and noWax home kits.

MP3 culture has expanded massively washing over society and noWax has caught the wave and is hanging ten.

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