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How do electronic musicians make their music?
Creative practice through informal learning resources.

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Contents

Abstract

The paper will explore the creative practices of professional electronic musicians through their interviews published in consumer materials, commonly perceived as informal learning resources. Drawing on data gathered from music technology and music culture-related publications including magazines, newspapers, online sources, video, and radio, the study will consolidate 154 existing interviews, given over a seventeen-year period. The aim of this study is not to provide a complete illustration of electronic music production, but rather offer points of significance that hold meaning in the context of creative practice.

Introduction

On the evening of 16th May 2012, the Electronic Beats Festival in Graz is underway inside a converted industrial factory hall. The audience is mesmerised by a majestic audio-visual performance at the Helmut List Halle; it is hosting electronic musician Amon Tobin's performance of *ISAM*, a spectacular hi-tech visual score featuring a large multi-dimensional cubic sculpture and synchronised 3D projection mapping, creating a breathtaking multi-sensory narrative. The hall is filled with the foreboding rhythms of pounding mechanical hydraulics, only to be sporadically interrupted by beautiful crystalline stabs with bursts of liquid nitrogen. The assault of heavy electronic drums, are interspersed with occasional fractals of exoteric percussion. The menace of a 'Reece'[1] bass line fills the hall, juxtaposed by bittersweet granular flutters of angelic voices and celestial motifs. Like the biomechanical illustrations of Hans Rudolf Giger, these peculiar sounds are paradoxically mechanical yet organic.[2] This is not vernacular dance music as one might experience at a conventional electronic dance music (EDM) event; dancing is replaced by reassuring movements to rhythm, against an imposing futuristic dystopian soundtrack. The sonic abstracts are largely unidentifiable but familiar, reminiscent to those not dissimilar to cinematic Foley sound designs. These sounds are not of those derived from conventional musical instruments, yet they are profoundly expressive with the ability to evoke a broad spectrum of emotional responses. Expectation is built through complex layers in rhythm and evolving timbral textures inviting the listener. Melody and tonality does not take precedence, but rather rhythm and timbre – a departure from the traditional reliance of tonal compositional styles that use to define composers of popular Western music (Neill, 2002: 3). The deployment of abstract sounds is evident throughout Tobin's music yet we do not really understand its nature and how they are derived – we can only assume it to be

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[1] Reece refers to the bass sound used on Kevin Saunderson's 1988 track 'Just Want Another Chance' released under his 'Reese' pseudonym. The sound became highly influential amongst Drum and Bass genres when it was sampled.
[2] Hans Rudolf Giger is a Swiss surrealist painter best known for his paintings of biomechanical creations. For more information see: http://www.hrgiger.com [Accessed 4/9/2015].

the product of technological mediation with limited understanding of the creative process. Traditional musical instruments can often be identified by their idiomatic characteristics whereas the sounds in Tobin's music are less easy to define. His work exemplifies electronic music production styles that are perceptibly complex and diverse in both sound and programming. How do these electronic musicians create their music? This paper aims to explore creative practice through the experience of professional electronic musicians, where insight into enactments of creativity will be obtained by analysing accounts related to similar phenomenon taken from published interviews with professional electronic musicians. These will be collated from existing consumer music technology and music-related publications including magazines, newspapers, online webzines, podcasts, video and radio interviews. Although thematic commonalities are likely to emerge through layered accounts, the research does not intend to provide an overarching generalisation on creative practice in electronic music production, but rather illustrate points of significance that hold meaning.

The research will adopt a qualitative approach using interpretative phenomenological analysis (IPA), along with ideas drawn from discourse analysis. IPA is a method widely used in health and psychology studies but has since been adopted in areas of musicology, music therapy, and pedagogy (Pothoulaki, MacDonald, and Flowers, 2012: Slater, 2016). It concerns 'understanding personal lived experience [of a person's relationship and] involvement in a particular event or process (phenomenon)' (Smith, Flowers, and Larkin, 2009: 40), to provide a detailed method of exploring creative practice as 'a social process rather than through a final and fixed musical product' (Martin, 2014: 7). Whilst it is not necessary for the researcher to have 'insider' status (Styles, 1979 cited in Smith, Flowers, and Larkin, 2009: 42), most qualitative research is usually conducted from this perspective. IPA requires one to imagine the position of those being researched since there are interpretative, psychological, and idiographic components to be considered. As a practitioner who has worked in various areas of electronic music production since 1996 (DJing, studio engineering, remixing, and production), an IPA approach enables me to access personal experiences and pre-

conceptions to identify significance in the data. It allows variant responses to be considered through eidetic reduction to arrive at 'the essence' of an experience (Smith, Flowers, and Larkin, 2009).

Traditional IPA involves sample collection via interviewing participants or focus groups however, this study will instead adopt a method using IPA with interviews sourced from existing consumer publications and materials. *Sound on Sound* (SOS), *Future Music* (FM), *The Wire*, and *Red Bull Music Academy* (RBMA) have previously featured production-related interviews with the musicians considered in this paper, whereas other sources offer broader discussions on related areas albeit under self-promotional contexts. There is justification in examining these materials since they are influential 'at every level of music-making and in every sector of the music industry' (Théberge, 1997: 94). They play a significant role in disseminating ideas, and provide insight into professional practice; Thompson (2012) identifies these as valuable sources of knowledge to support informal learning and pedagogy. The interviews will be consolidated to create a sample set of 154 interview transcripts totalling approximately 298,000 words to provide a rich source for analyses. Whilst primary research would introduce parity in the questions posed to the interviewees, no original interviews will be exclusively conducted since it detracts from what we can learn from these materials. Furthermore, time and labour constraints determined that an interview method for data collation is beyond the scope of this study, and postponed for future research opportunities.

The accounts collated for the sample set reveal contrasting interviewer and interviewee relationships in their dynamics, and different interview approaches against shifting contexts. There are instances where interviewees were less congenial in disclosing their trade practices in detail. Furthermore, musicians often loathe promotional activities but are, to some extent, amenable to discussing their music and practice. To help us see 'beyond the sentence' (Schiffrin, Tannen, and Hamilton, 2001: 1) we borrow the tools in discourse analysis with IPA to seek meaning in the transcripts. Discourse analysis is used across a diverse range of disciplines and has developed different

meanings to those researching in different fields; it is perceived by linguists to describe anything 'beyond the sentence', and others as the study of language and how it is used. Both definitions 'focus on specific instances or spates of language' where for example, sentences adopt new meaning when they are read in the context of other texts prior to or after it.

All interview transcripts were compiled using Nvivo software where accounts that shared mutual themes, were identified and filed under a common superordinate node, for example, *creative endeavours*. These were subsequently broken down to subordinate nodes which gave focus on specific areas within the superordinate nodal theme, for example, *motivation* and *personal growth* are subordinate to *creative endeavours*.[3] The sample set was gradually condensed into several superordinate nodes using a process of data reduction. A total of 49 nodal themes were identified though not all feature in this paper – nodes with significantly less contributions or lack breadth were left out. Their omission does not suggest these themes are less important but simply require more evidence to support further debate. Themes were extrapolated from layered accounts that exhibited coherence, quality, and quantity. In some cases, contributions from other professional practitioners outside the sample set, were added to support discussions on certain themes. The nodal themes broadly fell in the following areas which were later refined and renamed into chapters for this paper:

1. Compositional methods and approaches
2. Creative endeavours
3. Management of technologies

The electronic musicians featured in this research will be referred to as *interviewees* for clarity and convenience rather than *producer*, *artist*, or *DJ*. Whilst the term *electronic musician* may also apply to those working in related fields in art music styles, to producers of electronic dance music (EDM), this work does not seek to compare these genre differences. Chadabe (cited in

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[3] Examples of nodal themes used in Nvivo can be found in Appendix F.

Neill, 2002: 3) and Ratcliffe (2011: 235) already acknowledge the cross-pollination and procedural cross-fertilisation of ideas between high and popular art that started since the development of computer music, hence discussions on stylistic differences deviate from the focus of this work. This paper simply refers to established professional musicians who work in areas related to electronic dance music.

The interviewees chosen for the sample set include Amon Tobin, Kieran Hebden (Four Tet), Tom Jenkinson (Squarepusher), and Michael Sandison and Marcus Eoin (Boards of Canada).[4] These are experienced professionals whom remain active to the present day, having commercially released music since 1998. The specificity of this year marks a socio-technological milestone – the beginning of contemporary digital audio workstation (DAW) music production workflow schema through the arrival of affordable multi-channel audio interfaces in 1997[5] (White, 1997). The technologies became increasingly powerful and accessible to see a concomitant rise of the 'bedroom producer' (Martin, 2014: 111). The self-sufficiency and do-it-yourself ethos was identified as a common trait amongst these selected musicians, with many continuing to work in this manner.

By considering the release dates of these musicians' first commercial recordings, we can assume they honed their skills using traditional hardware tools prior to the innovations of DAW technologies. Traditional and innovative tools and approaches should be perceived to inform and support each other; 'It is only by thinking about their interrelationship that we can understand processes of creativity and cultural change' (Negus and Pickering, 2004: 91). McIntyre (2015) also acknowledges tradition and innovation as not diametrically opposed, but instead complementary. Hence, musicians were

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[4] For further details on these artist, see Appendix E.
[5] The Emagic Audiowerk 8 multi-output audio interface retailed at £499 in 1997 offering 24 track digital recording when used with Logic Audio 2.5 which cost £645 (White, 1996). Compared to a digital recording system of similar specificiation, the project version of Pro Tools 4's audio interface costs £891.83 which requires the Digidesign Disk I/O card at £2231.33 (Lehrman, 1997). For more information, see:
https://web.archive.org/web/20150606085730/http://www.soundonsound.com/sos/1996_articles/feb96/logic2.5.html
and
https://web.archive.org/web/20150606080510/http://www.soundonsound.com/sos/1997_articles/jul97/protools4.html
[last accessed on 7th May 2017].

purposely selected for their experience in using both traditional hardware, and software tools. Whilst this paper does not set an initial focus on technology, its ubiquity in electronic music production is indisputable hence technology-related themes will inevitably emerge from the sample set.

A significant portion of the sample set was mostly collected from online sources but their impermanence and transient nature saw some materials become unavailable during the period of this research. The issues with unarchived web content is recognised as a problem in Huurdeman, Kamps Samar, de Vries, Ben-David, and Rogers (2015), Perkel (2015), and Weisbard (2011). For this reason, all materials were permanently captured during the data collection process as a precautionary measure. Online sources were archived as portable document format files (pdf), and online audio and video were appropriately captured as MP3 and MP4 data files respectively. Ripping online media raises obvious copyright issues however, content archival enables offline access solely for the purposes of this paper and can be regarded as fair use.

The first chapter investigates the compositional approaches in electronic music production illustrating the activities these musicians undertake, and how they consider the materials they work with. The second chapter explores the conditions for creative work to gain insight on how they maintain creativity. The final chapter investigates mediation with technological tools, to understand the relationship between musicians and technologies.

Context and literature review

Despite growing interest in electronic music production, as evidenced in the popularity and commercial success of consumer magazines (*Future Music*, *Computer Music*, *Music Tech*) and online sources (*Sonic State*, *Red Bull Music Academy*, *The Wire*) there are relatively few academic studies related to this area until relatively recently. Academic contributions to this field include e-journal Dancecult (2009) exploring areas related to electronic dance music culture through historical and contemporary perspectives; volume six (2014) featured several works by Zeiner-Henriksen (2014), McIntyre and Morey (2014), and Ratcliffe (2014), each in related areas of production technologies and studio practices in electronic dance music culture, as referenced throughout this paper. These consumer publications offer insight into professional electronic music practice via featured artist interviews, and will be the source material for exploration in this paper. The literature review is presented around emergent themes in the data set related to electronic music making; these were broadly identified as compositional approaches, conditions for creative work, and technological mediation.

Compositional approaches

McIntyre and Morey (2014) adopts a case study methodological approach to investigate the creative practices of contemporary dance music sampling composers. The work explores how these composers choose their samples through listening, selecting, and editing, alongside creative, ethical, and economic factors. Discussions related to sampling practice emerge through the accounts gathered for this study, hence the work serves as a useful reference to identify similarities practices in this paper. McIntyre and Morey asserts how certain aspects of the production process enables these composers to gain shared authorship over the use of third-party samples, where deliberate constraints on what they sampled, and the tools they used, help reduce options to promote creativity. It presents a comprehensive exploration on sampling practice to illustrate the techniques used by sampling

musicians. For this reason, the work is useful as a comparative reference when observing the themes related to sampling activities in this paper. Broader considerations regarding working practice are not discussed in McIntyre and Morey hence, this study seeks to address some of these omissions to include time-related and technological considerations.

Sampling practice also features in Ratcliffe (2014) who proposes a system of classification to describe different ways in which samples are used in relation to their 'sonic, musical, and referential properties'. It provides a typology using a framework of concepts and terminology borrowed from the field of electroacoustics to support the analysis of EDM works. Ratcliffe approach is justified since there is already existing acknowledgement on the cultural shift in art music influences in popular music (Chadabe cited in Neill, 2002). Whereas McIntyre and Morey use case studies to focus on the activities and approaches of sampling composers, Ratcliffe examines materials and extracts from existing artist interviews to investigate sampling practice through the structural and transformative properties of the samples themselves. The work is useful in providing additional insight on how samples are adopted in electronic music works, but remains focused on defining the sample typology rather than the broader considerations on creative work. Whilst the typology has limited applications in this paper, it excels in revealing the breadth and diversity on how samples are deployed.

Brett (2014) approaches the creative process of electronic group Autechre through 'techno-geek discourses and amateur instructional videos on YouTube'. Autechre's musical careers began in the early 1990s and share many similarities to the artists selected for this paper. Despite the group's prolific career and productivity, Autechre maintain enigmatic in their reputation by disclosing few details on their production approaches, techniques, and equipment. Brett illustrates how electronic music fandom generates speculative discussion and creative music-making activities amongst their fans to produce music inspired by the group, enculturating their fans' own understanding of music-making. The work does not ultimately explain how Autechre make their music in their own words, but rather illustrates how

creative approaches are imagined through the conjectures of their fans. It reveals examples of social, musico-technological activities generated through the reception and analyses of Autechre's work. The paper I propose aims to explore creative practice through the direct accounts of electronic musicians who are comparatively more congenial in discussing their process. Additionally, this paper will gather sample sets of interviews from four case studies rather than a single case study; it aims to illustrate breadth of approaches through commonalities and differences in working practice.

The term electronic 'producer' is often interchangeably used to describe electronic musician hence, studies on the working practices of music producers was deemed relevant to the interests of this paper. Martin (2014) adopts an interpretative phenomenological analysis method to investigate the role of music producers and their working practices; it reveals plurality and diversity in practice, where the producer's role facilitates and continually adapts to different contexts. Although the work considers music producers in the wider context to include those working in other genres beyond electronic music, it explores in part, the music producer from an electronic music perspective. Martin illustrates the variables in the producer's role with respect to technology, artist, recording environments, and budgets, reducing the role to a tripartite model which includes social, musical, and technical nodes. The work is useful as it demonstrates how traditional IPA method is used in a musicological context – an approach that will be adapted for this paper. Martin asserts that a producer's social skills is the most important aspect of their working practice to enable them to effectively communicate with artists; music producer Phil Harding suggests that a producer's role is 70% social ability and 30% technical knowledge (cited in Martin, 2014: 123). However, the electronic musicians in this paper do not necessarily share the same producer responsibilities in social mediation as described in Martin's work since *they* are the artists themselves, and only do so in collaboration. Furthermore, all interviewees are solo artists except for Boards of Canada (BoC) who are a duo renowned for their secrecy, hence social interactions in collaborative practice were seldom discussed. Given the nature of consumer music technology publications from which interviews were collated for this paper, it was

9

unsurprising to find the accounts were primarily concerned with musical, creative, and technological themes, underpinned by social factors related to creative work as a secondary focus. These solitary yet pluralistic practices are specific to the selected electronic musicians and will be further investigated in this paper.

Conditions for creative work

Frequent discussions on creativity emerged through the data, to reflect aspects of existing academic literature by Csikszentmihalyi (1996), McIntyre (2008), Slater (2015), and Cohen and Ferrari (2010). For creativity to occur, Csikszentmihalyi asserts there are three components necessary for creative work to take place; he proposes a tripartite systems model of creativity to illustrate the interactions between the individual (the artist), a cultural domain (a cultural scene or movement that governs its own rules), and a field of experts (other practitioners, audience, critics etc.) whom decide whether the work contributes towards the field. Csikszentmihalyi describes creative actions in a manner not dissimilar to a fire that requires three components for it to occur, tinder, oxygen, and a spark. Although focus is often placed on the spark (the creative individual), without any one of these three components, the fire will not occur. The model illustrates how creativity is governed by interrelated factors beyond the individual, to include reception and cultural considerations. However, these three components will not always feature with equal precedence in this paper since the accounts are often focused on the *individual*. Furthermore, as professional electronic musicians, the interviewees are already established in their *domains* and have continually received approval from the *field*. These factors may emerge through the perspectives of these individuals as they appear in the accounts and will remain sincere to the data.

McIntyre (2008) also refers to Csikszentmihalyi's tripartite model to analyse the distribution of power through the context of a recording studio. It reiterates what the individual can bring in the system of creativity, through their personal life experiences, class, gender, and unique biological attributes. The *field*

however, is 'a complex network of experts with varying expertise, status, and power' (Sawyer cited in McIntyre, 2008: 4) who pass judgement on works in the cultural *domain* to influence the system. McIntyre asserts that the *field* must therefore consist of producers, engineers, musicians, and artists and repertoire (A&R) executives whom can demonstrate 'expertise and power to perform this function in the field of record production' (2008: 4). The work also builds on the expansion of the term *field* using terminology derived from Pierre Bourdieu who describes it as 'an arena of social contestation' (McIntyre, 2008: 5), where competition and struggle are central to his approach. Although this theoretical model may have limited uses in this paper, its application in a recording studio context is informative to underline the external factors these interviewees must consider.

Slater (2015) offers an approach on creative practice with respect to time, illustrating the interrupted and fragmented nature of creative work as a non-linear, aperiodic process. The term *fractus of creativity* outlines a framework of 'nests, arcs and cycles' to describe how creativity is played out in different ways; 'nests' concerns the layering of time in social-cultural, historical contexts through nurturing and development; 'arcs' describes the spans of time from beginning to end, birth to death, and 'cycles' refers to the repetition of events that forms the creative practice. Although the observations are based on a case study studio project involving a collective of creative practitioners over an eight-year period, it nonetheless provides a useful framework for this paper to understand the scattered nature of creative practice and the time-specific challenges that confront the interviewees in this paper.

Additionally, Cohen and Ferrari (2010) investigates the notion of taking time out to consider creative choices; it explores the relationship between rumination, indecision, and creativity. The work identifies self-reflective rumination as beneficial to the creative process in contrary to traditional understanding of rumination as a maladaptive coping mechanism which indicated potential depressive symptoms. Whilst these academic works have considerable value in the field regarding the exploration of creativity, the application of these theories in this paper may have limited use. Furthermore,

the creative enactments of the interviewees considered in this paper will differ to those outlined in these existing studies.

Technological mediation

This paper does not initially assert technology as its focus, yet its associations with electronic music production are inextricable. The theme on technological tools and equipment frequently emerged in the accounts, which was unsurprising given the context of music technology magazines from where many of these interviews were taken. Hence, studies related to musico-technological activities were useful for this paper to provide a context. The development of technologies in the twentieth century has had a significant impact on creative practice in music giving rise to new relations with musicians and their tools. Slater and Martin (2012) recognise the increasing diversity in musico-technological creativity, varying from the familiar, centralised enactments (recording a drum kit in a studio) to those unconventional, less formalised enactments (making a beat on a mobile phone whilst on a train platform). These rapid technological advancements afford creative activity to take place in less conventional settings. beyond the confines of conventional studio environments; making music on laptops, mobile, and tablet devices, change our traditional understanding of the recording studio (Slater and Martin, 2012). This steady proliferation of new production technologies continues to challenge traditional values in music production and performance.

Folkestad, Hargreaves, and Lindström (2012) investigates computer-based composition 'as it appears in informal learning situations' to illustrate different approaches in which music is made using computers. The test was conducted on participants aged 15-16 with no prior experience of composition, outside a formal education context for them to create music privately without the presence of an observer. The results broadly identified two categories of composition – vertical and horizontal, where *vertical* saw composition and arranging as a single integrated process, and *horizontal* considered composition and arranging as separate activities. Despite its strong pedagogical emphasis, the work illustrates the heuristic approaches often

adopted in computer-mediated composition, suggesting there is no 'correct' or 'incorrect' way to create music. Although the test participants were novice music makers rather than experienced electronic musicians, it explores common challenges related to music-making with computers which emerges throughout the data and therefore of interest. These include the significance in software user interface designs that promote exploration, and transparency in technological mediation where computers are perceived as tools for realising musical ideas.

Nevels (2012) also offers a pedagogical perspective on composition using music software through a case study on a recording project in a classroom environment involving a single student with prior musical training. The paper acknowledged software as an indispensable part of the process that enhanced the composition, but also presented problems where too many options hindered the creative process. The ability to easily edit sounds and timbre consequently promoted the pursuit for continual improvement amongst users. The focus is once again pedagogical but does raise some common issues across all computer-mediated practice regarding decision-making and options which will be explored in this paper.

Mediation with newer digital technologies emerge throughout the data, but the role of older equipment should not be overlooked. McIntyre (2015) investigates the use of older equipment in conjunction with newer digital technologies, to underline significance in continuity and change in innovative practice by looking at 'the things we keep and the things we discard'. Innovation is often perceived as the most valued conditions in creative practice (Niu and Sternberg, 2006), and considered the diametric-opposite to things we consider as 'safe' and 'traditional'. McIntyre asserts that old traditional tools along with accumulated pre-existing knowledge, is very much part of being innovative. The work shares some methodical commonalities with this study through the analyses of publicly accessible online interviews of music professionals, but differs thereafter. McIntyre initiates a technological focus from the outset whereas this paper's phenomenological approach enables themes to emerge accordingly regardless of their relations to technology. The work also draws

from the experiences of professionals in other areas of music (session musicians, engineers, classical guitarists etc.) whereas this paper's focus is specific to the creative working practices of electronic musicians. McIntyre's work nevertheless enables us to understand how creative professionals choose and integrate tools in their practice – a theme that emerges in the data and therefore useful as a source of reference.

Zeiner-Henriksen (2014) continues with the theme on old equipment by exploring the preference for vintage equipment in electronic dance music production, as seen through The Chemical Brothers' use of the ARP 2600 analogue synthesiser. The work provides two theoretical approaches to this phenomenon; Bijker's sociotechnical perspective on technological development using the example of analogue to digital instruments, and Thornton's concept of subcultural capital where vintage instruments are perceived as prestigious, coveted artefacts, where by association they maintain a positioning related to power within a subculture. Whilst the work does not claim to explicitly explain creative practice, it provides a useful sociotechnical approach to understanding The Chemical Brothers' and other similar musicians' reasons to adopt older, less-stable instruments over new digital equipment. Due to the shared commonalities in practice between The Chemical Brothers and the interviewees considered in this paper, the work is useful to provide a framework to explain this phenomenon.

Duignan, Noble, and Biddle (2010) explores the activities in workflows of professional music producers. The work illuminates occasional short falls in the graphical layout in Digital Audio Workstations (DAW), where its designs do not fully meet the user's needs. Its sole focus on DAW processes provides a useful approach to understanding DAW related activities for this paper, but excludes creative activities using hardware sequencing and recording. Not all interviewees use DAWs in their workflows, and the way they are deployed varies considerably for each practitioner where some would use it as a main compositional tool whilst others approached it as a tape recording device. The work provides useful support in furthering our understanding of DAW workflows, but also underlines how graphical user interfaces can impact on

how we approach technologies – a concern raised in the data, and highlighted earlier in Folkestad, Hargreaves, and Lindström (2012).

1. Compositional approaches

Our point of discussion begins by observing compositional approaches outlined in the accounts of the interviewees considered in this paper. The aim is to illustrate examples of methods, processes, and techniques from layered accounts describing similar creative enactments. It is not uncommon to find electronic musicians working with broad sound palettes using diverse approaches. Many of these techniques can be traced back to 20th century western art music forms, Musique Concrète and Electronishe Musicke. In 1948 Pierre Schaeffer created *Etude aux chemins de fer* – the first Musique Concrète piece made up of manipulated recordings of railway trains (Griffiths, 2002: 17); Stockhausen created a sine-tone composition *Studie I* in 1953, based on the principles outlined in Fourier's theory that any sound can be synthesised using pure frequencies of sine waves (Griffiths, 2002: 45). What is striking, is that both forms sought to create compositions without the use of traditional musical instruments, adopting devices such as electronic oscillators and reel-to-reel tape recorders instead. Whereas established musical instruments such as the violin carries associated playing techniques developed and accumulated over centuries, a device such as the tape recording machine bears no such sensibilities. Often considered an instrument by early electroacoustic composers, it requires interactions from the user to define its role and function in the creative process. Current hardware MIDI controllers can be perceived in a similar manner, where musicians dictate their function and purpose. Without those associated 'accumulated sensibilities' (Théberge, 1997: 159) found in conventional instruments, the tools of electronic music production are often defined by user interactions to suit certain requirements. The composer's interactions with technology, how they designate the purpose of technology, and their production methods therefore define the sonic characteristics of their music. The following chapter is broadly demarcated into four themes: curation, sound manipulation, indeterminacy and serendipity, and specificity of objectives.

1.1 Curation

The placement and gathering of sound materials is an integral part of the compositional process, forming the initial building blocks that determine the 'sound' of the work. 'Selecting' is intertwined with listening and editing, of which are central activities in the practices of electronic musicians working with audio samples (McIntyre and Morey, 2014). The data shows how some interviewees collect sound materials to an archive for future use; the curation process considers a variety of factors including the sound material's context, its juxtaposition against other components, and its placement in the composition.[6]

1.1.1 Context of materials

There are sounds that have strong cultural affiliations with existing musical contexts and therefore evoke connections to specific genres. Take the example of the Amen drum break[7] – it has been used as a jungle signifier in experimental sub-genres of EDM (Ratcliffe, 2014: 105), or the Roland TB-303 bass synthesiser's synonymous relationship with 'acid house'.[8] Tom Jenkinson, an artist known for his extensive use of the Amen drum break in his earlier work speaks fondly of the sample and its significance in the music he grew up with.

> I first heard it being used in the Mantronix track 'King of The Beats', and I just thought: 'Fucking hell, that is heavy!' I was 15‑16. Then, the same break started getting used in the early '90s in the early rave, breakbeat stuff. Then, of course, it became the main break in jungle or drum & bass. So for me it has these maybe slightly rose‑tinted associations of happy musical times… The Amen break has its own references, and if you are happy to abuse them, all well and good. (Jenkinson cited in Tingen, 2011)

Jenkinson is allured to the Amen drum break's unique sonic character and its nostalgic 'rose-tinted' affiliations with earlier musical contexts. Despite its

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[6] The source material for the datasets for each selected case study of electronic musician can be found listed in the appendices from hereon. Tobin in Appendix A, BoC in Appendix B, Jenkinson in Appendix C, and Hebden in Appendix D respectively.

[7] The Amen break is a 4-bar drum solo taken from the 1969 song 'Amen Brother' performed by the Winstons; widely used in hip hop, breakbeat, drum and bass. See http://www.bbc.co.uk/news/magazine-32087287 [last accessed 27th March 2016].

[8] The Roland TB-303 is a bass synthesizer with built in sequencer released in 1982.
See http://www.roland.co.uk/blog/flashback-tb-303-bassline-synth/ [last accessed 27th March 2016].

exhaustive appearance on countless recordings, he continues to use the sample in his work through subversion by seeking innovative ways to present it. According to Schloss (2004: 66), an original and innovate deployment of a sample may be a way of measuring its validation by the field on its creative use (Csikszentmihalyi, 1996: 6). This may explain Jenkinson's persistent use of the Amen drum loop in addition to his fondness for the sample. Tobin also finds qualities he seeks in sounds that have prior musical contexts but not for nostalgic reasons, as described in the following account:

> I like using sounds that have existed in a different musical context before. It's not musique concrète or found sounds and I won't use session musicians or sample CDs. I find sample CDs of, say, a session drummer really flat, because they don't have any real musical context. (Tobin cited in Young, 2003)

Tobin prefers to use samples from existing musical contexts since they have value, serving a purpose in the recordings from where they were taken – qualities he considers absent in sample CDs where the performances are not associated to any creative context. In the opening song 'Like Regular Chickens' from the album *Permutations* (1998),[9] Tobin appears to use an unconfirmed sample of dialogue taken from the David Lynch film *Eraserhead* (1977).[10] The sample could easily be recreated using a voice actor, but Tobin uses the sample from the film rather than replicate it. One suspects that it maintains authenticity in his work within a sampling subculture. Using the sample also enables him to construct meaning through his audience's active perception of his work – that is, the listener's own life experience i.e. whether they identify the source of the sample, will determine how the piece is interpret. Warner explains that these 'extra-musical connotations inform the work; 'physical, cultural, or phonographical signs replace or override musical signs' (2003: 97). The ability to identify samples and their obscure origins is a characteristic trait amongst many sampling composers, described by McIntyre and Morey as 'hyper-listeners' who have a deep knowledge on sample-based music. We will not know whether Tobin ever intended his audience to make transcontextual links. However, as a phrase that is categorised under 'self-

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[9] See Amon Tobin, 'Like Regular Chickens', *Permutations*. 1998. Ninja Tune Records, zenCD 36.

[10] See *Eraserhead* (1977) Directed by David Lynch [DVD]. Davidlynch.com

referential musical elements', Ratcliffe (2014: 103-104) would argue that the sample simply functions as a vocal element irrespective of the source without requiring the listener to recognise its original context.

1.1.2 Juxtaposition

The juxtaposition of contrasting samples that retain a referential musical aspect is a familiar practice amongst hip-hop beat makers where originality in the samples used, are intrinsically linked to the freshness of the producer's sound. Ratcliffe refers to these as 'transcontextual musical elements' – samples that are intended to be recognised for their musical properties, as well as its extra-musical associations (2014: 104). This is epitomised in rap group Run-D.M.C.'s 1986 single 'Walk This Way', which featured a sample of the 1975 song of the same name by rock band Aerosmith. The recording gained commercial success, where the re-contextualisation of the sample in its new setting helped initiate a new genre. In this example, the source sample must remain identifiable to the audience for it to be recognised in its new context and purpose (Tobin cited in Thill, 2011), though there are ethical, legal, and economic repercussions associated with this approach as discussed by Morey (2012b). In the following account, Hebden describes the use of juxtaposition in his earlier work:

> Especially doing the early Four Tet stuff, the mentality was more like 'oh, what if I like get this and kind of join it together with this', and like create these new kind of blends of things that hadn't been seen, been together so much, you know sampling folk records or whatever but making hip-hop or something. (Hebden cited in XLR8R, 2009)

Hebden describes experimentation by bringing together samples from unexpected varieties of genres 'that hadn't been seen'. This approach works for Hebden but can also produce incongruous results in cases where the combination of sounds fail to work (Jenkinson cited in Tingen, 2011). Whilst some would mesh samples from contrasting genres, the blending of diametrically opposed sounds was also considered. Hebden recalls his love for UK garage music for its experimental edginess featuring 'rugged rolling dark tracks with sweet female vocals' (Hebden cited in Obkircher, 2014). His

comment describes bittersweet juxtaposition – a technique that Boards of Canada (BoC) often use to instill tension and resolution in their work (BoC cited in Detourn, 2005).

> It's about finding something beautiful in desolation, something draws us to the atmosphere of destroyed, abandoned places. It's a bitter-sweet thing that we've always tried to achieve in our music. It seems too obvious to make music that is just purely dark, that just seems too easy and naive. We always try very hard to create something that balances between dark and light. If you can achieve that ambiguity in music, it makes the listener do some work, emotionally. It allows you to put something subversive inside the music, that doesn't necessarily just declare itself outright. (BoC cited in Döringer and Herrmann, 2013)

BoC explains how they avoid curating sounds that are emotionally explicit by deploying 'dark and light' elements in juxtaposition. This achieves a sense of emotional ambiguity, inviting the listener to interpret and subsequently engage with the work. These bittersweet elements 'involving a mixture of sadness of wistful joy' are often associated with Nostalgia, a complex emotion that evokes mostly positive affects on the listener (Batcho, 2007; Sedikides et al, 2004, cited in Barrett et al, 2010: 391).

1.1.3 Assemblage

Gaining insight into how electronic musicians assemble their compositions can provide clues into understanding the type of sounds materials they look for. Musical potential of non-musical elements is often explored in electronic music production, where sounds are either retained in their abstract form or recontextualised as individual notes or events and sequenced into a musical phrase (Radcliffe, 2014: 102). Much like sound designers who consider spectral, timbral, and manipulative qualities in their materials, some interviewees sought similar properties in their sounds. These considerations are evident in Tobin's composite constructs of sounds, built from layering concrète and prepared sources that reside in contrasting spectral regions; for example, the droning of an engine would form the sub bass element whilst the high pitch sound of a bird would create the high frequency component (Tobin cited in McLean, 2008). He recognises the potential in industrial sounds where 'a lot of machinery has inherent rhythm and harmonics in it' giving him

sufficient material to work with (Tobin cited in Less Than 3, 2012). The scope in sound manipulation enables Tobin to develop a method beyond basic time and pitch transformations to include spectral extraction and synthetic morphing (Tobin cited in Staff, 2012). Having the ability to construct sounds from composite spectral components opens new possibilities, enabling Tobin to access less obvious materials from a wider field. It is evident that some electronic compositions may consist of elaborate constructs of sound involving multifold processes. In the following account, Jenkinson recalls how the track *50 Cycles* was painstakingly built from intricate edits of audio:

> The track '50 Cycles' on Ultravisitor [2004] is a monster that took me a month to make. I used the Vegas software, made by Sonic Foundry at the time, to assemble literally thousands of edited pieces of audio, and it became something of monstrous complexity. I wanted cutting‑edge digital signal processing and I wanted the most awkward, difficult, angular sounds. (Jenkinson cited in Tingen, 2011)

Jenkinson describes the time-consuming assembly process where each sound element is meticulously sourced, edited, and processed. The approach resonates with those methods used in early electroacoustic works where edits of sound were physically spliced from magnetic tape rather than digital audio. Cage's *Williams Mix* (1952) exemplifies the complexities and labour-intensive nature of some earlier electroacoustic compositions, made up of no less than 1,097 fragments, and taking a year to complete (Kostelanez, 2003: 168). The use of smaller audio fragments to construct structures beyond its original identifiable form continues today – musicians are less likely to use large identifiable samples to attain authorship or for legal and financial reasons (McIntyre and Morey, 2014: 43), The process of micro editing is illustrated in the works of late hip-hop producer James Dewitt Yancey - also known as J Dilla; his production technique involved dissecting sound into intricate edits such that samples in odd time signatures could be re-configuring to seamlessly fit into a standard four-four time signature (Questlove cited in Red Bull Music Academy, 2014). Beyond triggering a single sound source reconfigured from smaller divisible time divisions, variations on this technique also involve the construction of sounds made of multiple regions from several sources. A similar micro editing approach is outlined in Tobin's account:

> And so I was doing things like trying to make […] a drum track that had come from maybe four or five different places, so having a snare from one record, a fill from another record, kick drum sound from another record, and trying to make a coherent sort of pattern by programming all of these things together to make a kind of a chain. And with other sounds as well, like a trumpet or a saxophone; but like trying to make a melody over time that was made of little pieces of other melodies, sort of stringing them together. (Tobin cited in RBMAradio, 2012)

Tobin describes the fastidious construction of drum patterns, and melodic elements using sounds extracted from multiple unrelated sources (Tobin cited in Solipsistic Nation, 2008). Their seamless recontextualisation and reconfiguration are a testament to Tobin's skills in curating components that compliment each other. Both Dewitt Yancey and Tobin's approaches illustrate their ability to hear potential in their materials – a curative skill identified by McIntyre and Morey where 'the ability to listen and select was considered as compositionally significant as any production or technique based skills' (2014: 48).

1.1.4 Personal sound archive

Some interviewees retained personal sound archives to consolidate accumulated sound materials of interest; the archive would be referred to throughout the creative process where material would be continually added and extracted. In addition to samples collated over time, the constituent components of completed and shelved material were also gathered to serve as building blocks for new projects, as highlighted by Duignan, Noble, and Biddle (2010). The following account explains how Hebden began building his sound archive or *sound diary*:

> When I'm working on something, I'm not sitting there with piles of records and stuff, looking for sounds to make it all fit. I keep this permanent sample diary which I've been doing, for like over ten years or something now where I have, every time I hear something on a record, on a DVD, on a cassette tape, on anything I hear, sounds that I like or useful, even if I come up with something on guitar or keyboard or something, I'll record it into the computer like I did with the Tenori-On[11] loop, record in the computer and archive it away as something from that time, and then when I go to work on music, it's just me and this enormous archive of sound. (Hebden cited in Future Music Magazine, 2013)

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[11] Tenori-on is a hand held electronic instrument manufactured by Yamaha. It features a screen in which a sixteen-by-sixteen grid of LED switches enables the user to interact to create sound.
See http://www.soundonsound.com/sos/feb08/articles/yamahatenorion.htm [last accessed on 24th May 2017].

Hebden's sample diary provides him with an ever-growing personalised pool of material that forms the building blocks to his music. Unlike the methods adopted in traditional hip-hop sampling practices where sounds are mostly taken from vinyl records, Hebden uses samples from a broad variety of sources including videos, cassette tapes, personal recordings, and even musical ideas performed on the Tenori-on – a portable electronic musical instrument with built-in sequencer and sounds. Hebden adapts these musical sketches by altering the pitch and time parameters to fit them into existing projects under construction (Hebden cited in Future Music, 2013). Coincidently, Apple's consumer iOS app *Music Memo* is built on a similar concept, where musical sketches are captured on a mobile or tablet device; the tempo and key are instead calculated automatically so it can be easily imported into a DAW for further development.[12] In contrast to Hebden who retains larger motivic components in his sound archive, glitch[13] artist Markus Popp also known as Oval, collects tens of thousands of tiny audio fragments extracted from existing CDs – a palette that compliments the aesthetics of his glitch-style compositions (Inglis, 2002). These fragments are usually rendered and manipulated to generate more material which is added back to replenish an ever-growing archive of sounds. Besides audio files, sound archives may also feature collections of personalised patch settings for software instruments and effects, specific to the individual's needs. In the following account, Jenkinson describes his personal library of custom digital signal processing (DSP) patches which he refers to for his productions:

> I've built up such a massive library of what you might call 'default' plug-ins – options are there on tap for me now. They all came out of my own research and development, and they're also waiting to be modified. I do have those quick-fix solutions if I need to just grab it and chuck it in. If a synth isn't quite doing the job I'll swap it out and change it; but they're all things that were borne out of an R&D process. (Jenkinson cited in Assar, 2012)

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[12] *Music Memo* is an iOS app from Apple that enables the musical ideas to be captured and automatically analysed to suggest chords and rhythmic accompaniment. For more information, see: https://www.apple.com/uk/music-memos/ [last accessed on 31st May 2017].
[13] Glitch is a post-digital movement in electronic music emerged during the early to mid '90s. The focus is not on digital medium itself, but rather the tools and their malfunctions, errors, bugs, distortion, glitches, and quantisation noise. Glitch musicians explore these aesthetics of digital failure in their music. See Kim Cascone, 'The Aesthetics of Failure: 'Post-Digital Tendencies in Contemporary Computer Music', *Computer Music Journal*, 24/4 (2000), 12-18.

Jenkinson suggests that his library of plug-ins are a product of research and development accumulated over time. Instead of collating audio samples, collecting customised DSP provides instruments and effects that enables him to quickly attain the results he seeks in his work. Yet working with vast sound/ DSP archives can be overwhelming without appropriate content management; the archive's functionality is largely determined on whether files are catalogued to enable quick access to specific sounds. Tobin however, prefers an approach that avoids these potential file management issues:

> I tend to have an idea and then search for the components for that idea. I don't really go out and collect stuff first and then make things from it, so I don't really have that much of anything really. Even vinyl, I have the stuff that I need to make the records, that's it really. (Tobin cited in Hillyard, 2011)

Tobin does not keep an archive of sounds, but prefers to gather materials when necessary to avoid trawling through large sound libraries. The constraints of using specific vinyl records for his sound source, does not inundate him with excess sound materials at the start of the creative process. One would suspect that Tobin perhaps accumulates specific vinyl records in preparation for his work, rather than archiving samples in a data base.

Sound curation is evident throughout the creative process, whether during the preparatory stages of gathering initial materials, or at the development stage to determine how components should coexist within a composition. The selection and placement of sounds in electronic music production can be regarded with significance since it can serve as an indication of authorship for the electronic musician. Where traditional instruments allow musicians to express their style and musicality through performance, electronic music does not always feature conventional musical instruments and hence relies on the style of sound curation to define a musician's work.

1.2 Sound manipulation

The interviewees' sound palettes often extended beyond conventional instruments to include sculpted sound materials derived from musical and non-

musical sources; these components are attained using extensive sound manipulation. The nature of transformation and extent often becomes a defining aspect of the electronic musician's style: how the sounds work in the music 'is really down to how you then manipulate it' (Tobin cited in Kerr, 2007). Sound manipulation can vary from subtle enhancements to controlled degradation. One could argue that even sounds that are seemingly void of processing, are mediated by the method of capture and the environmental space in which it resides. Sounds may be permanently processed during the recording by inserting effects e.g. equalisation, compression, and guitar pedals etc. or captured without any (or little) processing to be subsequently manipulated in a procedural manner such as altering time and pitch parameters in a sampler (Ratcliffe, 2014: 110). The rapid development in computing resources and DSP algorithms has enabled sound processing tools to become ever more powerful and accessible, exceeding the capabilities of earlier synthesis and sampling tools to offer spectromorphological transformation potential. The following themes related to sound manipulation were identified in the sample set.

1.2.1 Custom modular tools

Sound designers and researchers have long adopted audio processing tools since the 1990s using powerful programming languages such as Csound, Pure Data (Pd), MaxMSP, and Kyma[14] for creating software devices beyond the affordances of commercial software. Among the interviewees, Jenkinson and Tobin discuss the deployment of bespoke software tools in their work; despite the steep learning curve involved in learning to program the software, configurable tools are generally welcome since it provides solutions for specific workflows unattainable by other means. The requirement of specialist

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[14] Csound is a free music synthesis language developed by Barry Vercoe at MIT; See www.csounds.com [last accessed on 25th January 2016]. Pure Data and MaxMSP are visual programming languages for music and multimedia. The first version of Max was written by Miller Puckette at IRCAM in the mid '80s. See http://cycling74.com/products/max/ [last accessed on 25th January 2016]. Puckette continued to develop Pure Data during the '90s as an open source project. See http://puredata.info/ [last accessed on 26th January 2016]. Kyma is also a visual programming language powered by a proprietary DSP engine. First written in 1986 by Carla Scaletti, Kyma is used by sound designers and researchers. See http://kyma.symbolicsound.com [last accessed on 26th January 2016].

knowledge in programing sees Tobin enlisting support from software programmers to help him develop tools specific to his needs. In the following account, Jenkinson explains the liberation of using custom software in his practice:

> It puts me out of the reach of tech companies and out of the reach of gear manufacturers, and I can determine my creative path, because I'm not being set into a predetermined creative structure that's governed by engineers, not musicians [...] The main point of it was to make available musical possibilities that I didn't see being available through off-the-shelf software or conventional musical hardware. And one of the advantages of it is portability, because it runs inside a computer. (Jenkinson cited in Mettler, 2015)

The advantages of running bespoke software tools, offers Jenkinson greater control over the creative process without the constraints or influence in the designs of commercial software environments. One suspects that Jenkinson is not entirely satisfied with the mass-produced tools that are commercially offered, since they do not support his method of working. He uses Pure Data and Reaktor for building custom software devices that offer real-time control over sound parameters. Developing custom software devices to run on laptop computers has obvious advantages in practicality and convenience, where different design iterations can be easily tested only to be constrained by its processing resource. Having the means to control custom DSP in real time offers enormous creative control and performability but is vastly draining on CPU load and likely to cause audio playback problems, as highlighted by Jenkinson:

> Because I was using this very, very CPU-intensive DSP process on this record, I had to keep the sample rate to 44.1 to stop the CPU load escalating to the point where it was starting to make the audio drop out, with clicks and silences in there. So, in the end, I went with 44.1/24.[15] In any case, that's the resolution of what I'm putting out with the soundcard — and there's no need to stretch it beyond that, because it's entertaining other kinds of problems with the audio, even if it's achieving a greater degree of resolution. (Jenkinson cited in Mettler, 2015)

The account typically describes the problems encountered with running many simultaneous plug-ins that demand significant DSP resource, where audio performance is deliberately compromised to make CPU resources available

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[15] 44.1/24 refers to the sampling rate of digital audio 44.1kHz at 24bit.

for other tasks. Priorities lie in addressing DSP requirements over audio playback at high-resolution sampling rates that are typically offered in modern digital audio systems (Jenkinson cited in Micallef, 2014). The deployment of stand-alone hardware DSP was also evident in Jenkinson's practice, where custom algorithms were developed for an Eventide *Orville*, and *Ultra-Harmonizer DSP4000* – both multipurpose programmable digital audio signal processors capable of high quality pitch-changing effects (Jenkinson cited in Whitman, 2001).

Tobin who deploys similar approaches using bespoke tools, sought alternate ways to manage computing resources through external hardware DSP engines without draining native processing from his DAW system. He uses *Kyma* as his main sound processing tool but unlike programs such as *Reaktor* which rely on the computer's processing resource, *Kyma* is powered by *Capybara* which is a proprietary external hardware DSP engine. *Kyma's* DSP requirements are entirely processed independent to the computer's CPU without causing issues with audio playback quality. The software offers vast creative potential in spectral sound transformation, superseding conventional cut-and-paste sampling methods where the scope for manipulation is limited. In the following responses, Tobin discusses the creative flexibility offered in radical sound transformation:

> What I found this time is that the room for manipulation of the sound is so much more powerful and interesting that really I didn't have to go far at all a lot of the time. Even an elastic band or whatever can be music, or my own voice, changing that. Really much more about what you can do with the sound rather than where it comes from. (Tobin cited in Pollard, 2011)

> It's really just about manipulation now. Like I said, back in the early nineties, it was interesting just to take samples as they were and see what you could do with them. And now, the technology has advanced so much more and there's a lot more room for manoeuvres between synthesizers and synthetic processes applied to recorded material and sampled material. (Tobin cited in Hodge, 2008)

The accounts describes *Kyma's* powerful sound generation capacity using re-synthesis to transform virtually any sound source into useful compositional elements. The sound manipulation potential in advancing software has de-emphasised the importance of the material's origin. This indicates a shift in

Tobin's earlier views regarding sample curation in the section *Context of Materials* (p.17), illustrating how technological affordances impact on the working practices of electronic musicians. Tobin uses *Kyma* to extract spectral properties of the source audio to synthesise new sounds through granular and spectral synthesis techniques. Furthermore, mapping MIDI continuous controller events to morphing, pitch and timbral parameters with a *Haken Continuum* performance controller,[16] Tobin constructs a highly playable and expressive musical instrument using field recordings and prepared sounds (Tobin cited in Beatport Team, 2011). This approach was used throughout *Foley Room* (2007) which exclusively takes samples from found objects, machines, animals, and nature, transforming the sound of small objects such as insects into large sounds, and vice versa (Tobin cited in Telford, 2012). The work indicates a development from his earlier compositions which featured large segments of sampled material – a method that was likely to raise ethical and copyright issues as discussed in Morey (2012a, 2012b). For his 'own integrity and for obvious legal reasons', Tobin no longer uses this approach (Tobin cited in Young, 2003). Artistically, using large unmodified samples in music is often regarded as uncreative and lacking in originality (Ratcliffe, 2014: 102), hence dissection and reconstruction can be perceived as a way to attain ownership over the sounds. For composers who predominantly work with third-party samples, extensive transmutation may serve to disguise the identity of self-referential sources. Powerful innovations in DSP coupled with bespoke modular software, enables these interviewees to evolve their practice in areas that were previously difficult to achieve.

1.2.2 Destruction and degradation

Manipulation as a destructive process, was perceived amongst the interviewees as either an erosive or irreversible process. Jenkinson describes how he uses DSP for 'ripping sounds apart, smashing them together… almost being as destructive as creative' (Jenkinson cited in MusicTech.net in 2015).

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[16] Haken Continuum is a performance controller/ synthesizer featuring a neoprene playing surface that responds to finger motion across three dimensions, enabling continuous control over pitch, timbre and amplitude. For more information, see: http://www.hakenaudio.com/Continuum/hakenaudiooovervg.html [last accessed on 24th May 2017].

BoC share similar destructive approaches to Jenkinson but instead of using DSP, they experiment with analogue processes using hardware where they would for example, deliberately record on domestic hi-fi equipment, using low quality cassette tape, or old reel-to-reel recorders, as outlined in the following account:

> We processed those sounds and made them unique, antiquated but beautiful. We thought that the core concept of BoC could have been adapted not only with electrically made sounds but also with other instruments. So, this is a kind of destruction of sounds. The majority of the work we do is to bring the sensation of time and places to music; and we do not use the clean and perfect, recorded sounds. Normally we record onto low quality cassette tapes to bring the quality down and then re-compose the music. (BoC cited in Hara, 2005)

BoC's deployment of old recording technologies instils character to the audio to achieve a lo-fi quality not dissimilar to those found in third-party samples taken from eroding media, evoking familiarity and nostalgia; it provides a welcome contrast to those often 'santised' sounds found on modern synthesisers (Warner, 2003: 30). BoC create their own self-made samples by composing and recording short extracts of music, a technique commonly deployed amongst sampling composers (McIntyre and Morey, 2014). They proceed by antiquating these self-made samples by degrading the audio quality; 'even tunes that sound like samples are really made by us, but destroyed by the sampling process' (BoC cited in Leloup, 1998). In the following account, BoC refers to one example of a destructive process used in their workflow:

> One technique we like is to create entirely new instruments by sampling ourselves performing on real instruments and then destroying the sounds. So we'll maybe spend days just playing various things, wind instruments, strings, guitars, bass, synths, for hours into the samplers and then feeding those sounds through stacks of destructive hardware and resampling them to make unrecognizable new sounds. This is all before we even begin writing any tunes. (BoC cited in Pareles, 2013)

The account describes the considerable effort and time taken on creating unique sample-based instruments that are appropriate to their BoCs sound. Even though these activities take place before they write the music, these considerations in timbre and texture can be perceived as an integral part of their compositional process. BoC are not concerned with achieving sonic

excellence through distortion-free recordings, but prefer the idiosyncrasies obtained by misusing old and partially working equipment to 'destroy' the sound (BoC cited in Nicholls, 2002), which includes 'throwing parts onto overloaded tape or amping them up and re-recording them back in through low-quality mics' (BoC cited in Murnin, 2005). Further manipulation of the material may include editing sub-divisions, processing, and reconfiguration. BoC's efforts in antiquating their sounds may explain the popular misconception that they extensively use third-party samples – a claim they strongly refute, 'We don't sample old tunes or soundtracks as some have suggested' (BoC cited in Sherburne, 2002).

1.2.3 Manipulating recorded performance

Audio tools for manipulating pitch and time parameters are already widely used in contemporary music production, often to fix minor discrepancies in performance. These tools are usually used for corrective purposes, but some interviewees adopt them to alter instrument performances beyond their original state. Instead of retaining the human qualities in a captured performance, Hebden sometimes uses pitch and time manipulation to deliberately strip away these attributes. Manipulation suppresses idiomatic traces in recorded performance, leaving it to be subsequently treated as raw sound material without the inherent cultural associations of the source instrument. In one instance, Hebden uses manipulation to remove all traces of feel in human performance, to achieve an edited sequenced sound (Hebden cited in McGlynn, 2010). As a previous performing member of the band Fridge, Hebden rarely records instruments against the songs he is working on; instead, ideas, melodies, and chord progressions developed on guitar or keyboard are independently captured without the context of an existing track under development. Hebden collates these framents of musical ideas into a sample 'sketch-book' for use in future works (as discussed in the previous section *Personal sound archive*). These recorded sketches are often reconfigured into new ideas, to help avoid the trappings of clichés, familiarity, and muscle-memory in performance; the guitar is already 'such an explored

instrument' (Hebden cited in Future Music Magazine, 2010). The following account describes an example of Hebden using extreme manipulation methods to obtain new musical elements:

> I've got a sample, melody, or anything, I usually try at half the speed or double the speed just to see what I can get out of it. I'll try like… usually something slowed down, I'll get a nice bass line or bass sound or something. (Hebden cited in Future Music Magazine, 2013)

Hebden explores different editing permutations of pitch transposition through octaves, and time stretching via doubling or halving the tempo to establish how the sound can be successfully incorporated to his work. The process is not dissimilar to BoC's approach described earlier, where samples are made from recorded performance, followed by deconstruction, manipulation, and re-composition. The chosen methods of practice may contrast in terms of the tools; the tactility of hardware equipment and the sonic character it imparts is likely to produce different results and interactions, against works that are exclusively created within a DAW environment. This may explain why BoC choose hardware over software approaches, using music equipment, analogue multi-track recorders, hardware synthesisers and samplers. Unlike computer-based systems that freeze once pushed beyond its processing resource, hardware rarely crashes and has potential to produce serendipitous outcomes, although digital audio failure can too create interesting results as embraced by post-digital glitch musicians (Cascone, 2000). For Hebden, working 'inside the box' in a self-contained DAW environment affords portability and convenience, allowing easier management of vast sound resources. His deliberate constraint on the techniques and choice of tools he uses, are what distinguish his sound.

1.3 Indeterminacy and serendipity

In live music ensemble performance, the spontaneous interactions between performers lead to improvisations, creating possible conditions where fortunate happenstance of unplanned musical brilliance to occur. For the solo electronic musician who spends most of their time interacting with technologies

instead of human collaborators, the tools are usually a means of facilitation rather than a contributory part of the work. Unplanned creative interventions to the compositional process can provide a refreshing momentary change to the pre-conceived approaches of DAW music production. 'One does not contrive an accident; one observes it to draw inspiration therefrom. An accident is perhaps the only thing that really inspires us' (Stravinsky, 1947: 55). Experimentation and exploration opens possibilities where unexpected results may be derived, as Jenkinson states: 'I'd be lying if I said that there weren't certain things on the album that came about by accident' (cited in Tantum, 2012). The comment resonates with Eno's assertion that some compositions develop from 'seeds' of ideas where the composer tends to the direction of its growth, of which some aspects of the work are not intentional (2011). Although many artists have clear initial creative aims, exploration often takes them on divergent routes. In the following account, Tobin illustrates the serendipity of unplanned events occurring through the exploratory process of him striving to attain results:

> It's more satisfying if you can realise something that is imagined rather than it just happening. It's nice if it happens too! It always comes from something I'm hoping to achieve, that I'm hoping to get to. And I never quite get there either, honestly. I fail a lot. I try things out and they don't work or I try something and it's almost there...that does kind of motivate you. (Tobin cited in Hillyard, 2011)

Tobin welcomes the notion of musical results 'just happening' but is more rewarded by realising something borne out of a conceptual idea. The sense of personal achievement is perhaps greater when specific creative objectives are successfully fulfilled. It appears that Tobin spends a lot of time exploring approaches that fail to produce usable results. Conversely, he occasionally achieves results that are 'way cooler' than what he was looking for (Tobin cited in Telford, 2012). In the following account, Jenkinson acknowledges the creative process as one that is not always entirely planned or driven by deliberate intention:

> One thing I would say is that you don't necessarily associate the creative activity with yourself because it's not principally deliberate – music is not entirely the result of a rational decision-making process. (Jenkinson cited in MusicTech.net, 2015)

One suspects Jenkinson's detachment from aspects of decision-making is possible through his method, and choice of tools, to influence the extent in which indeterminate factors are introduced to the workflow. Many DAW environments are not congenial to promoting spontaneity, improvisation, and randomness due to its design rooted in programming and editing. Musicians such as BoC and Hebden overcome this problem by recording extended improvisations, but are still faced with further tasks of selecting and edited. In the following statement, Jenkinson recalls a period where he reverts to performing with traditional instruments, to overcome the stifling limitations and predictability of sequencers:

> One of the reasons that I headed in that direction as opposed to the more computer sequence-type stuff is because I was actually beginning to feel really limited using sequencers and samplers. I'm basically a musician. My history is really playing live- not writing or recording. I hadn't done that in such a long time. I was really beginning to yearn for the sort of unpredictability of the randomness of improvising with live instruments. I was just starting to choke. The sequencer is too square, too digital. I just wanted to get really fucking loose and just start again somehow. I was starting to feel really suffocated, using the sequencer. (Jenkinson cited in Gross, 1999)

Jenkinson's account illustrates a craving for indeterminacy through improvisation, to embrace the mistakes and spontaneity that is often lost in programmed sequenced music. His receptiveness to approaches that introduce randomness reflects an earlier period of Jenkinson's career where he surrenders elements of control in his work. This contrasts to later approaches where he rejects the influence of indeterminate factors in his music; 'I'm trying to leave as little to chance as possible' (Jenkinson cited in Sherburne, 2012). Musicians such as Hebden prefers to manually program perceived amounts of randomness in his work, instead of using built-in algorithms that generate randomisation. In the following passage, Hebden describes how he meticulously programs a drum solo to mimic the free-spirited nature of an improvised live performance:

> Even where something sounds completely spontaneous, it may be carefully planned, like the free-jazz wig-out drumming on 'And They All Look Broken Hearted' [Rounds, 2003]. That random drumming was actually a really laborious Cakewalk process that took hours, taking loads of sounds and breaking them up and trying loads of different placings. I wanted to have the feeling that someone was just knocking around a drum kit, and what I really like about that track is that the drums go along in this random way, and it's building

up and you expect the drums to kick into a beat, but then another kit comes in, and it's that other kit that suddenly kicks into the beat. (Hebden cited in Inglis, 2003)

Hebden's digital construct of a live-sounding drum performance had taken him considerable time to complete through trial and error, where the results capture the spontaneity of a jazz drummer with each drum hit meticulously placed to simulate the timing deviations in human performance beyond the restrictions of the quantisation grid imposed within a DAW. Despite continual advancements in production technologies, DAW designs remain unconducive to divergent workflows, but sufficient for Hebden to create the illusion of a live drum performance. The mouse-driven, single-function operation of DAW based systems offers limited potential for improvisation, although this can be alleviated to some extent using programmable hardware MIDI controllers offering tactility and performability. Electronic musicians continue to seek different ways to overcome these issues, to instil human qualities in their work through manipulation, improvisation and randomness. Indeterminate factors can even be traced in aspects of music production software design, where users can dial in amounts of 'randomness' to simulate pitch and time deviations in human performance. An example of randomisation in software is 'round robin sampling' which enables two or more audio samples to be assigned to a single MIDI note. In the event where the same note is repeated, alternate takes of the sample are successively triggered so that the same sample is never played twice in succession, which would otherwise sound unnatural.

1.4 Specificity of objectives

It is evident from the interviewees responses that a considerable amount of exploratory learning and experimentation takes place as part of the creative practice. This notion may conjure imaginary ideas of practice consumed in free-spirited experimentation, yet these interviewees have specific intentions and clear objectives to achieve in their work. The clarity and specificity of these objectives are important for driving the creative direction and building momentum on a project. Jenkinson describes being overwhelmed with

creative options, that he must be 'really brutal' with his choices (Jenkinson cited in Assar, 2012), by deleting unwanted material for the work to develop. Slater describes deleting problematic material as a 'confident and liberating action' (2015: 91) where the alternative option would be to 'preserve' the material for reflective rumination (Cohen & Ferrari, 2010). Decisiveness in having specific intentions will counter option dilemma at the start of the process where musicians are faced with a blank canvas of infinite possibilities. In the following account, Tobin recalls how he usually works towards realising specific conceptual ideas:

> There's a lot of trial and error, and that's part of the thrill of it for me. But I really have very deliberate ideas that I want to try and realize, so it's not a random process. Sometimes I fail miserably, and sometimes I get close to it, which, when that happens, is really a great reward, to be able to share that with people. (Tobin cited in DeLeo, 2011)

Tobin describes elements of experimental and exploratory practice driven by specific aims to guide the nature of experimentation. These creative objectives are evident in Tobin's released works, where very specific approaches are deployed for each album: *Bricolage* (1997) is predominantly based on sampling and recontexualisation of sounds, capturing moments and extending them; *Permutation* (1998) uses increasingly smaller chunks of sound taken from multiple sources to form elements constructed from composite parts; *Supermodified* (2000) features experimental sound manipulation where the sonic characteristics of a component are removed from its original context; *ISAM* grew from taking field recordings and a commitment to combine sound design as part of the compositional process (Tobin cited in RBMAradio, 2012). At first glance, each album appears to stem from a premediated conceptual idea – a claim Tobin firmly rejects: 'I just didn't want to get trapped in some concept, high-brow thing like that. I wanted it to be a kind of consistent thing' (Tobin cited in Hodge, 2008). One suspects that each album and their associated works, are simply accumulated explorations that share commonalities to reflect an instance in Tobin's ongoing development. Creative objectives can also be perceived to provide guidance for maintaining consistency across multiple works. The clarity of these objectives is perhaps what defines the scope of experimentation and direction in which the work

develops. In the following account, Hebden describes a period where his prime objective was to create records exclusively for club audiences:

> I decided to do more [dance records] this year because I just wanted to put some records out that are just club records. I didn't want them to have any kind of baggage particularly; I just wanted people to accept that these are twelve inches and they're just made for clubs – that's the whole motivation behind this. (Hebden cited in Benji B, Four Tet Takeover, 2014)

The objective of making twelve inch records do not resemble or correlate to any of Hebden's previous released works – they are simply records made to be played in clubs; 'I started to make music to play out. Now that's become […] one of the main things I do these days' (Hebden cited in Benji B, Four Tet Takeover, 2014). Club orientated twelve-inch records retain simplicity through repetition, using structures that are 'designed in ways that allow them to be combined and juxtaposed with great flexibility' (Butler, 2006: 204). Making 'DJ friendly' records requires Hebden to maintain his gaze on the conforms and stylistic conventions in club music during the writing process, yet it is not unreasonable to consider the possibility of new divergent ideas to develop into creative tangents. In the following account, Tobin explains his approach to managing new ideas that emerge during the creative process:

> I'll be halfway finished through with the record and I'll have all kinds of ideas but I won't be able to…I have to finish what I'm doing because otherwise it becomes fractured. I have to shelve a lot of enthusiasm for when I can do things. (Tobin cited in Kim, 2012)

Tobin's is mindful of introducing divergent ideas midway into an album project under construction, since this will inevitably disrupt the overall parity across the collective works. He shows restraint by prioritising the completion of the project instead of committing to fresh exploratory pursuits. The specificity of objectives helps set the boundaries for a project to guide Tobin on the creative direction of the work, so there is an understanding on where the track should be heading. Knowing when the work has reached its finished state, is perhaps one of the key qualities that distinguishes a producer's role. In the following account, Hebden discusses this point:

> I get asked in pretty much every interview, 'How do you know when a track's finished?' I'm like 'That's the easiest thing ever.' I think that's what my talent is, essentially. That's what makes a producer. The whole reason I'm talking to you, and that the record's coming out, is because I know how to work on something and know when it's finished, or know when it's not finished and what it needs, and when it's going to make sense to listeners. That's the bit that's second nature. (Hebden cited in Inglis, 2003)

Hebden does not reveal what he seeks in a finished track, or how he knows when the work is finished. The account discloses few details besides intuition and instinct informing his actions; Hebden's decisiveness comes from knowing what he wants in his work through objectives outlined for the project. The role can be perceived analogous to that of a film director who's responsible for guiding others to accomplish what is best for the final product. Take the example of Tobin's album *Foley Room* (2007), a project that was constructed from recordings of found sound and collaborations with the Kronos Quartet.[17] In the following account, Tobin describes an instance where he assigns a technically simple musical part for highly capable players to perform:

> Often I'd be in a room with these really talented musicians, who were capable of so much, and I had a really specific job for them that was only a tiny fraction of what they could do, but that's what I wanted them to do. They were very over-qualified. […] I guess it's a more sort of directorial role – maybe an actor can do a lot more than you want him to do for a particular scene, but you have a film in mind, rather than his career. (Tobin cited in Telford, 2012)

Despite Kronos Quartet's virtuosic skills, they are required only to play the parts Tobin requests which are comparatively basic against the technical pieces they usually perform. Tobin acknowledges their musical potential but rather than adapting the instrument parts to their ability, he seeks what is requires for the overall project even if the parts are technically unchallenging. The creative approaches deployed by some interviewees were so specific, that the deployment of unconventional methods or processes were adopted. An example of this was shown in Hebden's preference for bypassing the mastering stage for his music – a process that is often standard in the delivery of music. His objective is to retain the sound exactly the way he mixes it, without the intervention of a mastering engineer who would usually add further

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[17] Kronos Quartet are an established American string quartet based in San Francisco, with over forty years' experience, specialising in new and contemporary music. Their collaboration with Amon Tobin can be heard on the track 'Bloodstone' taken from the album *Foley Room* (2007), available at: https://www.youtube.com/watch?v=NB3MyO_RfpY [last accessed on 1st November 2015].

processing to alter the sound, an approach that is unorthodox but serves the aims Hebden seeks.

> I kind of got into this thing with some of the music I was making like this, was very digital. The main kind of loop for this is so... it's all very click digital sounds. I want to preserve that as much as possible; I don't want to lose generation or anything by going off into putting through a desk or anything like that you know […] I just wanted to preserve the digital-ness in some ways, which I know people are always going on like 'really want to get that analogue warmth in'. I think I've got enough of that analogue warmth now, I just want to preserve that digital clarity alongside it. (Hebden cited in Future Music Magazine, 2013)

The account illustrates Hebden's specificity on how he wants his work to sound. Most of his music is constructed digitally within a DAW environment, a platform that continues to generate debate amongst some music production aficionados for its lack of perceived 'warmth' compared to those made with traditional analogue recording approaches (Robjohns, 2010). These views however do not concern Hebden; his approach to mixing music involves the preservation of mid and bass frequencies to achieve the desired 'warmth'. He is specific on retaining digital clarity in his work by not subjecting it through any conventional mastering process, or running it through an analogue stage (Hebden cited in Future Music Magazine, 2013).

1.5 Concluding thoughts

The chapter has shown extensive use of curation and manipulation skills throughout the creative process. The development of listening skills was significant to facilitate sound selection and placement, where identity and meaning were conveyed through the sounds curated by these musicians. Furthermore, sound manipulation was considered a way to personalise materials, enabling musicians to gain authorship over samples. These usually involved multifold processes specific to each interviewee's production methods, by deploying tools ranging from domestic hi-fi equipment to highly specialised bespoke modular software; creativity and technique was often gauged by the nature of sound transformation performed. Manipulation not only transformed textual qualities in sound through destructive processes, but

also enabled musical phrases to be micro-edited to achieve unexpected results. Whilst these musicians sought to develop proficiency in the tools they used to gain control over the development of their work, they also welcomed elements of randomness in a controlled environment, to break up the linearity of pre-conceived writing methods. This was sometimes achieved by adopting tools that were more exploratory by their design, for example, using instruments with unconventional user interfaces. The notion of imperfections in mistakes or serendipity were widely embraced by the interviewees.

2. Conditions for creativity

The previous chapter saw diversity in compositional approaches adopted by the interviewees that were unique to their individual creative pursuits, often involving many layered processes of manipulation and curation. In some cases, the methods evolved through the advancement of production technologies to enable these musicians to explore their work in increasingly different ways. The emerging picture of creative practice reveals a continually evolving process of shifting complexity. Kozbelt compares creative work with embryological development through the concept of 'ontogenetic heterochrony' (2009: 35), suggesting minute changes during the developmental process can cause vast differences to the end outcome. Creative workflows are heuristic where the artist employs a practical, exploratory approach rather than one that ensures perfection; they begin from an established pattern of processes that potentially mutate in a similar manner to embryonic growth. These mutations manifest in 'truncation, condensation, expansion, addition, reordering', altering the timing for different aspects of the overall process, with each of these influencing the end outcome of the work (Slater, 2015: 71). To gain a clearer understanding of creative work, Csikszentmihalyi (1996) suggests looking beyond solely at the creative individual by exploring other factors; he considers creativity as a tripartite system model:

> Creativity results from the interaction of a system composed of three elements: a culture that contains symbolic rules, a person who brings novelty into the symbolic domain, and a field of experts who recognize and validate the innovation. All three are necessary for a creative idea, product, or discovery to take place. (Csikszentmihalyi, 1996: 6)

In the context of electronic music, the 'culture' can be perceived as the expected norms associated with a genre, where novelty occurs when innovation is contributed to the field to be subsequently approved by the 'field' of experts, audiences and critics. With Csikszentmihalyi's model in mind, this chapter will explore the conditions these interviewees seek in their creative work to sustain their professional practice, by innovation through learning, and maintaining a position within the field by delivering cultural products. It identifies four themes that describes some of the points that characterise the

creative conditions these musicians seek: motivation, personal growth, the discography for reflection, and the duration and nature of composition.

2.1 Motivation

In Self-Determination Theory (Deci and Ryan, 1985), motivational behavior arises from intrinsic and/or extrinsic rewards. Intrinsic motivation refers to doing something that is inherently enjoyable or interesting; where curiosity, control, challenge, cooperation, competition, recognition, and fantasy, are factors that promote increased motivation (Malone and Lepper, 1987: 224). Extrinsic motivation is driven by external rewards such as money, fame, and praise, yet these do not necessarily increase the artist's motivation, and can in fact decrease intrinsic motivational behaviour otherwise known as the 'overjustification effect' (Lepper, Greene, and Nisbett, 1973). The phenomenon is often observed at the start of creative careers where artists are motivated by intrinsic factors such as curiosity and self-gratification; once they are rewarded by external incentives such as money or acclaim, their motivation decreases when they engage in music making activities in the future. Csikszentmihalyi suggests there are probably very few creative persons entirely motivated by money, yet 'very few can be indifferent to it entirely' (1976: 334). Money provides security and stability, to enable artists to devote more time on their work than worrying about financial matters. It also allows investment in equipment and additional support, to travel and acquire new skills from other practitioners further afield; artists need to attain a balance where they can lead financially sustainable practices, without compromising their artistic endeavours. Slater (2015: 71) identifies motivation as a crucial factor for maintaining a creative practice that is to yield positive results at completion. For those musicians considered in this paper, intrinsic rewards are the primary motivation; a comprehension of those factors will offer a clearer illustration on how creativity and enthusiasm is maintained. Our initial point of discussion explores what the interviewees aim to accomplish in their work.

2.1.1 Self-serving

The notion that musicians write music to serve the needs of their audience is a popular misconception, as commented by Tobin; 'I just hate the way I hear all the time interviews and bands are always like, *oh man, it's all about the fans!*' (cited in Lost in a supermarket, 2012c). Such myths are perpetuated by those who make these claims publicly, yet one suspects these are strategies in public-relations to maintain fan support and loyalty. Furthermore, McIntyre asserts that the *field* in Csikszentmihalyi's model may only include those who have the power and status to approve whether works are accepted into the cultural domain, such as A&R executives, producers, engineers and musicians (2014: 4). However, the sentiments expressed amongst the interviewees indicate how their work is only motivated by their own interests. Musicians such as Jenkinson were emphatic that their music was not made to serve anyone else's interests besides their own; they only write music for themselves. 'I don't look at what I do as extreme or revolutionary, it is simply what I like to do' (Jenkinson cited in V Knid Esq, 2004). Jenkinson offers this explanation on why he does not consider the interests of his audience:

> Before I had become known as the pusher of squares, there was a time when I was absolutely broke. I thought to myself, 'I am really fed up with living on baked beans and stale bread crusts, I'm going to make a housey-builder track and make a real packet.' Everyone I played my nascent house hit to said it was crap, and no-one was interested in releasing it. From that point on I realised that I had no real idea about how people receive my music, and that being the case, it would make little sense to bother to consider it in the process of composition, and never thought about it again. (Jenkinson cited in V Knid Esq, 2004)

Jenkinson's anecdote recollects a time of financial hardship before he assumed the artist name Squarepusher. His early attempt at writing an anthemic house track was allured by the prospect of lucrative financial returns, ending in failure and rejection. His interpretation of what he considered to be a club track was evidently different from what his audience saw. BoC also recognise the disparity between artist perception and audience reception, 'I don't know if we hear it quite the way the listener does' (BoC cited in Nicholls, 2002). Jenkinson's story resonates with popular romantic notions based on authenticity and artistic values, where musicians should 'make music for the

right reasons' (Hebden cited in Strashnov, 2011); instead, his motivations were financially driven than those of artistic endeavors. Moreover, the significance of this experience has a lasting impact on how he approaches his work thereafter. Jenkinson no longer tries to appease the listener, or make assumptions on how his music will be received as experience has shown his disconnect between personal perception and audience reception. 'The case of what attracts and repels in my music is simply not for me to worry about' (Jenkinson cited in Wyse, 2004). Jenkinson argues a valid case for ignoring audience demands:

> Any musician that puts himself primarily at the service of his audience is likely to quite rapidly become a self-repeating machine. With audiences, there's always a tension. (Jenkinson cited in Sherburne, 2012)

The account describes cases where musicians who succumb to audience demands, are likely to become human jukeboxes repeating ideas trapped in a cycle, reiterating a prior moment of success. The strategy is likely to constrain exploration of new approaches and consequently diminish enthusiasm in future works. Jenkinson does not serve the interest of others; 'I just do what I like; I follow my taste' (Jenkinson cited in Merrill, 2012). The tensions generated through changes in evolving practice against the expectations of the fans are perhaps what maintains an audience's interest. Unfortunately, this can also result in displeasing some listeners who disapprove new material that do not meet their expectations (Jenkinson cited in Sherburne, 2012). In the following account, Tobin describes the extreme scenario where some listeners articulate their opinions directly back to him:

> Of course everyone is going to have their opinion on what you do, whether they like it or not, but it's funny when people try and tell you about it. People do that! They write to me personally and say 'go back to doing beats because you shouldn't be doing this, it's not working, you should stick to what you know' and it's just bizarre! I can't imagine doing that to anybody else (laughs), but, like you say, it goes with the territory. You just need to try and ignore a lot of rubbish. (Tobin cited in Hillyard, 2011)

Tobin illustrates the myriad of public opinions that confuse and cast doubt on a musician's work. These potentially damaging distractions could explain the reason why these interviewees ignore external influences, perhaps with exception of trusted peers and record label stakeholders. Conversely,

Csikszentmihalyi adds that recognition and acclaim are not necessities for *true* creative individuals, but it is also not rejected; artists are often insecure and seek approval in their work (Csikszentmihalyi, 1997: 335). Tobin has learnt to manage these distractions by simply shutting them out, accepting the impossibility of satisfying everyone's musical tastes, let alone predict what they are thinking; 'I've given up trying to work out what goes on in other people's heads' (Tobin cited in Clarke, 2004). His primary motivation is to seek what interests him and pursue it as much as possible regardless of what other people tell him (Tobin cited in Solipsistic Nation, 2008). Creating works of art for the universal is, by nature, an impossible proposition. In the following comment, BoC describes how they approach their work by imagining no audience will ever hear it:

> I think the best music we've made previously was written when there were no expectations on us. So now we just imagine nobody's going to hear it. The moment you start thinking about people waiting for your music, that's when you start damaging your creativity. (BoC cited in Nicholls, 2002)

The account warns of the potential psychological damage external expectation has on BoC's creativity. They consider their best work was made when there was no expectation from them; by imagining no audience, they are not burdened with the pressures of guessing how their music will be received – they simply write music for themselves.

2.1.2 Enthusiasm

The self-serving nature of the aforementioned approaches may seem selfish and indulgent, yet one can argue that it produces the most uncompromising results closest to the interviewees' creative goals. They would do whatever necessary to maintain enthusiasm and interest in their work – a significant factor for those working alone who do not have the support of creative collaborators to exchange ideas and motivate each other. In the following accounts, Tobin, Jenkinson, and Hebden discuss how they maintain enthusiasm with their work:

> I'm really quite selfish, and I'm just trying to make stuff that interests me and keeps me excited and I guess, interested in what I'm doing. I just hope other people like it too, right? But […] I have no idea really, on what's going to happen after I put it out. (Tobin cited in Encore!, 2011)

> For me actually the only thing that makes this project continue is keeping my enthusiasm alive, and consequently I base my decisions primarily on the effect they'll have on my enthusiasm; because without that, there's nothing. There's no music happening. Without enthusiasm there's just no—and I might well have a studio, but I just don't want to go in it. So who the fuck cares? In the end, actually, there is some concession that has to be made to the crowd, because I wouldn't be up there onstage unless I had some desire to bring an experience to people. I'm not shut off from the crowd, I'm not hiding, although sometimes I do want to. (Jenkinson cited in Reidell, 2012)

> I definitely get kind of excited about something. The world suddenly opens up. Like I said, right now, let's just make big club tracks. I get a little idea in my head and I just go with it for a few months until I'm bored or until I bump into something else. (Hebden cited in Benji B, Four Tet Takeover, 2014)

Placing self-interests above other priorities was consistent amongst all interviewees for maintaining motivation. These personal pursuits of interest often had little correlation with audience expectations, but were commonly identified as areas of intrigue and enjoyment. Tobin admits to his self-indulgence with what he chooses to focus on his work; projects must keep him excited regardless of audience and commercial considerations. His creative ethos is grounded on the notion that others may approve of his work if he can achieve the results he seeks.

Jenkinson shares the view that keeping his interest and enthusiasm ignited, is the primary consideration in his studio practice to keep him motivated – without motivation, new music is unlikely to be made. He accepts that some accommodations are made in his live shows, where the audience will expect familiar works to be performed. Whereas some artists may loathe repetition and would rather perform new materials to serve their own interests, Jenkinson accepts that some concessions must be made in favour of the audience experience.

Hebden's approach is similarly orientated around personal interests. He keeps enthused with his work by obsessively exploring and researching different pursuits until his interest wanes; he then proceeds to find the next thing that reignites his excitement. These may include all manner of creative

manifestations, from discovering a previously unknown artist's music catalogue, analysing production methods, to finding unexplored subgenres of music that serve as inspiration for sampling. As a DJ, Hebden must find and listen for new records to play out in clubs, or rare recordings for sampling and inspiration; part of this entails spending considerable time in record shops during the week to hear the latest music releases that inspires him to create new work (Hebden cited in Benji B, Four Tet Takeover, 2014). Promoting enthusiasm through passion and excitement in music making, is crucial for maintaining self-motivation where its lacking will transpire in the quality or absence of work produced.

2.1.3 Commercial success

The perception of success has historically been measured by one's acquisition of wealth, power, and prestige; these external rewards are often perceived to promote motivation. The autobiography of Renaissance goldsmith Benvenuto Cellini illustrates the significance of money as a way for artists to gauge their self-worth; 'The importance of honor, respect, or a good conscience keeps diminishing in comparison to the rewarding power of money' (Csikszentmihalyi, 1996: 335). Artistic achievement and innovation is not always proportional to financial success; Rembrandt (1606-1669) and Van Gogh (1853-1890)[18] are but a few examples of many revered artists who died penniless. It is however, rare for creative people to be motivated solely based on commercial success. In the following account, Tobin describes how the music he produces and its success is not necessarily related:

> The success of the music isn't just about the music, right? It's about when it happens to come out, what's going on at that time, if there's a spotlight like a searchlight you know, I look at…I guess, hype or […] fashion in general; its kind of like a searchlight – its moving around all the time, and there's all these people in the dark, all these musicians and artists or whatever, making their stuff in the dark, the searchlight happens to be going over what you're doing at that stage, then its seen as like a seminal moment you know (laughs)… it's an important moment in your career because people happen to be looking

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[18] Rembrandt Harmenszoon van Rijn (1606-1669) was bankrupt before he died. All his paintings and personal goods were sold off for pittance. See https://www.nationalgallery.org.uk/artists/rembrandt [last accessed on 17th February 2016].
Vincent Van Gough (1853-1890) achieved little success whilst he was alive, only ever selling one painting during his lifetime. See http://www.vangoghgallery.com/misc/biography.html [last accessed on 17th February 2016].

at that moment. But the truth is, that searchlight has to keep moving; its definition of what it is. So it'll move on you, it'll move off you, maybe it'll move on you again later; who knows but the point is, you were doing what you were doing in the dark before that searchlight ever came, and you'll continue doing it after its gone because you do it for yourself, right? (Tobin cited in Hodge, 2008)

Tobin believes that the success of a record is governed by several factors such as the timing of its release, what is 'under the spotlight', and musical movements coinciding at that moment in time. The searchlight analogy describes the increased media attention on a fresh music *cultural scene* that powerful tastemakers in the *field* regard as the next fashionable and commodifiable trend in music; these interrelated factors can be understood through Csikszentmihalyi's model (1996). The example of 'Acid Tracks' (1987) by Phuture illustrates this phenomenon; often regarded as one of the first acid house records, its popularity may have been perpetuated by media 'searchlight' on recordings with 'acid' in its title, coupled with the timing of widespread social use of the recreational drug MDMA in the acid house scene during that period (Hunt, Moloney, and Evans, 2010).[19] In Tobin's case, his earlier works such as *Bricolage* (1997) and *Permutation* (1998) shared similar musical traits with those found in trip-hop and drum and bass genres that were at the height of popularity during the latter half of the 1990s. Although Tobin's music is more experimental in nature compared to those genres, it is plausible that the searchlight on those musical movements may have caught his music in its sight. The suggested wisdom is that artists should retain the same philosophical approach to their work as they started regardless of success or money yet the music must continually evolve, a notion supported by Jenkinson, 'Just carry on doing what you want because that's what got you there in the first place' (cited in Pitchfolk, 2012). Whilst the interviewees have each enjoyed successes in their music, the notion of economic gains are underplayed, but most artists would not object to more people listening and buying their work. In the following account, Jenkinson warns the danger of focusing on material gains and other non-music related sources as primary motivation:

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[19] 'Acid Tracks' (1987) by Chicago-based group Phuture is one of several records that claim to be the first associated with the genre acid house. See https://www.youtube.com/watch?v=JCUPc9zVfyo [last accessed on 5th May 2017]

> I think when you start focusing on more worldly things like turn it into a money making venture, or a statement designed to make you look cool, you know you just lose track and you lose… potentially you lose the point in what you're doing. I don't think so many people start off doing that; it's those concerns creep in later on you know, particularly if you get a lot of attention early on in your career, I think some people panic and think how am I going to carry on getting that attention; how am I going to keep that attention on me, how am I going to retain that status? No for me, it's like, forget it. (Jenkinson cited in Pitchfolk, 2012)

Jenkinson describes how emphasis on extrinsic rewards over intrinsic factors is a probable indication of those losing sight of their initial reasons for making music. Most artists begin their careers motivated by self-exploration to create works of art for enjoyment. Jenkinson clearly articulates this notion from personal experience; 'making music at home was for fun and to educate myself, without having an aim in mind' (cited in Tingen, 2011). Yet for some, the prize of commercial gains and maintaining success, dominated by extra-musical concerns, detracts from their artistic development. In the following account, Jenkinson does however acknowledge that it is impossible to entirely exclude external factors - everyone including musicians require money to survive:

> I'm not going to make music for commercial gain, but also I'm not going to make it just to be part of a scene or be popular. My external concerns are… well, they're always on the list somewhere, because you can't make music and survive on nothing, but I'll always try and keep experimenting. You could say that's selfish, I'm just like entertaining myself, but actually you can frame any kind of music-making endeavour as self-indulgent. (Jenkinson cited in Blanning, 2012)

The account describes Jenkinson's motivation in pursuing his personal interests whilst mindful of financial needs to sustain his practice; he has no intention of conforming or associating himself with genres. Motivations in monetary gain, and fulfilment of creative ambitions are constantly under tension where a musician must sell enough records to earn sufficient revenue to support themselves whilst managing the pressures of external constraints; a harmonious relationship between these two objectives should be achieved to promote a practice that offers freedom to enable creative exploration – a balance that Hebden claims to have achieved through the liberation of running his own record label, as described in the following account:

> But I'm running a label where I remove the concept of trying to sell records. It gives you enormous freedom to make very bizarre decisions. The quantity of records we sell is not the priority of anything at all. The priority is my sanity and peacefulness in life. (Hebden cited in Obkircher, 2014)

Gaining control over the dissemination of his own music removes the pressures of contractual obligations often associated with record labels. Hebden's role in running his own record label would assume additional responsibilities but does not necessarily suggest upscaling commercial ambitions, but rather enables more control of his career to dictate the pace at which he works. Most artists would not reject high volume sales, yet the notion of selling records appear secondary to Hebden; well-being and making music are his primary considerations. 'I don't want to get someone involved to scale everything up. I want to scale things down and make them stay exactly the same' (Hebden cited in Hodgkinson, 2003). Perhaps Hebden's success affords him more creative freedom where financial turnover in sales are not a critical concern.

BoC also expressed little interest in commercial gains despite having achieved success with their work. Their secrecy and reticence to engage with media journalists have inadvertently helped them gain a cult-like status amongst loyal fans. Despite the large catalogue of work generated out of 'literally thousands of tracks going way back into the '80s (BoC cited in Pareles, 2013), BoC are not concerned whether any of it will ever be commercially released:

> We've been making music since we were at school in the early 80's [*sic*.], and nobody will ever hear most of it, so it doesn't bother us to do a really limited release. Our friends and families hear all the music we write, and that's all that matters really. (BoC cited in Passet, 1998)

The account describes their creative efforts mainly serving those close to them rather than the interests of commercial expectations. In addition to music, BoC's creative output includes also short films and paintings, of which are driven by their self-interests for their friends and family. It illustrates where BoC seek approval of their work, from a small circle of friends and family whom they trust.

2.1.4 Reactionary responses

Some interviewees found motivation by expressing their personal views related to sociopolitical concerns; it enables frustration and anger to vent through a creative channel. Social and political commentary in music is not uncommon where notable examples can be traced throughout history concerning conflict, tension, and injustice; the Vietnam War, the 1960s Civil Rights movement in America, anti-apartheid in South Africa, to Cold War tensions (Lynskey, 2012). The interviewees were similarly motivated by their personal reactionary responses, although these were mostly concerned with individual experiences than those of broader political issues. Nile Rodgers' anecdote on Chic's hit single 'Le Freak' (1978) best illustrates reactionary response as a motivational force.[20] The song was conceived as an angry gesture to an incident on New Year's Eve 1977, where his band were refused entry to the popular nightclub Studio 54 despite having been formally invited as guests. Rodgers and his group returned to their rehearsal space that evening, and wrote the song with lyrics that originally read 'fuck off!' but was later changed to 'freak out!' Whilst the final version of the song does not explicitly refer to the incident outside Studio 54, it illustrates how inspiration manifests unexpectedly, through Rodgers's ability to channel his infuriation into a creative work. In the following account, Hebden describes a similar reactionary response through music:

> I just wanted to make a record that was a kind of a 'fuck you' to all the dance records that were coming out at the time that were kind of jazz influenced supposedly, because they were always twee (mimics swing ride cymbal pattern), always fusion type solos and stuff. I always saw jazz as being much more vicious, dark, sort of thing. It was probably the most punk record I ever put out on the first album. (Hebden cited in Whitney, 2003)

Hebden is driven by personal disdain of other dance records that claim to be jazz-inspired but fall short of their associations. Spurred by frustration of their disservice, he is motivated to create works that capture his understanding of jazz by underlining the darker, visceral qualities that he identifies with. One suspects Hebden's actions to make a record that is *better* than those he

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[20] Nile Rogers is the guitarist and producer of the disco group 'Chic'. More details can be found online: http://www.nilerodgers.com [last accessed on 17th February 2016].

dislikes, asserts his positioning in power amongst the competitive field as described by Bourdieu's 'arena of social contestation' (cited in McIntyre, 2014: 5). Hebden considers his reactionary response to those ideologies of punk culture, where the establishment and crass mainstream culture are rejected. Tobin describes a similar experience in the following account:

> I was also just kind of into making quite sort of rowdy tracks, like big beat had been around for a while, but I felt a lot of that music, it was more focused on like drinking beer and being a football fan than anything else. I was still listening to the breaks, and I wasn't really into that scene at all. My aim was to out do (laughs) what I was hearing from those scenes but without any kind of nasty gimmickry or bad association really.
> (Tobin cited in Solipsistic Nation, 2008)

Tobin's motivation to respond resonates with Bourdieu's competitive field described earlier. In a similar way to Hebden's actions, Tobin is asserting his position within the field. He acknowledges similarities in his own music to those associated with the 'big beat' genre, where sampled break beats are used in both cases.[21] The genre features brash up-tempo drum breaks and euphoric crescendos, commonly renowned for its affiliation with hedonistic 'lager-drinking' culture – a scene which Tobin firmly rejects. His response was to create work that was equally brash and unrestrained, without the predictability of cliché gestures, or associations to laddish culture. Both Hebden and Tobin are similarly motivated to create works that defy the cultural crassness of others. Hebden however, also finds himself deliberately reacting against his own previous work to challenge prior public misconceptions on his music. His earlier work *Dialogue* (1999), *Pause* (2001), and *Rounds* (2003), was often referred to as *folktronica* by music journalists, to describe electronic music that featured elements of organic sounds and folk music samples. In the following comment, Hebden describes his disdain for the term:

> Looking back now, I'm even more annoyed by it [the media folktronica branding]. Ultimately, it had an effect on the music I made afterward. It was like a direct rebellion against 'folktronica.' I had to move away from it. (Hebden cited in Beta, 2013)

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[21] Big beat is a genre of electronic music that uses sampled drum breaks and synthesized loops, not dissimilar to acid house. The genre emerged during the mid-1990s and championed by artists such as Fatboy Slim and The Chemical Brothers. The record label Skint championed the big beat sound. More details are available at: www.theguardian.com/music/musicblog/2008/apr/09/bigbeat [last accessed on 13th July 2016].

The media's folktronica branding forced Hebden to actively disassociate his music with the term, to subsequently change creative direction of future works to exclude the use of folk samples. His explorations in sampling folk music is merely one aspect amongst many endeavours he explores in his music, 'I am trying to do something with folk music – and jazz, and techno, and hip-hop. There is a lot more going on' (Hebden cited in Obkircher, 2014). A similar case of active disassociation can be seen in hip-hop group De La Soul's debut album *3 Feet High and Rising* (1989), a record that was critically well received across a broad audience on its release and regarded by critics as the beginning of alternative hip-hop. It featured samples taken from an eclectic pool of music genres, accompanied by positive messages in the lyrics – a sharp departure from the gangster rap music styles that were highly popular at the time.[22] Spurred by their positive themes and with song titles such as 'D.A.I.S.Y. Age' (an acronym for 'da inner sound, y'all'), music journalists began to brand them as rappers with liberal hippie associations. Eager to distance themselves from being perceived as a novelty act, De La Soul responded by releasing the follow up album *De La Soul Is Dead* (1991) which featured an illustration of a broken plant pot of daisies on the cover, signaling the death of the D.A.I.S.Y. Age. The lyric subject matter address more serious issues, with cynicism replacing the optimistic outlook on their previous album. The shift in creative direction in their work indicates a bold reactionary response against media branding. Whereas Hebden and Tobin are each driven to develop works that surpass genres they disapprove, BoC are motivated in making music they believe, has not been attempted before:

> I can tell you, from the very beginning we've just been trying to make something that we would have loved somebody else to come along and do, but nobody else was coming along and doing it, so we had to make it ourselves. It always felt to us like some kind of a dead zone in music, like an obvious space to us, but somehow nobody was there. So it was like 'okay, that's where we belong'. (BoC cited in Döringer and Herrmann, 2013)

BoC's reactionary response to filling an unchartered void in their perception of the musical landscape, can be thought of as actions associated with pioneers, or innovators, placing them firmly in a position within Bourdeiu's competitive

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[22] Gangster or Gangsta rap was a sub-genre of hip-hop music around the mid 1980s to early 1990s. It promoted gangster lifestyles, often featuring confrontational lyrics with violence and misogyny.

field. Their motivation is simply driven by their determination to create something they had longed to hear, by exploiting an unexplored musical endeavor.

2.2 Personal growth

The acquisition of new skills and knowledge was perceived as an important condition for creative practice. Interviewees would often explore fresh working methods via embracing new innovations or subverting existing technologies – approaches that were aimed at promoting originality in their work. The pursuit of knowledge through experimentation is the foundation of innovation. Csikszentmihalyi explains the evolution of culture as a necessity, where our ancestors sought ways to improve their chances of survival and quality of life through the development of science, technology and arts (1996: 341). Competing for survival requires effective hunting skills, as well as physical qualities in speed, stamina, and strength, yet these qualities seem less significant in the present day. Instead, the ability to exceed in skills associated with complex domains has more cultural significance, to demonstrate creativity and innovation; artists must achieve novelty within a domain to create works of art as cultural contributions. 'We are motivated to learn, to become experts, to innovate and strike out in new directions in large part because to do so promises very real material advantages' (Csikszentmihalyi, 1996: 341). The following section considers exploratory learning, and the significance of early experiences on the interviewees' work.

2.2.1 Exploratory learning

Discovery through praxis and exploratory experimentation is how most musicians develop new ways to do things. The interviewees' motivation to learn and understand music and sound was essential to further their creative practices. Exploration not only provides learning opportunities for discovery but may also facilitate the achievement of originality and novelty. The appetite

for knowledge and self-development is evident in Tobin's practice, where he is 'trying to learn about music and sound and why it does, why it works the way it does' (Tobin cited in Beatport News, 2014). In the following account, he describes his perception on learning as the central focus to his music making process:

> It's a learning process—the music comes out of me trying to figure things out. I'm always analyzing the world around me and how it works, and the music is just a byproduct of that. (Tobin cited in Less Than 3, 2012)

Tobin perceives his music as mere consequences of his exploratory work, characterising it as part of a broader learning experience to understand more about all things around him, not just music-related. The approach is an ongoing effort to enrich personal culture and knowledge, to eventually feed into creative work through breadth and depth. Inquisition and curiosity are the motivational forces that drives him; 'I'm learning all the time which is exciting' (Tobin cited in Steinberg, 2011). In the following account, Hebden illustrates a similar inquisitive approach by obsessing over production details to attain the high standards of his contemporaries.

> You get interested in different things, and there've been times where I've been obsessed with recording most quiet intimate little quiet acoustic guitars, and there are times where I've spent months trying to work out what are the heaviest possible bass drums you're ever going to hear in a club. Why is this guy's record always slamming so hard, whereas everything else sounds a little bit weak. Someone like Carl Craig […] every time he puts out a record and I hear it in a club, and it's like, 'oh my god like what is he doing that makes something as simple as just the bass drum just […] hit you in this like excellent way every time?' So I think it's stuff like that, I'm constantly kind of like studying and trying to work out, and that's the sort of stuff that's evolving and changing from the creative process. (Hebden cited in Les Frères du Son, 2011)

Hebden describes his persistent analysis and experimentation to unravel the methods adopted by his peers. These 'obsessive music listening' practices are characteristic amongst music fans who are often musicians, to assist learning their craft (Firth, 1996: 55). His competitive nature and aspiration to develop skills to exceed the standards of his musical peers are part of Hebden's ongoing effort to improve the quality of his work through exploratory learning. His contact with a broad range of music, from old rare recordings to the latest musical trends through his eclectic DJ practice, informs his tastes and working

methods. Jenkinson also shares a similar inquisitive view, investigating the tools for making music without prejudice:

> To me, the things you use to make music are all fascinating. In the same way I didn't define music into categories or styles, according to how it was made, I didn't divide-up instruments – any instrument is interesting to me. (Jenkinson cited in MusicTech.net, 2015)

Jenkinson's comment suggests that his curiosity extends to any musical instrument. His refusal to define music into genre categories indicates a willingness to explore and understand different music styles and its associated instruments with equal precedence. Exploratory work by nature, is discovery through trial and error – as seen in Jenkinson and Tobin's practices. Tobin reflects on his own creative practice as incremental development 'full of failings and corrections and hopefully some progress' (Tobin cited in Bell, 2013). However, committed experimentation alone does not necessarily ensure completion of any works, which is a primary objective for professional electronic musicians. Tobin understands the importance of balancing familiar techniques to get things done, whilst exploring new techniques beyond his comfort zone to advance his practice (Tobin cited in Steinberg, 2011). The gratification gained in achieving results regardless of their significance illustrates the importance of experimentation and discovery to maintain personal interest in their work, as outlined in the following accounts from Tobin and Jenkinson:

> It's all about the things I'm learning while I'm making the record, right? The experiments that I'm able to…the experience I'm able to have, and the personal triumphs, and the little dramas; all the things that make it as fascinating for me you know, very personal things I guess to do with sound and rhythm in my own little conquests here and there; things that other people may never be aware of necessarily. (Tobin cited in Solipsistic Nation, 2008)

> When I make a record, when I'm getting going in the studio, I'm always trying to explore something. I'm always trying to get away from what I've done before, trying to correct the mistakes that I've made, if you like. In a way, I see my career as like, it's just a litany of errors. Just this mass of mistakes, and when I make one record I feel I'm trying to correct the wrongs of the one that went before it. And part of that process is learning more stuff, learning new things, learning about new ways to do things – in terms of harmony, whatever. So, each experience, I suppose, is kind of special in that respect. (Jenkinson cited in Blanning, 2012)

Tobin belives his practice is built on the notion of exploratory learning, where the achievements and failures maintains interest in his work. His efforts are honed towards learning things that continue to fascinate him. Despite the audience not ever knowing the full nature of Tobin's steep learning he must undertake, he gains satisfaction from overcoming each challenge. The notion of learning through mistakes via exploratory practice is also outlined in Jenkinson's account. He understands the importance of continual development in skills and knowledge to improve on his previous efforts. Jenkinson is critical of his own work, seeing each record as a series of mistakes to be rectified on the next future release. His effort to avoid repetition of existing ideas, prompts him to explore new approaches and learn new things for each track.

2.2.2 Early experiences

Csikszentmihalyi's study underlines how inquisitive behaviours such as curiosity and exploratory learning was consistently prominent amongst the childhoods of eminent creative individuals. 'Practically every individual who has made a novel contribution to a domain remembers feeling awe about the mysteries of life' (Csikszentmihalyi, 1996: 156). The significance of these early childhood fascinations remain pertinent throughout the person's life, influencing their method and work; these early experiences occasionally emerged through some interviewees' accounts. In Tobin's case, his childhood fascination with editing sound can be viewed as the first steps towards developing the foundations of his craft, as described in the following account:

> You know I mentioned my dad was into language, right? He was a language, English teacher, and he had all these cassettes on how to learn English for foreign students, and there were always phrases like you know, when you're in a café and 'I'd like a coffee please' or something; and the people would say these phrases very clearly out loud, many times over many different scenarios, and I got really into editing all the words so that they'd say different things or sticking words together and making new sentences, all with that twin cassette thing again. I didn't realize this, but a few years ago, I actually thought about that for the first time in years, and I realized that I guess that was probably my first type of experiment into sampling I guess and tape looping, and editing in general, editing audio. (Tobin cited in Solipsistic Nation, 2008)

Tobin's recalls his curiosity at a young age where he would reconfigure recordings of spoken phrases on language instructional tapes to create new sentences. The editing techniques that Tobin explored are not dissimilar to those used on his earlier music releases; rather than words, sounds and musical elements are rearranged into new contexts. These early experiences are evident that Tobin had been manipulating recordings for many years which is likely to explain the fluency of his methods. The sound explorations that began in Tobin's childhood are the foundations of his creative practice and remain part of his professional work as an artist. The paradigm of childhood musical exploits carried into habitual practice in professional work, can also be traced in Jenkinson's practice. His early curiosity in electronics began from the outset where he was already exploring equipment to its limitations by 'testing things to destruction' (Jenkinson cited in Dax, 2013). In the following account, Jenkinson recalls his childhood fascination with electronic equipment and the sounds they produced:

> Well, I suppose what people would call my career started in 1994 when I had my first record out but actually it's fully continuous with what I use to do for fun as a kid which was messing around with electronics, radios, trying to get my hands on whatever musical instruments were available to me. But there's always been a sort of a strong tendency to develop music with technology, mutate it so the earliest things I was doing with respect to that was just literally like tuning the radio, seeing what tunes you could make out of the modulation artifacts on short-wave bands and stuff, then recording it, splicing bits together […] Basically, applying a kind of completely sort of exploratory but fun attitude to it you know. It was just like, what can you do with the things you've got in front of you… (Jenkinson cited in Morning Becomes Eclectic, 2012)

Even at childhood, Jenkinson was resourceful with his compositional tools, and always sought ways to subvert technologies imaginatively – an approach that continues in his professional practice. Jenkinson perceives his first album as a continuation of his earlier musical explorations with electronics, where the music is merely a product of his exploratory learning that was 'fun' and light-hearted. These earlier works such as *Feed Me Weird Things* (1996) and *Hard Normal Daddy* (1997) remind Jenkinson of a younger self; 'it's a bit more [of a] naive approach, a bit more fresh' (Jenkinson cited in Gross, 1999). It suggests that naivety can sometimes have a positive role on creative work. Less informed approaches at the start of a musician's career often produce liberated

results; naivety brings fresh ideas not bound or conformed by rules, which may explain why many first album releases are significantly different from subsequent works. It is an initial period of unrestrained creative freedom that does not return once the artist reflects on their initial placement of work within a cultural domain, as outlined in Csikszentmihalyi's interrelated model described earlier in this chapter. Hebden reiterates this point in the following account:

> When a musician starts out, you've got this naive period that you never ever get back again. It's the reason why people like so many acts' first albums a certain way, because they lose something after that. I definitely got that period really well documented. I'd released three or four albums before I even actually sat there and thought, 'What on earth am I even trying to do here? What's any of this about?' (Hebden cited in Beta, 2013)

Hebden sees naivety in the compositional approaches on his earlier albums – a likely occurrence at the early stages of a career where one might be consumed with matters related to creative output rather than those concerning the *field* or symbolic rules of a cultural *domain*, as discussed earlier in this chapter, p.42. Despite the perceived single mindedness of some artist's creative goals, some still seek approval from audiences and peers to validate their innovation (Csikszentmihalyi, 1996: 6). Furthermore, positive audience feedback reinforces artist's confidence in their work. Once Hebden establishes where his work is placed in the cultural domain, innocence and naivety are gradually replaced by informed approaches.

For BoC, the interpretation of early experiences is a defining characteristic in their work. Their music strives to evoke the ambiguity of hazy nostalgic childhood memories in hope that some listeners will relate to through similar experiences (BoC cited in Georgopoulos, 2002). Existing studies found that nostalgia as an emotion was often triggered by music (Janata et al, 2007; Juslin et al, 2008; Zentner et al, 2008 cited in Barrett et al, 2010). In the following account, BoC describe how they capture recordings using low fidelity recording equipment to impair a textural quality that is reminiscent to those recordings they remember in their childhood:

> The thing about the older films is that the quality of picture and soundtrack wasn't perfect, it was grainy and wobbly. We used to record compositions on cheap tapes which gave a similar rough quality, and we've always returned to that sound because it feels personal and nostalgic. (BoC cited in Passet, 1998)

BoC's method involves degrading the sound quality of their recordings – a technique discussed earlier in the previous chapter under *Destruction and degradation* p.28. The textural grain of old films is analogous to the kind of quality that BoC seek to achieve in a production style that is deliberately rough-and-ready with imperfections to give a personalised, worn quality. The choice of production techniques and tools, and its historical accuracy to a bygone golden era of recording, is perhaps less significant; more important is the textual quality of the sound, and whether it evokes a nostalgic feeling. BoC's fond memories are perhaps built on an imagined nostalgia, where reminiscence is positively distorted, to create an account that appears more seductive than actual events.

2.3 Discography for reflection

The interviewees often discussed their published works in relation to specific points of their musical development. As a source for reflection, a musician's catalogue of work gives a chronological account of their musical journey with insight into their ideas and influences at a given point. Not dissimilar to a diary, it provides a record of musical exploration to illustrate evolution in artistic growth. Jenkinson perceives each one of his records as a series of experiments depicting a snapshot of musical development (cited in Hutchings, 2015) – a view also shared by Tobin. The commercial release of a recording is analogous to that of publishing laboratory results in science research (Jenkinson cited in Assar, 2012). Hence, all published materials are perceived as iterations of experiments and explorations related to those points in the musician's development, even those considered embarrassing as Tobin explains:

> There's some stuff that's really embarrassing! When you've been around for a while you kind of grow publically, all your little experiments and learning curves are on display. I don't feel bad about it all; it's like having a tattoo or something, you know it was right at

the time, it might be a bad tattoo but it represents a time in your life. (Tobin cited in Hillyard, 2011)

Tobin acknowledge aspects of his earlier catalogue lack the accomplishment of recent works, but he does not regret these since they represent his musical development at a specific point in time. Hence, compositions can be viewed as published results of experimentation rather than refined works of finesse. There are however, examples where a discography does not reflect the artist's chronological development, as shown in Jenkinson's case where the perceived chronology of his work is not accurate; 'If I were to play you what I've done in sequence over the years, then you wouldn't have that' (Squarepusher/Keith Fullerton Whitman Interview uploaded by Rush, 2014). It is not uncommon for albums to be compiled from selections of new and previously unreleased archive material, where tracks share artistic commonalities that enable them to function as a unified collection of works. Also, it is not uncommon for stakeholders such as record company's A&R executives to have creative influence on the final track selection and running order of an album where previously shelved material is as likely to feature despite being made at different times. For Hebden, the catalogue of work remains a useful point of reflection for documenting development and change, as describes in the following account:

> I want to be able to look back at everything I've done in like thirty or forty years' time if I'm alive, and be able to look back and all the recordings be a kind of document to my musical journey I had. If I go home and see my record collection and see Miles Davis there, and it's like, twenty albums or whatever, and it's a perfect document of someone's musical ideas, from the very beginning like, and all the way and constantly evolving and changing. (Hebden cited in Les Frères du Son, 2011)

Hebden's ambition is to accomplish a body of work that illustrates change from an artist who is continually evolving. He aspires to the diversity shown in Miles Davis' discography – a jazz artist renowned for his sense of experimentation who released 48 studio albums and 36 live albums.[23] Hebden's published works serves as a reference for him to reflect on his own development. He is committed to see his work evolve whilst conscious of repeating ideas already

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[23] For further information on Miles Davis's discography, see https://www.discogs.com/artist/23755-Miles-Davis [last accessed on 13th July 2016].

explored; 'If I did anything and it was like the same as before, I'd chuck it in the bin and start something new' (Hebden cited in Strashnov, 2011). Change is necessary for artists to evolve, inviting fresh perspectives to enable musicians to 'create a lifetime's worth of music rather than trapping yourself in a situation of always trying to do a better version of something' (Hebden cited in Creators Project, 2013). Reinvention rather than refinement of the same ideas enables an artist to continue producing interesting work without reverting to formulaic approaches.

2.4 Duration and nature of composition

Earlier studies on creative practices initially suggested a four-stage model of preparation, incubation, illumination, and verification (Wallas, 1926). This was subsequently challenged in later research and criticised for its overly simplistic linear illustration on creativity (Eindhoven and Vinacke, 1952: 161-162). Recent studies have shown creative practice as a complex system where multiple processes run in tandem in a reoccurring manner. In truth, creative activity does not conveniently break down into the proposed stages described by Wallas, but is instead non-linear and more complex than it appears. The scattered nature of creative work renders it difficult to precisely establish spent hours on creative activities. The notion of time arguably falls into two categories — cyclical or linear models. Cyclical time suggests repetition, reoccurrence, periodicity, and predictability; Curating sound materials, sound manipulation and developing custom DSP iterations, can be perceived as examples of activities that are repeated and therefore cyclical during the creative discourse. Linear time however, refers to the constantly changing, unexpected and irreversible nature of the creative process – its journey from birth to death, where *birth* is the point where initial ideas first emerge, to *death* where the track is finished (which is itself can be perceived as another type of birth). Slater (2015: 70) supports the view that creative practice is fragmented and non-linear, proposing a fracto-chronological perspective where there are three ways to consider time in a creative context: nests, arcs and cycles. Arcs and cycles share conceptual similarities to the linear and cyclical models

discussed earlier, whereas nested time refers to instances that only exist through gradual development and nurturing – the accumulated time spent on gaining experience and knowledge; it is a 'place of safety, like a nest, where something emerges, develops and grows' (Slater, 2015: 73). Learning new things, discovering music and sounds, require considerable time, commitment and research (Tobin cited in Phil, 2012). The interviewees considered the acquisition of new related skills and knowledge as vital to their personal growth.

2.4.1 Intensive work practice

The total time duration spent on completing a track varied considerably depending on the requirement of the work, and its associated creative and technical challenges. Some interviewees would schedule an uninterrupted period for project development; Tobin ensures he has several free months each year where he is not performing as a DJ, to allow sufficient time to write his music (Tobin cited in Solipsistic Nation, 2008). This approach enables him to become fully immersed in his practice (Tobin cited in Nightmarecast24, 2005). Other interviewees such as BoC work on several projects in parallel, since they claim to have short attention spans. The flexibility of this non-linear approach allows them to swap between projects to suit their mood (BoC in Hoffmann, 2005a). Both Tobin and BoC described stages of intensive development during their writing process which occasionally spiraled into longer spans of exploration of which some works remained unfinished. In the following accounts, Tobin and Hebden recalls their development process and the amount of time they spend on writing:

> I think that in total I've spent about a good month working on the album. It all came very well. I did some terrible tracks, as well, that went completely wrong. You see, I have a tendency to hold on to an idea for too long. Sometimes I have an idea and I just keep working on it for days, weeks, months on end, even if I know deep down that it's a waste of time. Until I stuff up completely. (Tobin cited in Roosendaal, 2002)

> [A track can take] anything from three hours to three months basically. Just depending on, I might start work on something and I might just capture a moment and be totally happy with it and just stick with what happens in that little moment. I might do something that's quite long drawn out process where I do the bulk of it but then keep going back to

it every few days and then see, tweaking it and changing it [...] I throw a lot of stuff away half way through this because I suddenly realize, oh yeah maybe I'm not really achieving much or it's just kind of repetition of other stuff I've done. (Hebden cited in Whitney, 2003)

The account describes Tobin's successes and failures during the writing process for his album, *Out from Out Where* (2002) – a process that is productive but not without challenges, where the development of conceptual ideas into finished works through exploration may take considerable time and effort, without assurance of results. Hebden also illustrates the point that the time taken for track development is often variable and unpredictable, where the nature of creativity may change during the compositional process. Furthermore, new ideas that bear resemblance to those already published are often discarded for creative reasons – such actions can be regarded as continual learning and development though repeated failures may have broader economic repercussions. Tobin's persistence in exhausting different creative approaches is an aspect of his learning – a method echoed in Stravinsky's approach on compositional practice, 'an entity that will not take definite shape except by the action of a constantly vigilant technique' (1947: 51). Evidence of nocturnal work in Tobin's accounts also illustrates intensive habitual practice during unsociable hours (Tobin cited in Young, 2003). Besides avoiding daytime social interventions, nocturnal practice enables Tobin to reach a state of consciousness where he can immerse in his work in a highly productive state, a phenomenon Csikszentmihalyi refers to as 'flow' where 'things were going well as an almost automatic, effortless, yet highly focused state of consciousness' (1996: 110). Creative work can flow uninterrupted nocturnally, yet the impact of work unsociable hours can have obvious strains on relationships and family life. BoC also discussed nocturnal practice, once describing their work pattern for *Geogaddi* (2002) as 'hellish', working until 4am every day (BoC cited in Hodgkinson, 2005). The nature in which electronic compositions are constructed may explain why BoC and Tobin are spending considerable time nocturnally to develop their work. Traditional recording processes involve sequential stages of tracking, overdub and mixing whereas electronic music production does not always fit into this model since elements are derived through continual transformation and manipulation. Furthermore, components must be mixed throughout the

compositional process rather than left towards the completion of the track, requiring time and effort, as BoC explain in the following account:

> When you're finely tuning sound textures as part of the core of a song, you can't leave it to later and hope something works; you have to hear it while you write. The main thing I find us doing in the mix is removing stuff, like when you've played something a lot and you suddenly realize that something doesn't need to be loud or even there at all. There's at least one track on the record where the core idea that the song was built around has been removed at the end in the mix, almost like making a plaster-cast mold. (BoC cited in Hutton, 2005)

BoC underlines the importance of sculpting sounds during the writing process where sound design *is* an integral part of the compositional process. Their method of using a core element to develop ideas that is later discarded to leave a sonic relief, typically illustrates an example of a transformative process that is unlikely to be completed over a short period of time. Whilst BoC do not disclose any specific examples of this approach, this technique is outlined in McIntyre and Morey's study (2014: 53-54), where a sample is used as the source of inspiration to build the composition around. Musicians 'jam' to the groove of sample, taking inspiration from it without fully recreating it. Once sufficient parts have been built, the original sample is removed enabling some influence from the source to remain without incurring sample clearance costs, and loss of publishing revenue.

Whereas nocturnal practice has the advantage of minimising distractions of day-to-day interventions, enabling BoC and Tobin to reach immersive states of flow, Hebden instead advocates the notion of immersive music making as an activity that is always happening around him, as a daily recreation rather than work:

> I was recording all the time. I wanted making music to be a part of my day-to-day life, the same as eating and sleeping. I've never been the sort of person to go and spend ten hours in the studio every day. [The recording] is happening all the time. I was so committed to the idea when I was doing *Rounds* that music was something that should be going on alongside life all the time. I'd get up in the morning and watch TV, make a little music, hang out with friends, go out to dinner, come back, make a little music. Music was constantly happening. (Hebden cited in Joyce, 2013)

The utopian vision of creative practice described by Hebden was perhaps one he experienced at an earlier stage of his career prior to family commitments,

where immersive music making occurs alongside every aspect of daily life. He describes the routine of normal life as 'mundane' only to be augmented by the pleasures of music making (Hebden cited in Hodgkinson, 2003). Hebden's immersive relationship with his music and his commitment is admirable, showing dedication to his art but can only function if compatible with family life and broader commitments. The seven months taken for Hebden to complete *Beautiful Rewind* (Four Tet, 2013) is short in contrast to BoC's measured approach where an album takes several years to finish. Both BoC and Hebden's working methods illustrate the dynamic interrelations of factors that come into play (Slater, 2015: 71) where processes of transformation and mutation may perpetuate over time. The completion time for a project is naturally dependent on the aims for each individual piece and the preparatory processes for the materials at the starting point (Hebden cited in Inglis, 2003).

2.4.2 Promoting objectivity

The immersive practices outlined in these interviewees' accounts often describe the intimate involvement with every aspect of their work. Having close relations with projects under development potentially diminishes objective decision-making, consequently prolonging the completion time or worse, result in failed outcomes. For musicians such as Jenkinson, there are additional challenges where he must be proficient in simultaneous roles as bassist, drummer, programmer, engineer, producer, and listener, requiring expertise 'as part of a constellation of skills' (Slater, 2016: 22). Each role asserts its influence and ambitions on to the work, governed by economic, social, cultural and symbolic factors, as outlined by McIntyre (2008). It is not uncommon for tensions to develop between these roles where 'one tries to please the other, and yet there are divergent interests' (Jenkinson cited in Sherburne, 2012). Assuming these multiple responsibilities, requires mindfulness on the different needs for each role, and management of priorities to maintain objectivity.

Some interviewees devised ways to distance themselves from their work – a strategy adopted by working professionals who place an episodic or

dispositional distance between aspects of their work that cause anxieties or distress (Martin, 2000: 86). Both BoC and Hebden deployed strategies involving rumination to maintain objectivity with their work. The notion of taking time out to consider creative choices was perceived to have a positive impact on creativity (Cohen and Ferrari, 2010). BoC 'live with' works in progress whilst attending to other projects, during which incremental amendments are gradually made over time (BoC cited in Murnin, 2005); Hebden also prefers to work on projects and then 'sit on it for a little bit' to reflect and amend compositional choices (Hebden cited in Whitney, 2003). Living with the work has obvious advantages in promoting objectivity, but may not be practical or viable for those musicians constrained by tight contractual time arrangements. Hebden who also performs as a DJ, assesses his work in the domain during its development by testing works in progress in DJ performances to evaluate its reproduction through a club sound-system and audience reaction. A cycle of amendment through testing the work in its intended environment and audience, informs Hebden on the necessary changes he must make to achieve the results he seeks. The consumer influence on the creative process is examined in Zagorski-Thomas's study where the concept of 'functional' staging is explored, i.e. whether the placement and treatment of sounds in the record production process is influenced by audience reception rather than aesthetics (2010: 251). Hebden seeks functional staging that is appropriate for a club environment that coheres to the rules governed by the *cultural domain* in Csikszentmihalyi's tripartite model (1996), whereas approval of the arrangement's effectiveness comes from the audience on the dance floor.

2.4.3 Learning vs making

The conditions in which creativity takes place is an accumulation of factors involving an individual's history, learning, experience, background and contextual dimensions including technological development, physical environment, cultural climate (Slater, 2015: 73). To understand creative practice, one must perceive the practitioner as constantly evolving in a shifting cultural setting (Gruber, 1988: 32). The acquisition of knowledge and skills are

fundamental for artist growth, where the accumulation of these experiences can be quantified as stratified antecedent layers of *nested* time (Slater, 2015). Examples of nested periods of learning are described in Tobin's account, where he devotes several years away from performing to develop new skills and knowledge to make his album *ISAM* (2011), a body of work which involves considerable research and exploration. Although the time taken may seem disproportionate, it typically illustrates the necessary learning involved for Tobin's work to evolve. He uses Kyma for re-synthisising sound into new instruments through custom DSP algorithms – a process that involves multifold tasks of sufficient complexity requiring theoretical knowledge and practical expertise.

> [It] tends to happen more in blocks. For the last three years, up until spring 2011, I wasn't taking any gigs because I wanted to get involved in the *ISAM* record. I stayed hermited up in the studio for about three years. Even my agent thought I'd sort of retired. (Tobin cited in Kim, 2012)

Whilst the process of *learning* is necessary for artistic growth, it detracts from activities in *making* creative works. The acquisition of new skills and knowledge is clearly needed for developing growth but musicians must also find ways to satisfy their creative urges during these extended periods of learning. Tobin's work includes projects that range from those involving deep exploration, to others requiring minimal preparation. 'Two Fingers' is Tobin's collaborative side-project with electronic musician Joe Chapman (Doubleclick), a project that is less fastidious to channel his surplus creativity during periods of steep learning for his other more ambitious experimental solo projects. 'Two Fingers' is aimed firmly at developing beat-orientated tracks for club audiences, taking only a matter of hours to complete enabling Tobin to have 'fun, pulling tricks with beats and bass' (Tobin cited in Bell, 2013). 'I'm just doing whatever works and banging it out in the process of a day […] It's an instant-gratification thing' (Tobin cited in Ryce, 2012). One suspects the collaborative nature of 'Two Fingers' offers Tobin respite, enabling him to share the burden of creative responsibility by exchanging ideas with a collaborator. The spontaneous construction of these tracks is considerably different to those methods used on more ambitious projects developed over a

longer time-period where committed exploratory work is needed. Tobin's example illustrates how specific project aims require different compositional methods and skills, where these approaches are not always fixed. Hebden concurs in the following account, comparing the qualities of results achieved through spontaneous writing to those using longer drawn out methods:

> This is the track called 'Smile Around the Face'. I made it really quickly; I made it in like two months; I hadn't done that on a record for a while. I spent quite a long, long time on *Rounds*, kind of sitting with it and working on the tracks for ages. But this one, I wanted it to feel like a burst of energy. If you do it really quickly, the music's gonna be very much kind of like set in whatever mood you're in at that point; it captures that moment in your life whereas when you spend a year on it, the record ends up encompassing maybe all the things that happen to you during that year. (Hebden cited in Oscarthefuzz, 2010)

The account suggests that music made quickly is likely to encapsulate the mood and spirit of the moment, whereas tracks constructed over an entire year will encompass ideas and experiences over a broader development, as shown in Tobin's ISAM project. Hebden describes capturing the 'burst of energy' in his work which is not dissimilar to the spontaneity of Tobin's approach to his 'Two Fingers' projects.

2.5 Concluding thoughts

This chapter illuminates the self-serving nature of these creative practices, where learning and maintaining interests were often perceived over all other factors such as money and audience feedback. Despite the opportunities for free-spirited experimentation, these musicians often had clear objectives in relation to areas of interests and explorations. The discography provided a useful source for reflection on their development where reinvention rather than refinement allows them to continue producing work without repeating existing ideas. All interviewees recognised the importance of developing skills and knowledge, to enable them to approach their work in new and interesting ways. Motivation and enthusiasm was maintained by pursuing individual creative endeavours, some of which involved steep learning curves whereas others were quick fixes to satisfy creative urges. The contrast in these different approaches would result in projects taking variable lengths of time to complete,

from several hours to several months. The variety of production methods alongside the affordances of advancing technologies showed the complex nature of creative work, where workflows are often heuristic. Projects demanding longer committed learning and experimentation sometimes tensioned with economic pressures, requiring a fine balance between these factors.

3. Technological mediation

The final chapter draws our attention on the relationship between electronic musicians and their tools of creativity. Discussions on equipment frequently emerged from the interviewees' accounts since the role of technology is often central to their practice. Technological mediation is synonymous with electronic music production, where production tools are perceived as the instruments to electronic musicians but unlike conventional musical instruments, they evolve through the process of exaptation and adaptation – its purpose is often defined by the user through their interactions. This chapter seeks to gain further understanding on how these musicians perceive and adopt technological tools in their practice. Whereas compositional approaches were examined in the initial chapter, the following texts explores what they consider in the tools required to accomplish these tasks against an ever-growing choice of emerging technologies. The conditions identified in the second chapter illustrates how these creative undertakings are often but not exclusively linked to the tools for facilitation. This chapter will restate these areas of practice with emphasis on technology and its relationship with the user, hence existing themes from previous chapters are likely to re-emerge. The purpose is not to present an inventory of specific equipment used by the interviewees, but rather explore how tools are adopted and managed.

3.1 Attitudes to technology

This section explores the interviewees' view on technologies they used and its role in creative practice. Despite the affordances of new tools, history has shown repeated cases where new technologies claiming to offer radical solutions are usually met with scepticism at their introduction. Edison's phonograph (1877) was initially considered a novelty despite its ability to capture and replay sound – a function that was revolutionary at the time and continued to have significant economic and aesthetic impacts on performance; it enabled musicians to hear themselves as others experience them, changing

70

'the nature of interpretation' (Chanan, 1995: 7). Early synthesisers and drum machines in the 1970s were also criticised as 'soul-less' for their lack in 'feel' or 'touch' (Frith, 1986: 265). They were even considered a threat to musicians' livelihoods – new wave pop musician Gary Numan was banned from joining the Musician's Union on the grounds that his synthesisers diminished work opportunities for 'proper' musicians (Numan cited in Roland, n.d.).[24] Not only was technology perceived as a threat but contemptuous attitudes grew towards those who worked with music technologies as subordinate practitioners. There were notions suggesting that a 'drummer is a musician in a way that the drum machine programmer is not' (Frith, 2007: 109). These regressive attitudes have since largely dispelled, although a cultural anxiety remains in the zeitgeist where humans will be superseded by technologies; the threat of artificial intelligence (AI) is depicted in Kubrick's film *2001* (1968), and more recently by Stephen Hawking who warned that AI could pose a threat to human existence (Cellan-Jones, 2014). Whilst these sentiments did not fully transpire in the interviewees' accounts, there were general concerns over the trajectories in which emerging technologies were designed to inhibit rather than promote creativity.

3.1.1 Homogenisation of technologies

Some interviewees saw the development of technologies as misdirected towards replacing human ingenuity and effort, to serve consumer convenience rather than offering deeper user functionality. In the following account, Tobin is critical of the marketing priorities of music technologies where product is promoted as a facilitator to simplify processes that would otherwise require skill and technique:

> In the same way now, music technology is marketed primarily as a way to make things easier, from DJing to production. Which is a sleight of hand I think, by those who are trying to sell it. The notion that you can buy what you might lack through personal effort and ingenuity is very appealing to us all, given that we are inherently lazy. (Tobin cited in Thill, 2011)

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[24] Gary Numan was the lead singer for the new wave band *Tubeway Army* releasing two albums in 1979. For more information see: http://www.roland.co.uk/blog/gary-numan-interview/ [last accessed on 12th June 2016].

Tobin sees the appeal of emerging technologies that offer immediacy, but suspects these designs are mostly directed at broadening consumer appeal to boost sales. The ethos of 'easy to play' instruments is linked to a notion of musical democracy (Roell, 1989: 156-159 cited in Théberge, 1997: 29), to enable those with limited musical skills to participate in musical activities. The message conveyed in the marketing reveals an emerging paradigm in the designs of recent music production software, where priorities are largely placed on convenience over innovation; 'technology is sold as a sort of automated alternative to human effort, instead of a tool for actual progress' (Tobin cited in Thill, 2011). Most modern production software feature generous built-in sound libraries; at the time of writing, Apple's Logic X comes with a substantial 40GB of audio content, whilst Native Instruments Komplete Ultimate offer 17,000 sounds comprising 440GB of instruments and effects. Convenience and choice in vast libraries of prefabricated sounds may appear to offer consumer value for money but in practice, large sound libraries overwhelm users and discourage exploration. In the following comment, BoC argue that this generates a false perception of empowerment:

> Modern technology often gives an illusion of empowerment while in reality it's increasingly all about removal of liberty, and homogenising the user base. (BoC cited in Pattison, 2013)

BoC's account underlines the paradox where modern production technologies constrain musicians to pre-designated workflows and relations, despite their enormous potential and convenience. There is the view that creative practices are becoming simplified through the homogenisation of DAW applications, rendering complex production processes (and skills) into algorithmic functions executed by single key commands (Slater and Martin, 2012). Improved accessibility and convenience is however, an attractive offering for potential consumers, appealing to a wider audience of novice users. Most DAW environments are equipped with sufficient tools to enable 'in-the-box' music production, which consequently allures users to adopt the same tools and sounds thus homogenising the way in which these works are produced. The problem does not necessarily concern technology itself but more with the way users interact with it, and to the extent in which they adopt them. Breaking

away from those suggested conventions is likely to promote originality and freshness in the work. In the following account, Hebden describes how diversity in production approaches, creates far more interesting results which contributes towards a healthier cultural scene:

> Maybe why it was more interesting ten years ago is that even if [live electronic music] wasn't so widespread, there were all sorts of different ways of doing it. Everybody was using different software and different methods. (Hebden cited in Joyce, 2013)

Hebden's comment refers to an era where live electronic music performance was less commonplace prior to the emergence of established performance-related tools such as Ableton Live. Electronic musicians had little choice but to adapt whatever equipment available to them, to migrate studio-based compositions into a live context. These constraints forced them to develop innovative methods using a variety of technologies that were not designed for performance purposes. Due to the unique nature of each setup, interesting juxtapositions could be achieved adding interest to the performance. Ableton Live remains a popular platform for live electronic music performance amongst many electronic musicians, although Hebden is mindful of its role:

> I don't know much about Ableton at all and the sorts of things it can do. There's probably like a million functions in there that do the sort of functions I want to do. I'm very wary of them because I don't want to sound like everybody else. (Hebden cited in Red Bull Music Academy, 2013)

Although Hebden uses Ableton Live, he is conscious of the trappings of becoming exclusively reliant on its functions available within its environment, as this may influence how his work will develop and sound. Instead, he finds his own methods by incorporating external hardware tools with Ableton Live, to acquire results that may otherwise be emulated using the software's built in plug-ins. Yet the results he obtains are sufficiently different due to the interactions between software and hardware domains. The sum of these seemingly small production choices is significant for Hebden to achieve a unique personalised sound in his work.

3.1.2 New ideas do not require new technologies

The concept of technology 'linked to the notion of progress and change' (Théberge, 1997: 111) is widely endorsed by manufacturers of electronic musical instruments, as conveyed in their advertisements in music periodicals. Promoting a culture of renewable consumption encourages musicians to purchase music technologies that offer perceived gateways into the latest music trends, enabling manufacturers to continue supplying consumers with new products. An example that illustrates this notion of progress can be seen in the launch of the Yamaha DX7 synthesiser in 1983 – one of the first mass-produced polyphonic digital synthesisers, marking the beginning of the decline for analogue synthesisers. The proliferation of digital musical instruments during the 80s was spurred by rapid growth in the home computer market through the development of smaller, low cost integrated circuits replacing expensive discrete component circuit designs. The transectorial innovation in microprocessor development for home computers enabled cheaper manufacturing of digital instruments using the same microprocessors, to propel the digital synthesiser market (Théberge, 1997: 58). Sales figures for the Minimoog during the decade of 1970 were 12,000 units, whereas Yamaha's DX7 sold 200,000 units in three years since its launch (Théberge, 1997: 73). Unlike analogue synthesisers, DX7s had few tactile controls for real-time manipulation and were difficult to program but came prefabricated with banks of pristine digital sounds. It is perhaps most identifiable for 'its characteristic preprogrammed presets, such as electric piano, bells, and other "stuck" and "plucked" sounds with complex attack transients' (Brøvig-Hanssen and Danielsen, 2016: 46). The Minimoog was monophonic and required some knowledge in synthesis to operate it, whereas the DX7 had preloaded polyphonic sounds that enabled anyone with no synthesis experience to use them (Zeiner-Henriksen, 2014: 32). Musical instrument manufacturers wanted to advocate digital instruments as progress and change, yet analogue synthesisers offered greater tactile manipulability. However, many people view the concept of 'digital' as 'machine' and 'not human' as opposed to 'analogue' having a more human quality and feel (Kvifte, 2007: 120). Analogue electronics is based on a continuous and variable flow of electrical current whereas digital

electronics operate on discrete binary digits which some people consider inappropriate for expressive and emotional forms of human communication such as music (Zeiner-Henriksen, 2014: 36). One argues whether digital instruments offer improvements over analogue technologies, but rather alternatives in choice and increased convenience for consumers. In the following accounts, Jenkinson is critical of examples where new technologies are hastily adopted in productions to provide novelty:

> There's no specific need for a new thing. Assuming that there's a link between 'new equipment' and 'new music' is bullshit. I'm extremely sceptical about the obsession with novelty. I'll shoot it down every day of the week. (Jenkinson cited in Griffiths, 2012)

> The history of popular music is littered with examples of the flash new trend, but in 20 years' time it's just crap, vacuous gimmickry, but the thing that doesn't erode is great writing. (Jenkinson cited in MusicTech.net, 2015)

Jenkinson strongly rejects the notion that new technology is linked to the development of new ideas. Fresh music does not manifest from simply using new gear, as often conveyed by music instrument manufacturers; the concept is perhaps reinforced in the advertisements that promote electronic music's consumer culture, featured in music technology periodicals (Théberge, 1997). Jenkinson views the deployment of new technological fads as poor practice, since he perceives it to quickly outdate a composition. He rebukes cases where new 'flash' technologies are deliberately adopted in effort to appear relevant and up-to-date. Embracing new technologies does not necessarily produce compositions that are fresh. 'I think the danger is the emperor's new clothes thing, whereby "I've got a new instrument so I've done something new" – well not necessarily' (cited in MusicTech.net, 2015). Jenkinson asserts that musical ideas in 'great writing' is more important than adopting technological gimmickry, suggesting technology is subservient to musical ideas – a view shared by professional music producers interviewed in Martin (2014: 233-234). The significance of whether tools are new or old becomes irrelevant – producers refer to equipment that delivers what they require for each project. Tobin concurs Jenkinson's views, suggesting there is often too much emphasis placed on equipment in the culture of electronic music:

> I'm not a tech-head and I don't want to lose myself in valves and pretty lights. There's so much bullshit surrounding equipment. I'd much rather listen to some badly produced wicked tune over some crystal-clear ambient nonsense produced on a Neve desk. (Tobin cited in Young, 2003)

Once again, Tobin's comment resonates with the view that technology is subservient to creative ideas; the development of strong creative ideas outweighing any technologies, even the industry standard Neve mixing desk associated with professional industry practice and sonic excellence, becomes irrelevant if the musical ideas are poor.

3.1.3 Obsessing and collecting

The interviewees generally perceived the culture of consuming and collecting equipment, as distracting from creative work. To understand the culture, one must acknowledge the role in which music periodicals disseminate music ideas, aesthetics, and ideologies, redefining the 'material-symbolic' status of musical instruments as objects of consumption and use (William Leiss (1976) cited in Théberge, 1997: 112). In *Keyboard* magazine, Bennett asserts that musician's magazines have a dual identity, 'adverting for and bragging about new equipment while at the same time celebrating the mythical position of old equipment' (cited in Zeiner-Henriksen, 2014: 37). The underlying message suggests how consumers can attain the 'sound' of their favourite endorsed artist by buying the products they use. Music technology periodicals such as *Future Music*, *Sound on Sound*, *Computer Music*, and online music technology sites such as *Sonic State*, *Resident Advisor*, *Synthtopia*, *Muffwiggler* are a rich source of information, where the tools of electronic musicians are scrutinised and discussed. User-generated content on sites such as *Gearslutz* and *Equipboard* provide further speculations on the types of technologies artists use.[25] They reinforce a culture in music technology consumption through advertising, but also in articles that reveal the production tools used by artists, not unlike endorsements found in music instrument advertisements

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[25] Equipboard.com is a community based website where members can upload relevant information on the type of equipment artists use. Further information can be found at: http://equipboard.com/ [last accessed on 21st May 2017]. Gearslutz is a website dedicated to professional audio tools featuring reviews, forums, and information on music production products. Further information can be found at: http://gearslutz.com/ [last accessed on 21st May 2017].

(Théberge, 1997: 118). It is therefore unsurprising to learn that the relationship between music periodical publishing industries and musical instrument manufacturers are closely linked to influence the musical/cultural landscape (Théberge, 1997: 94). Music technology magazines are largely aimed at promoting the benefits of technologies which are likely to draw discussions on equipment rather than the actual process of creating music – a problem that BoC acknowledge where 'you end up spending all your time reading magazines and talking about high-tech gear but never actually writing any music' (cited in Micallef, 2002). The attention is often on the tools of music making rather than the music itself - a trait that is perhaps not surprising in electronic music where the culture is often perceived as technologically driven. BoC reiterates the importance of developing strong ideas over the tools used to create them:

> Too many new electronic musicians are obsessed with hi-tech gear and software, and that's what they devote 99 percent of their time thinking and talking about. It's like a sculptor making something out of clay. He can buy the best clay and the best tools, but he needs to have some good ideas in his head in the first place. (BoC cited in Georgopoulos, 2002)

BoC's account underlines the attention that is often misplaced on equipment and software in electronic music production culture, where musicians spend too much time fetishising over equipment rather than developing musical ideas. They argue that it is unusual for artists to obsess over their tools, in the same way that a sculptor is unlikely to obsess over their materials and tools, though this may indeed occur in privacy away from consumer scrutiny. Some interviewees were even discouraged over the thought of acquiring new equipment due to the demands of having to learn and explore how to use them, a problem described in Jenkinson's account. Only through exploration and discovery can Jenkinson establish the instrument's potential and compositional role.

> People fetishise gear. I don't. People talk about 'retail therapy'. I have the opposite. I have 'retail depression'. After I've bought something for a couple of weeks I'm like 'urggh ... '. For me owning a new instrument is a responsibility. I'm absolutely committed to exploring it so whenever it arrives there's a big job at hand (Jenkinson cited in Griffiths, 2012)

The comment illustrates Jenkinson's disinterest on obsessing over equipment, criticising those who amass instruments and production tools, where some may be driven by consumption rather than creativity, whilst others may simply enjoy the attributes it brings to their work. He is critical of those who amass lots of software tools and casually deploy them without exploring them in depth; 'they hardly […] do that much with any of it' (Squarepusher/Keith Fullerton Whitman Interview uploaded by Rush, 2014). In the following account, Jenkinson would rather see instruments actively used for sonic exploration than relegated as prize trophy purchases to collectors as subcultural capital (Thornton cited in Zeiner-Henriksen, 2014: 33):

> I don't endorse that collector's market for synths, I fucking hate it when they're just investing in things that should be in the hands of musicians, but that's a remarkable bit of kit. I don't know if I should tell you that because the last thing I want to do is prop up the value. People just have them on show now. But it's 'What have you done with it?' That's what I'm interested in. (Jenkinson cited in Griffiths, 2012)

Jenkinson's comment refers to his highly sought after Yamaha CS-80, a 1976 vintage analogue polyphonic synthesiser that fetches the highest prices for second-hand synthesisers of similar specification.[26] Although its scarcity and value suggests it is highly collectable, Jenkinson is more interested in its unique features not commonly found on other polyphonic analogue synthesisers: polyphonic velocity sensitivity, polyphonic after touch, and a pitch bend ribbon across three octaves of the keyboard (Vail, 2000: 179). Tobin shares a similar standpoint on collecting equipment. He does not regard himself as a collector but rather acquires items that serve a purpose in his creative process. Tobin's comment below describes his studio to have little appeal to others, since the equipment only serves his specific method of working (Tobin cited in Steinberg, 2011):

> I don't collect gear, synthesisers, samplers or any of that stuff. Everything I have is about the function that serves larger purpose for me creatively, it's not about just hoarding shit. (Tobin cited in Roland, 2015)

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[26] At the time of writing, on EBay a Yamaha CS-80 fetches around the region of £10,000 to £15,000 compared to other flagship synthesizers; Roland Jupiter 8, £5,000 to £6000, Oberheim OBX, £7000 to £8000. Further information on the Yamaha CS-80 synthesiser can be found at: http://www.synthmuseum.com/yamaha/yamcs8001.html [last accessed on 12th July 2016].

Whilst Tobin rejects the idea of hoarding equipment, some musicians accumulate gear not because they actively collect coveted instruments, but rather their work requires them to source sounds from a broad sonic palette. Ólafur Arnalds,[27] a multi-instrumentalist and composer prefers the characterful sound of vintage equipment over software instruments, even in those items that do not fully function. Zeiner-Henriksen asserts that many older instruments are forgotten and become obsolete – only some instruments acquire the 'requisite prestige' in their quality or features that makes them stand out against other instruments (2014: 37). In the following account, Arnalds explains why his studio is amassed with old electronic instruments and outboard:

> When I'm composing, one of the most important things for me, and the reason why I like to have all these things here [in his studio surrounded by synthesizers and equipment] and not just go later to another studio and record everything is that from the very beginning of composing, I need to know what that element is going to sound like. The sound of my piano, adding felt on the grand piano and the way I place the mics; it makes it very intimate and that is part of the composition. If I was in a big concert hall with a big Steinway, and a Decca tree ten metres away, that's a whole different song even though it's the same melody. (Arnalds cited in Spitfire Audio, 2016)

His attention to attaining the correct timbral qualities as part of the initial compositional process, is the reason why Arnalds collects instruments and equipment. Composition traditionally concerns the placement of notes as its primary consideration, with often vague guidance on the sound used. In Arnalds' view, attaining the correct instrument timbre is as important as finding the appropriate musical notes, where physical tools provide the means and sounds he seeks; the assertion is, technical and musical considerations are both equally part of the compositional process and therefore given the same precedence. This view is contrary to those expressed in Martin (2014: 234) where the exploration of musical ideas is valued above technological processes in a chronological hierarchy. Having physical instruments at hand enables Arnalds to manipulate at source to his taste, i.e. adding felt on the piano's strings, and experimenting with microphone placement. The tactility of physical instruments invites interactions unattainable in software emulations;

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[27] Ólafur Arnalds is a BAFTA wining Icelandic composer and multi-instrumentalist who mixes ambient electronics with pop. Further details can be found at http://olafurarnalds.com [last accessed on 31st May 2017].

their unique idiosyncrasies are likely to produce more interesting results over those solely constructed in software. BoC also prefer the use of physical instruments, once suggesting they have a collection of 200 instruments which they use as raw sound sources to sample and further manipulate (BoC cited in Young, 2005):

> We've got a pretty weird collection of instruments at our studio - quite a few cheap guitars and a lot of flutes, percussion and old foreign instruments. We don't have that much money, so we just pick things up in second-hand shops for pennies. Mike recently picked up an Aeolian harp for £30 that plays itself in the wind. Our studio looks like a junk shop. A lot of the time, we play things quickly on a 'real' instrument, get it into the sampler, and then we just destroy the sound. (BoC, 2002: Northern Exposure)

The account suggests BoC's collection is not made up of sought-after instruments, but rather rarefied instruments of which some are cheap, unconventional, and even broken. Their eclectic taste in instruments, along with the absence, and possible deliberate non-disclosure of hi-tech equipment, suggests they are more concerned with finding unique and unusual qualities rather than coveted instruments. These characterful sources offer originality in contrast to the homogenised prefabricated sounds offered in new digital technologies. Both BoC and Arnalds can be perceived to adopt approaches that retain authenticity in their work, through the theoretical approaches described in Zeiner-Henriksen (2014).

3.2 Tools for realisation

We have learnt that the interviewees do not actively consume equipment for the sake of keeping up-to-date with technological innovations. They are more likely to use tools they are already familiar with, and only adopt new approaches or technologies where necessary; the equipment is merely a means to an end and is transparent in the process. According to Folkstead, Hargreaves, and Lindström, the computer functions as a tool for realising musical ideas and is 'more or less transparent in the creative process' (1998: 95). Martin also asserts that music producers craved for their technologies to remain invisible in the process during the capturing of ideas (Martin, 2014:

236). Hence, technologies should be functional and effective in facilitating musical ideas – a view Hebden shares through the control he finds in using older, familiar tools:

> I'm not interested in technology itself - everything I use is completely out of date, as that way, I feel completely in control of it – but I am interested in making music that could not have been made at any time but now. (Hebden cited in Hodgkinson, 2003)

Hebden's preference for obsolete technologies suggests he is accustomed to using the same tools for a considerable period of time, enabling him to develop an intimate understanding of their role and function, since 'we crave intimacy' in the tools we use (Eno, 1999). He relies on these tried and tested tools which delivers the results he wants. Hebden's choices reflect those of experienced producers who move forward in their practice 'with an eye to keeping the best of what works and discarding very quickly what doesn't' (McIntyre, 2015). Control and familiarity outweighs the unfamiliarity of new tools that require a breaking-in period of learning and exploration so that its functions and limitations can be understood. A culture that emphasises frequent renewing of technologies may entice users with new ways to create, but Hebden is more interested in getting on with the process of making music rather than learning new tools. Using obsolete technologies to make music 'that could not have been made at any time but now', suggests Hebden has gained fluency and transparency with these tools, that he controls them beyond the influence they exert. Zeiner-Heniksen asserts the use of older instruments may be 'a reaction to the deficiencies of the current state of the art and an expression of dissatisfaction with the direction of the development process' (2014: 38). Despite the steady flow of new music technologies that are designed to facilitate music makers, Tobin believes that these products do not always address the creative needs of users:

> One thing I've noticed, as I gradually and happily turn into a grumpy old man, is that evolution of technology and technology-driven music isn't always in sync. I think this is because, in the end, creativity doesn't really need technology. It's very much the other way around. (Tobin cited in Thill, 2011)

Tobin believes there is a discord between the music he makes, and the supply of new production tools. His comments suggest the functions offered in some

new music production technologies often fall short of the things musicians require in their creative practice, forcing tools to be adapted accordingly. The continual flow of new products feed consumption rather than innovation, seeing some technologies marketed to offer solutions to problems that do not exist for professional electronic musicians. Nevertheless, technology remains vital to facilitating the realisation of ideas, but still requires human skill and expertise to achieve results, a sentiment echoed in Tobin's view:

> At the end of the day, it's all just tools, it's what you do with them. I would never say that you need this to sound good, or you need that to make a good tune. I really firmly believe that music comes from people and people will make amazing stuff out of nothing. (Tobin cited in Beatport News, 2014)

Tobin's account reaffirms his position on creative ideas as more important than the technologies used to realise them. He is unequivocal that compositional outcomes rests firmly in the creative actions of people rather than the tools they use, despite the affordance of new creative possibilities. Moore *et al* (2013: 324) recognise the value of tools to facilitate creative processes that otherwise would not be possible to achieve, yet Tobin argues that it is people, not machines, who create art even under constrained circumstances and resources. Take the example of African-American grass root musicians in the 1930s who often were bereft of possessions yet could create remarkable music using primitive instruments such as the *diddley bow* - a plucked single tensioned string that provided the foundation for early blues music (Oliver, 2003: 416). The result illustrates remarkable innovation, where creativity manifests from human interactions using seemingly simple tools. For the electronic musician, their tools continues to attract scrutiny as evidenced in studio tours featured in music technology magazines and online sources. Jenkinson, like some musicians, initially maintained secrecy over what he used in his professional practice by refusing to disclose details on his studio equipment in fear of others plagiarising his methods, as described in the following account:

> There isn't much I feel that I've ever really exhausted. I don't do endorsements and I don't do interviews with technology mags because I don't want to be showing what's in my studio and saying 'you've got to have this to make the cool new music'. I used to be super secretive but now I don't care anymore because - more than ever - I'm convinced that

'the secret' is something that I can't actually giveaway… I'd love it if you emphasised that. That's why I've been reticent to do this kind of interview for years. You have to remember: It's all about how you approach the gear, not the gear itself. (Jenkinson cited in Griffiths, 2012)

The account shows Jenkinson taking a more relaxed stance on discussing the contents of his studio, knowing that the essence of his work exists only through the way he uses technologies and the choices made during the creative process rather than the equipment alone. Although he acknowledges the purpose of his interview is potentially aimed at those with an interest in music technology, he is adamant that technology should be a secondary consideration whereas the interactions between the user and their tools have greater significance.

3.2.1 Proficiency and fluency with instruments

The interviewees thought of their production tools as instruments where the approaches shared similarities to those applied to conventional musical instruments. Hebden asserts 'it's not a traditional instrument in any way' but it is the thing that he uses to create his best music on (cited in Les Frères du Son, 2011). He uses a laptop computer not through convenience, but rather to 'make the music in a creative way' which perhaps refers to his non-conformist approach to composing without a standard piano keyboard interface using only the laptop (Hebden cited in McGlynn, 2010). Additionally, its portability and affordance of working 'in-the-box' enables music-making in less formalised environments; 'as technologies get smaller and lighter, locations previously unusable for musico-technology creativity become available' (Slater and Martin, 2012: 59). The notion of production technologies as instruments is already acknowledged by Eno who perceives the recording studio as an instrument; he argues that the composer does not need to bring a conception of a finished piece to the studio but instead composes in relation to the recording facility (cited in Cox and Warner, 2007: 129). Technologies can be played like an instrument, where the recording studio can be used 'to fashion constructs otherwise impossible' (Dellaira, 1995: 200). Yet there are distinct differences in approaches that are adopted for conventional instruments, and

those used in production-related technologies. Jenkinson, who is known both as an accomplished instrumentalist as well as working extensively with computer based technologies, explains these differences:

> The line I see is that with a computer you're always thinking ahead. With an instrument you've gotta think in real time. You've gotta be doing it in real time – there's no planning and there's no thinking ahead. I suppose the whole thing gets extremely blurry. Now with editing techniques and software you can turn a bunch of disconnected little bits of playing into what resembles a single smooth instrumental take. The difference is primarily in that real-time experience of making the music, but in the end, there is very little difference. It's an instrument – even a musician is just another sound source. (Jenkinson cited in Assar, 2012)

Jenkinson illuminates the difference between real-time music-making using musical instruments, against non-real-time approaches on computers. Instrument performance involving improvisation is spontaneous and drawn from the subconscious, whereas pre-conceived composition is intentional and derived from the conscious (Holden cited in Ableton, 2016). Jenkinson however, perceives these differences as inconsequential in the context of computer-based music production, since both music-making methods generate sound materials which are likely to be further edited and manipulated. Playing an instrument requires a degree of competency and proficiency to achieve musical outcomes; electronic musicians who use computers as their main instrument, similarly requires fluency with their production tools to effectively translate ideas into musical works, as emphasised in the following account:

> Get something but then learn it; learn it inside out because that's the key thing. Fluency is what you need to basically translate things from your imagination into a real world activity. If you haven't got fluency I think you're kind of a bit high and dry, and especially if you're trying to mix up the activities of playing live instruments with electronics…. Basically, just learn the gear; learn it inside out. (Jenkinson cited in Radio Active Jazz, 2014)

Jenkinson argues the importance of learning his tools to gain in depth understanding of its function, enabling him to work quickly and efficiently. Where there is plurality in practice, fluency is particularly important for musicians who mostly work alone undertaking multiple roles between activities of listening, playing, engineering, and producing. Herbert confirms this view in that 'a music producer from an electronic perspective or from a dance

perspective tends to be someone who does everything and has the vision' (cited in Martin, 2014: 189). Hence, competency with tools across multiple skill areas, enables creative work to be effectively carried out in flow. Some electronic musicians prefer to keep relatively simple studio setups, using only a few select tools they understand intimately. Electronic musician Robin Rimbaud, also known as Scanner, once described accumulating an abundance of equipment of which he eventually sold; 'I don't need it. It played no role in what I do and was actually more of a distraction, to be honest' (Rimbaud cited in Martin, 2014: 224). Having a manageable number of tools helps promote a deeper understanding of the equipment – a view shared amongst the interviewees. Jenkinson states how he generally has two or three production tools he knows well (Jenkinson cited in V Knid Esq, 2004); 'I'm not a gear collector and am more interested in getting to know a few key pieces in depth' (Tobin cited in Steinberg, 2011). Hebden also shares a similar approach in using a few select tools by keeping his set up, simple and functional – qualities that resonate with the views expressed in Martin (2014: 235), as described in the following account:

> My whole thing is that I don't use a lot of equipment, I just keep it really simple. Good music's about ideas, really, and I don't want to get trapped in the whole thing of constantly worrying about my new software, and learning how to use it all the time. I feel I've mastered the equipment I've got, and I'm at the point now where I don't have to think about the equipment any more. I can concentrate on making the music. (Hebden cited in Inglis, 2003)

Fluency enables Hebden to work fluidly in a state of flow, where the process of music-making becomes seemingly effortless. He strongly supports the view of learning how to use what you have and sticking with it, rejecting the notion of updating production tools to avoid the chores of learning new software. His reluctance to adopt new tools is not through complacency, but rather to direct his efforts on creative rather than technological concerns, where more time can be allotted on learning about music, finding rare records as inspiration, and gathering materials for his personal sound diary. Having the ability to use the equipment effectively is a sentiment shared by Tobin:

> I like things that are user-friendly and intuitive, and I've never been an advocate of that elitist attitude that if you don't know about the latest or most complicated bit of kit, you

can't cut it. That's bollocks! What's important is your ideas and being able to get them out as effectively as possible. (Tobin cited in Young, 2003)

The account describes Tobin's preference over equipment that is easy to use and intuitive, enabling him to quickly develop ideas into finished works. Although Tobin rejects the notion that new and complex technologies are necessary to achieve results, he eventually adopts specialist tools such as Kyma and modular synthesisers as part of his practice in later works. Whilst his method may seem to contradict these earlier views, Tobin's transition into using these complex technologies are likely to be informed by the possibilities these tools provide rather than those concerning power and elitism; embracing these complex processing tools are part of Tobin's natural progression and development.

3.2.2 Opacity and affordance - enslaved to the (quantised) rhythm

The presence of technology is intrinsic to all recorded music, whether in capture, manipulation, or creation, yet its presence is not always detectable. Technologies may be traced on recordings through the presence of familiar prefabricated sounds, instruments, effects, or even the timing characteristics of a sequencer. Some interviewees adopted tools in a manner where they deliberately revealed their sonic signature 'using the very character of those instruments, [sic] making a big deal of it' (Jenkinson cited in Morpurgo, 2012), whilst others aimed for an organic quality in the music that belies its programmed origin; 'It's what I'm attracted to really, sounds that have those qualities. It's always changing' (Tobin cited in Young, 2003). Jenkinson's former comment describes how he purposely embraces the characteristics of digital tools in his work whereas Tobin's latter comment illustrates a transparent approach where the equipment he uses is barely traceable. Brøvig-Hanssen posits this as 'opaque mediation' which considers the amount of technological exposure, in contrast to 'transparent mediation' where the technology is undetectable by the listener (Brøvig-Hanssen in Danielsen, 2010: 159). The transparency of technological mediation can be explained through the example of Auto-Tune, an industry standard pitch-correction tool

used for vocal production. Extreme applications of Auto-Tune such as those featured on Cher's 'Believe' (1998)[28] is easily distinguishable and can be considered 'opaque mediation', whereas discrete applications can produce natural-sounding results or otherwise 'transparent mediation'. However, it can be argued that both natural and unnatural-sounding results can be experienced as opaque mediation, since it might involve the same amount of intervention to achieve a transparent mediation as it does for opaque mediation (Brøvig-Hanssen and Danielsen, 2016: 8). The perception on whether technological mediation is opaque or transparent will vary across different music genres and individual expectations (Ibid., 7).

The opacity or transparency of technologies is described as 'a sign of technical skill [...] is the removal or invisibility of technological influence from a studio setting' (Martin, 2014: 236). Folkstead, Hargreaves, and Lindström argues that *all* computer mediation is transparent since the computer merely functions as a tool for realising musical ideas (1998: 95). This does not suggest that *all* opaque mediation is a signifier of incompetence – deliberate technological opacity can be creatively informed, as described in Jenkinson's earlier comment. Those who are less adept with their tools are unlikely to have the skills to transcend their work entirely from the influence of the technologies used. The skills associated with these interactions and what technology enables users to accomplish, can be understood through Mooney's concept of frameworks and affordances (2010) where frameworks describe the physical and conceptual tools for music making, and affordances is what it allows us to do. Take the violin (framework) as an example; untrained users can scrape the strings to generate sounds, which can be considered an affordance at the lower end of the spectrum, whereas playing an advanced technical piece requires skill – an action at the higher end of the spectrum of affordance. Actions that reside within the spectrum of affordance can be perceived as the instrument's lexicon; the differences between low and high spectrum does not suggest one is better than the other, but rather illustrates how some actions

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[28] Cher's 1998 single 'Believe' was one of the first records to feature extreme pitch quantisation using Auto-tune. More details on Auto-tune and its use in popular music, can be found at:
https://www.theguardian.com/music/2010/apr/06/auto-tune [last accessed on 13th July 2016].

are easier to achieve, whilst others are more difficult (Mooney, 2010: 145). If we now consider a DAW sequencer, its design coupled with the visual interface easily facilitates the writing of music in a 4/4 meter. Novice users are likely to conform to this convention and place MIDI notes on a quantised grid of time sub-divisions, whilst using built-in sounds such as musical loops and plug-in instruments; these actions are relatively easy and can be considered an affordance at the lower spectrum. DAW technologies affords some genres of electronic music, particularly EDM, to be easily fabricated using generic factory-made sounds and patterns, rendering some music genres worthless in artistic value (Holden cited in Ableton, 2016). This perhaps explains why some genres that exhibit opaque mediation are held in low regard by electronic musicians, they would rather disassociate themselves from those genres entirely. BoC have even publicly expressed their disinterest in electronic dance music; 'actually we never wanted to make IDM, in fact we aren't really interested in dance music […]. We are no techno kids' (BoC cited in Poolman, 2005).

> We're not huge fans of electronica specifically. Technology has made it so easy for anyone to get into producing music, especially electronic music, that the whole electronica scene has been diluted. It's allowing a lot of mediocre music to be released. (BoC cited in Davenport, 2005)

BoC's reference to the 'dilution' of electronic music perhaps highlights their perception on the proliferation of mediocre EDM recordings, perpetuated by DAW technologies that offer gratifications through ready-made, genre-specific loops and sounds. The stifling of creativity through mediocrity is summarised by president of Stanford University, Gerhardt Casper at the Industry Summit of the World Economic Forum, on September 18, 1994: 'we can readily purchase mediocrity, which will lead to nothing other than more mediocrity' (cited in Csikszentmihaly, 1996: 404). One suspects BoC are motivated to defy these unremarkable recordings that dilute the culture. Jenkinson also disapproves of the impact new music production software has on current electronic music; 'You look at a lot of electronic music now, […] it's all new software but it sounds like f**king clockwork crap' (Jenkinson cited in MusicTech.net, 2015). His reference to 'clockwork' suggests these works

sound clinical and lack the qualities in feel and emotion. Technology facilitates the construction of 'clean, well-produced' music, devoid of skill and craftsmanship – qualities that are expected in works of art (BoC cited in Sherburne, 2002). Whilst technological mediation is present in all forms of recorded music, the opacity or transparency of technology is 'more the result of how technology has been used in the genre than of how much has been used' (Brøvig-Hanssen and Danielsen, 2016: 151). The interviewees are conscious of technology and its influence on their music, forcing them to develop transparent approaches. The desire for technologies to become invisible in the creative process so that more attention could be placed on music itself, was asserted in Martin (2014: 236). Transparency involves actions that are higher in the spectrum of affordance to successfully conceal traces of technologies, requiring skill and knowledge. Jenkinson warns of the danger that users simply become demonstrators of technology rather than those who have full control over their tools; 'If you don't play the gear, the gear plays you' (Jenkinson cited in Griffiths, 2012).

3.3 Redefining technology

There is general acknowledgement amongst the interviewees that innovation in music was not reliant on using the latest technologies, as discussed earlier in this chapter under *New ideas do not require new technologies* (p.74). Adopting the latest innovations may open new possibilities, but it is the way they are used and the creative decisions that determine whether works of artistic value, are achieved. It is not uncommon to find artists using technologies in a manner beyond their intended purpose (see discussion below on TB-303). The interactions between user and their tools determines the purpose and role of the technology through exaptation. This sociotechnical perspective on technology and its meaning correlates with Bijker's view who rejects the notion that the meaning of the artefact – in this case, music production tools, is already defined within the technology itself. He asserts 'how technologies are shaped and acquire their meanings in the heterogeneity of social interactions' (cited in Zeiner-Henriksen, 2014: 28), in other words, the

technology's function and purpose is revealed through the way it is used. In the following account, Jenkinson describes his explorations with technologies beyond their design:

> I mean there was one particular moment I remember as when I was about ten and they'd broadcast a section of the Jimi Hendrix Monterey performance where he set fire to his guitar, and… I mean as much as I suppose you might call artistic endevours in some ways creative, I quite like the idea of destruction as well and particular the sound that his guitar was making when it was melting and being smashed to pieces; that absolutely fascinated me. Quite seriously, I love the idea and exploring what the equipment does when you push it to the limit and beyond. (Jenkinson cited in Morning Becomes Eclectic, 2012)

The ritual-like spectacle of Hendrix's iconic burning of his Fender Stratocaster at Monterey International Pop Festival in 1967, accompanied by the unchartered sound of an amplified instrument under duress, evidently left a lasting impression on Jenkinson as a child. Aside from the theatrics of the burning guitar (only two instruments were ever set alight onstage during Hendrix's career), it was Hendrix's playing style and use of distortion and feedback that was distinctively fresh. The innovation was in the approach to the instrument rather than the instrument itself.

3.3.1 Subversion – extending the lexicon

The misuse and abuse of technologies was identified in chapter one under *Destruction and degradation* (p.29), as a familiar practice amongst the interviewees who push the functionality of their tools beyond its intended purpose to reveal new possibilities. Subversive use of technology is often viewed as ingenious and creative, and may even perceptively increase the artistic value of a work. In the following account, Jenkinson shares his views on seeking new functionality in the tools he uses:

> With some of the instruments I've used, people would be surprised about some of the results I've got out of them because they're not designed to do certain things and yet, if you put your mind to it and really get to grips with how it's built and not the manufacturer's intentions, any machine will do a number of things above and beyond what the manufacturer intended. It's just looking at it with an open mind, then those things become apparent. (Jenkinson cited in MusicTech.net, 2015)

The account describes Jenkinson's open-minded approach to instruments that enables him to find new functions. Evidently, Jenkinson seems proud that he can attain results that others find impossible. Attaining unique creative results through the deliberate misuse of technologies can be perceived as discovering new affordances at the higher end of the spectrum. The use of repurposed technologies can be traced in other related fields of music-making, from Cage's prepared piano where the timbre was modified using foreign objects inserted between the strings (Griffiths, 2002: 21), to the practice of circuit-bending or hardware hacking which involves 'the creative transformation of consumer electronic technology for alternative use' (Collins, 2006: xiii). In truth, subversion of technologies is quite often a consequence of resourcefulness and happenstance; Ghazala, who writes about the philosophy and art of circuit-bending, describes himself as being a penniless teenager who craved to explore synthesisers but could not afford to buy one; 'in this shorted-out mini amp, I had discovered a sound source within my means for exploring synthesis and experimental music' (2004: 97). The story of hardship shares similarities with Jenkinson's own experience as a young aspiring musician where resources and money were scarce:

> …it comes back down to the principle which I was forced to adhere as a kid which was basically do the best with what you can because, the means I had access to were very limited, so it wasn't the question of sitting there and going, 'well I want to have this new instrument' because I didn't have any money; I didn't have any way of going and getting those things. It was the case of, well if I want to try to explore ideas; if I want to try and express these things, I've got to use the things that are in front of me no matter what they are. I think my sympathies will remain in that direction because I think it seems to me a function of privilege to be able to specify in advance, your instrumentation; to specify the things that you want, to facilitate your compositional endeavours. There's something I find more endearing about the process and ultimately, more appealing about the process of making do with what you find around you. (Jenkinson cited in Radio Active Jazz, 2014)

The account explains Jenkinson's exhaustive approach to the equipment he uses as habitual practice, borne from not having the money to buy instruments of choice which force him to find creative and resourceful ways to make music. His account resonates with those artists whom have earned their position of respect in their trade, through skill and ingenuity to overcome hardship. Jenkinson suggests the way in which instruments are explored is far more important than the instruments themselves. Furthermore, such views may be traced to those who share similar early experiences as bedroom producers

with little equipment or money, a circumstance that forces one to explore and maximise the creative potential of whatever is available. Jenkinson is amongst those musicians who continue this philosophical approach, as shown in the following account where creative subversion remains central to his approach with technology:

> I was given this really cheap hand‑held cassette recorder made by some unknown brand that existed for a year or so, and that came with a small microphone. I was captivated by being able to record with it, but I also noticed a number of other things: if I walked around with the tape deck, the pitch would modulate, creating this almost drunken effect. If I put my fingers on the rollers while the cassette was playing, it would speed up the recording, and if I waved the microphone around, it altered the pitch of the recorded sound. I realised that what you're supposed to do with a piece of equipment was only a small subset of what you can actually do with it. And so, the initial intention of the recorder, to capture speech and music, went completely out of the window. This is still one way of summarising my approach to things. (Jenkinson cited in Tingen, 2011)

The account describes exploratory learning with a hand-held cassette recorder subverted into a pitch and time modulation device. In Jenkinson's view, the technology's intended function merely represents a small part of its creative use, but 'that doesn't mean I'll always use it with respect or in a sophisticated way' (Jenkinson cited in MusicTech.net, 2015). Jenkinson's latter comment suggests he does not rule out the use of crude and abusive actions to force the technology beyond its normal operations. In the following account, Hebden offers his view on subversion being linked to innovation.

> Everybody is thinking hard to do new and wonderful things. But in the past the main innovations in music came from the abuse of it. Like Jimi Hendrix's use of the whammy bar combined with feedback to create those screeching howls, the same way as when people that took samples that were supposed to recreate symphonic sounds or whatever, sampled James Browns drums instead and made hip hop beats. The moment I really look forward to is somebody taking a piece of technology and using it for something it was never ever intended for, because it's those kinds of bold moves that change music. (Hebden cited in Ghezawi, 2012)

Like Jenkinson, Hebden also recognise innovation in Hendrix's playing style, acknowledging that it is often the abuse of technologies that produces new and interesting results. He looks forward to those who discover radical new ways to misuse technologies that sparks innovation in music. Advancing technologies may offer new possibilities to facilitate creativity, yet without the creative choices and interactions from the user, innovations in music cannot occur. Take the example of the 1981 Roland TB-303 bass line synthesiser and

sequencer, originally designed as a practice device for solo guitarists and small lounge cabaret acts. The 1982 advertisement encapsulates the manufacturer's indented market, featuring a photo of jazz pianist Oscar Peterson posing beside Roland's 'Piano Plus' electric piano, a TB-303 bass synthesiser, and a TR-606 drum machine (see Figure 1).[29] Only 10,000 units were ever manufactured as the device was deemed a failure, since it was not able to generate a convincing acoustic bass sound. Yet the TB-303 would continue to later become a highly-coveted instrument, popularised through its distinctive sound that defined 'acid house' in the mid-to-late 80s by users abusing the filter controls at extreme settings.

Figure 1 – 1982 Roland advert featuring Oscar Peterson

The redefining of the TB-303 from a practice device for cabaret acts, to an instrument of cultural importance in electronic dance music, illustrates a shift in its aesthetic and stylistic characteristics. These changes are initiated by the way technologies are used, in this case, from supplying basic accompaniment to support guitar practice, to becoming a centre-piece in electronic dance music where subversive use of the filter and 'slide' controls generate fresh

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[29] See the original 1982 Roland advert online at: http://www.tb303.ch/140,0,tb-303-geschichte,index,0.html [last accessed on 24th March 2016].

93

musical innovations. These associated characteristics are established over a long period of usage, and constitute what Théberge considers as the 'accumulated sensibilities'. The sensibilities of an instrument is not set by its physical form but through its usage; 'it is primarily through their use that technologies become musical instruments, not their form' (1997: 159). Théberge suggests that the user interactions with technology rather than the technology itself, solely determines whether innovations in music are created. The transcendence from familiar sensibilities to the discovery of new and interesting approaches to expand the lexicon of familiar tools, is described in Jenkinson and Tobin's accounts:

> Part of the appeal […] has to do with hearing a familiar instrument being 'played' in an unfamiliar fashion. For me there has always been something fascinating about the encounter of the unfamiliar with the familiar. (Jenkinson cited in Warp, 2014)

> Thankfully, the flip side of all this is there is so much evidence of people using the tools available as a starting point, rather than an end in itself. So here's to the abuse of technology. Long live the kids doing it. (Tobin cited in Thill, 2011)

Both Jenkinson and Tobin positively support the notion of subverting technologies to achieve creative results. Jenkinson finds it 'fascinating' to experience unfamiliar approaches applied to familiar instrument, where; the level of inventiveness in the approach, seems equally appealing as the result. Tobin also applauds those who subvert technologies to achieve interesting results. He reflects the sentiments of those who use technology as a facilitator for ideas, and not others who see it as a substitute for creativity.

3.3.2 Active Limitation

The term limitation has negative meanings to suggest restriction or disadvantage, yet it serves an important function in creative practice. Some interviewees sought active limitation in their workflows as a strategy for managing studio resources so there are fewer options, enabling creative decisions to be made quicker. McIntyre and Morey asserts 'the existence of the limits set by the domain and field are not only constraining factors but they also enable creative action' (2014: 52); it suggests how deliberate use of

limitation promotes creativity with source materials and lateral thinking - a philosophical approach acknowledged by Eno (1999). Tobin also supports the use of constraints in the workflow to promote creative problem solving:

> It's actually not such a bad thing to have limits; it makes you a bit more creative. If you got a certain amount that you can do, you have to think of creative ways to overcome your limitations. That's never a bad thing. (Tobin cited in Turnmaster, 2013)

Tobin has personally experienced the positive influence of having limitations that makes him 'more creative'. In his view, knowing the options he has available, forces him to explore ways to attain results that transcend the limitations imposed. The notion of limitation as a necessity for creative work to flourish is outlined in Stravinsky's literature on composition; he states 'The creator's function is to sift the elements he receives from her, for human activity must impose limits upon itself' (1947: 63). An example of active limitation is shown in Duignan, Noble, and Biddle (2010), where DAW users consolidate and render materials to raw audio once they reach a stage where large track counts become difficult to manage, committing to processes that are irreversible. Eliminating options restores a degree of simplicity in the workflow to facilitate the management of potentially complex projects. In the case of production tools that offer manifold options, musicians exercise a disciplined approach by limiting their choices. For example, BoC constrain their sound palette for each album to help 'keep the project tied together and consistent within itself' (BoC cited in Döringer and Herrmann, 2013). This maintains sonic parity across different compositions within an album, and helps quickly eliminate irrelevant sources to further the creative process. Constraints in the workflow can therefore help creative work to be carried out more efficiently. In the following account, Jenkinson warns of the problems with having too many options during the recording process which impacts on the pace in which recording activities can take place:

> I often introduce rules at the start of a recording session to rule out options and speed up the process and get moving on the ideas. The worst thing is sitting in the studio with too many options. If you look around this room there's not a lot in it really. (Jenkinson cited in Griffiths, 2012)

Jenkinson describes eliminating options prior to a recording session to speed up the creative process; he is mindful of having too much equipment to avoid being overwhelmed with choices. Martin illustrates how recording technologies should be transparent, functional, and easy (2014: 236), qualities which can be achieved by simplifying options. Working intimately with a limited number of instruments enables Jenkinson to exploit its fullest potential. Yet one can argue whether it is plausible to claim that only finite options are available for any given tool, especially once you begin to consider the permutations of every parameter and the possibilities of subversive actions bound by the user's imagination. 'But pragmatically, after a while you get bored with things' (Jenkinson cited in Griffiths, 2012). It is rooted in the idea that creativity is only bound by the limits of the imagination, hence the innovation and skillfulness of those who can make great music using limited or low-tech instruments, are highly commended. 'I still love it when people realise great musical ideas on extremely limited equipment' (Jenkinson cited in Tingen, 2012). The notion of working with limited tools is illustrated in the following account where Hebden used a PC and cheap microphone to record all his projects. The microphone came bundled with his PC soundcard and despite its low-cost consumer quality, Hebden achieved remarkably good results and used it extensively on commercial projects.

> 'I have recorded everything for the last three years on this', says Kieran Hebden, indicating what looks like a miniature desk lamp. 'It came free with my Creative soundcard. I've recorded electric guitars on this, acoustic guitars, I've recorded vocals, and with this microphone I've done remixes for everyone — Beth Orton, Badly Drawn Boy, all those people. It's a wicked microphone but it's a bit light, so I put it on the desk and clip it under the mouse mat to hold it in place. I have to filter out the rumble from the hard drive, but the acoustic guitar sound from it is stunning'. (Hebden cited in Inglis, 2003)

Hebden continues to work with a limited range of tools, using only a laptop as his main instrument and a pair of speakers (Hebden cited in Obkircher, 2014). The notion of making music under limited constraints has been featured in a series of videos in webzines such as Mass Appeal's *Rhythm Roulette*, and FACT's *Against the Clock*, where electronic musicians are approached with a challenge.[30] In *Rhythm Roulette*, producers must create music using a limited

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[30] Rhythm Roulette challenges music producers to select three random records whilst blindfolded, to then construct a track from. More details can be found at:

sound palette. They initially select three random vinyl records whilst blindfolded, to then use as samples to create an original composition. The arbitrariness of these selected records become the constrained palette, where the musician's expertise, skill and inventiveness will determine the accomplishment of the finished composition. *Against the Clock* sees producers constrained with time, where they must create an original composition in under ten minutes in their studios. At first glance these videos may appear little more than a novelty concept for music fans, yet they provide unique insight into these musicians' approach and their creative environments.

3.4 Instruments and their influence

Although we have seen how some interviewees regard their equipment as secondary over primary considerations in compositional development, the choice of production tools and how it is used remains an influential factor on the finished work. Additionally, the equipment's interface design significantly impacts on how users interact with it. Duignan, Noble, and Biddle (2010), and Bell, Hein and Ratcliffe (2015) recognise how user interface metaphors can constrain or liberate the user's creativity. In the context on DAWs, the transfer of familiar traditional visual metaphors in new mediums facilitates learning for users who are experienced with traditional studio tools, but do not always fully represent the capabilities of the software. DAW visual interfaces do not always have a positive impact on the user and their music, as Hebden explains:

> People who make music on computers don't realise how powerful the visual element is. Whether you like it or not, your mind starts to think in terms of patterns, because it's a natural human way to do things, and you start seeing the way drums are lining up on the screen, and it becomes completely instinctive to line them up in a certain way. It's important just to close your eyes and use your ears, and trust what's coming out of the speakers more than anything. So many shitty records come out with terribly programmed drums, where everything's really stagnant and sterile. It's always been a problem with British dance and pop music when they've got a hip-hop beat on something. It's always so sterile, and when you listen to American productions they walk all over them, because there's so much more swing. It's just confidence — they'll just get an MPC and hit the beat out, and it's human at that point, they haven't just hit the quantise button. They trust

https://www.youtube.com/playlist?list=PL_QcLOtFJOUgNxURr8B4lNtf_3e9fWZzI [last accessed on 17th May 2017].
Against the Clock challenges electronic musicians to create a track in ten minutes. More details can be found at: http://www.factmag.com/tag/against-the-clock/ [last accessed on 17th May 2017].

their own judgement more than the computer's, and I think that's an important thing to try to remember. (Hebden cited in Inglis, 2003)

Hebden, who makes his music almost entirely within a DAW environment, is conscious of the impact visual interfaces have on the user and consequently, their approach to music-making. He underlines how creative choices should be informed by judgement through listening rather than visual indicators, to retain the timing and dynamics of human performance. Hebden acknowledges that confidence in trusting personal instinct is significant for overcoming conformity with DAWs. Whilst it cannot be argued that graphic user interfaces provide essential visual feedback to users, one would expect the music to be composed by how it sounds rather than its appearance. Mooney highlights this problem, drawing attention to the grid-based layouts found on software sequencer applications' bias towards 4/4 metric rhythmical music (2010: 147-148). The graphical abstracts of musical elements in a DAW environment, tends to conform users into creating visual patterns that conveniently fit the sequencer's quantised grid, offering false assurances. The paradigm is unsurprising, given that traditional music notation is largely based on the principle of musical note values conforming to rhythmic subdivisions of time, with the addition of dynamic and tempo markings to add expression. Functions such as groove quantise where the timing of a performance is automatically corrected to the nearest pre-determined subdivisions, further diminishes any trace of human performance attributes. Hence, it is unsurprising to learn that Hebden reverts to manual sound editing techniques to avoid automated algorithms that render time-related parameters; 'I do all this stuff by hand […]; I just do it all by sight and by ear, you know what works best' (Hebden cited in Future Music Magazine, 2013). The method enables Hebden to retain full manual control over timing and rhythmic feel of his music.

3.4.1 Resisting conformity

An existing study in HCI has shown the dynamic relationship between humans and computers in creative contexts, where the computer's role has shifted beyond providing efficient routine work support, to become a material that is

dynamically adapted by the user (Bertelsen, Breinbjerg and Pold, 2009). The design and visual metaphors used in software tools significantly influence the way users interact with computers, and the music created with them. The design layouts 'have a critical impact on the activities of professional producers' (Duignan, Noble and Biddle's, 2010). A graphic user interface (GUI) provides essential user feedback, though its implementation and visual nature can influence composition in more ways than intended. It is often a problem that DAW users become overly dependent on visual rather than aural cues through graphical building blocks to make their music. For this reason, some interviewees choose hardware sequencers over DAWs for the tactility and constrained graphical abstractions of sound, to promote the use of auditory rather than visual senses during composition. The dedicated role of a hardware sequencer removes ambiguity or confusion over its purpose and function, unlike a DAW that is capable of many things. It is commonly perceived that 'new software applications allow greater freedom to construct complex arrangements' (Nevels, 2012: 258). Yet, the notion of 'more options' equating to 'greater freedom' is regarded by Eno (1999) as a flaw in design philosophy in technology where constraints are seen to promote creativity and innovation.

> The problem with software-based work is that you never know what it does, you can never exhaust what it does, basically. So you can always cover the fact that you haven't got an idea by trying another option in the tools. So, if you have a lot of options, you don't usually have a lot of rapport with the instrument. If you have a few options, your rapport keeps increasing, because you understand the options better and better. And this is why people still make good music with crude instruments, simple instruments. Because they understand them better than us software people understand our instruments. (Eno cited in Red Bull Music Academy, 2013)

Eno's account underlines the advantages of using simple instruments, where the user can develop rapport with the instrument through an intimate understanding of its functions. Conversely, he highlights the problems with using software production tools which are often vastly complex, and difficult for users to fully exhaust and consequently, develop rapport. Furthermore, software tools are constantly changing through different incremental updates, which requires the user to become reacquainted with each revision. Where there are fewer options, musicians become more acquainted with their instruments and their knowledge of its functions and limitations. In the following

account, Jenkinson explains why he uses a hardware sequencer such as the Yamaha QY700 as his main writing tool.[31]

> The QY700 is my main sequencer. I much prefer it to using software-based sequencers. The latter just make my brain shut down. When the graphical information is too vivid, it makes it harder to retain the information in my memory, and one critical thing about making music is to have a real-time virtual image of the studio operating in your head, so you can make your choices very quickly. Looking at the gear all the time and every time having to work out how you're going to do something slows you down and shuts down your imagination. (Jenkinson cited in Tingen, 2011)

The account shows how Jenkinson does not favour the GUIs on DAWs, acknowledging that the visual feedback is distracting. GUI design is likely to influence less disciplined users to assume a pre-designated workflow, enabling some compositional functions to be easily achieved over others. Take the example of the visual grids found on most DAW timelines – the musical bars and beats are conducive to making music with a constant tempo and time signature, but less so for compositions with complex tempo and time signature changes; the latter although possible, requires skill, preparation, and planning. It is indeed possible to synchronise a DAW's tempo to a non-linear performance using beat mapping functions however, by default computers do not automatically adapt to natural tempo fluctuations in human performance. In the following account, BoC recognise the problem of having grids when using DAWs as their main compositional tool:

> If I have to say something, we turned our back to the horizontal grids, what they call sequencers. It feels to me limited. We used to make music only with cassette tape recorders in the past and there weren't any restrictions in front of my eyes. There wasn't the feeling of being 'filled in' within the tight grids. Nowadays, most of the producers, including the orchestra composers, make music within the grids unconsciously and they have not realized that they're limiting their creativities. (BoC cited in Hara, 2005)

BoC suggests that the presence of a visual grid will sufficiently influence the user to subconsciously conform to those conventions. Yet by default, most musicians are likely to write to a grid since all DAWs are designed to function correctly in this manner, where a reference master tempo is required for some built-in tools to operate accordingly for example, groove quantise, tempo-

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[31] The Yamaha QY700 is a multitrack hardware MIDI sequencer with built in synthesis engine. For more information, see: http://usa.yamaha.com/product_archive/music-production/qy700/?mode=model [last accessed on 13th November 2015].

based delays etc. Arguably it is the extent to which the user can ignore these visual constraints, and how they discipline their interactions with the technology. However, the deployment of computers in electronic composition does not always constrain users to conform to a typical DAW workflow. William Bevans, who is otherwise known as Burial, is an example of an artist who unorthadoxically creates electronic music without using conventional sequencer/DAWs. His compositions are constructed using Sound Forge,[32] an audio editor void of reference grids or DAW sequencing functionality. Rather than using coloured building blocks that snap to a pre-configured grid, Bevans works with graphical waveform representations on a timeline. His avoidance of conventional DAWs was not a conscious decision but a consequence of the software he chose to learn and became accustomed to.

> I've seen people using sequencers and I've tried hard to use them but it's blocks in different colours and I'm only used to just seeing the waves. I don't need to listen much to the drums because I know they look nice, like a fishbone… (Burial cited in Fisher, 2012)

Although Bevans' approach may appear removed from the limitations of visual grids and blocks found in conventional DAW practice, the GUI remains a central part to how he works, where the graphical representations of waveforms provides important user visual feedback. Folkestad, Hargreaves, and Lindström (2012) acknowledge how the designs in sequencing software can potentially diminish the relevance of conventional instrumental skills by for example, enabling only non-standardised methods of music-making, forcing users to approach the software in a more exploratory manner. A departure from conventional user interface design significantly impacts on how the musician interacts with their instruments. Take the asymmetric piano keyboard interface that enables playback of the twelve notes in the Western scale; although a universal standard, it constrains the user to conform within the boundaries of this convention only. For those who are accustomed to the keyboard interface, muscle memory often dictates the choice of notes played. Hence, some musicians deliberately avoid using the piano keyboard interface

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[32] Sound Forge is an audio waveform editor. More information can be found at:
http://www.magix-audio.com/us/sound-forge/#productMenu [last accessed on 17th May 2017].

to resist the trappings of familiar chord shapes. For this reason, electronic artist, James Holden often uses a QWERTY keyboard rather than a conventional piano keyboard, to enter musical notes into Buzz,[33] to help him avoid playing clichés on a piano keyboard (Holden cited in Future Music Magazine, 2012). Hebden shares a similar approach in using unconventional instrument interfaces:

> I prefer this [Boss Dr-Sample SP-303] than using like a MIDI keyboard or something. It pulls me away from that traditional piano keyboard, white notes, and black notes, and that. I have it set up… I don't think in terms of chords and things in any traditional sense from just pressing these grids of rubber buttons. (Hebden cited in FACTmagazine, 2007)

In this case, Hebden's choice of instrument is a DJ hardware sampler void of any conventional keyboard interface; it features a non-standardised system of buttons to assign and trigger samples, and rotary pots to adjust real-time DSP parameters, forcing the user to devise their own method of interaction with the device. Rejecting the conventional piano keyboard interface not only helps divorce Hebden from using readily familiar harmonic patterns and shapes, but also enables the development of fresh relationships and understanding of the instrument.

3.4.2. Computers are a hindrance

Advancements in computing processing have seen changes in music production software evolving from basic sequencers to powerful audio production environments. Whilst these developments offer tremendous potential in sound creation and manipulation, the complex nature of the technology can easily overbear the user. The multitude of processes in preparing a computer to perform basic recording tasks contrasts against the simplicity of tangible recording approaches, is echoed amongst the views of professional producers who believe that 'the key attributes of studio technology should be functional, simple and effective' (Martin, 2014: 233). The myriad of choice offered in technologies is likely to induce a paralysing effect on the user,

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[33] Buzz is a freeware modular music studio designed to run on Windows PCs. More information available at: http://jeskola.net/buzz/ [last accessed on 19th May 2017].

resulting in 'option dilemma' (Duignan, Noble, and Biddle, 2010: 31). Previously in *Active Limitation* (p.95), we saw musicians deliberately constrain their tools to not only promote creative actions, but also help manage decision-making with their resources. Eno and Schmidt (1975) proposed a further solution using a series of *Oblique Strategies* to alleviate these moments, consisting of a deck of cards each featuring cryptic statements to liberate the user from creative blocks by helping them consider more specific choices.[34] Although the cards feature somewhat abstract and seemingly arbitrary suggestions, they are designed to stimulate alternative methods by constraining options that are available. In the following account, BoC describe option dilemma as they recall an earlier attempt to adopt DAWs as their primary compositional tool to increase productivity, only to discover that the complexities of computer based systems impacted on their ability to create spontaneously:

> After *Music Has the Right to Children* (1998), we began to use more computer technology with the wrong intention of accelerating our composing process. But computers always end by bothering the possibilities that technical production offers, that has the unpleasant effect of drying up progressively all your inspiration. So, we react against that and now we're back in a more simple way of doing things, just like we worked in the beginning. (BoC cited in Broc, 2002)

BoC's decision to revert to an older workflow illustrates a desire for simplicity, where there are fewer technicalities to consider. 'Pretty soon, it just started to bog us down and take away the spontaneity. So, now we use computers sparingly' (BoC cited in Micallef, 2002). From the outset, a DAW as a main compositional tool is likely to inundate musicians with more choices surplus to their needs at different stages of the writing process. Their reluctance to adopt computers as a main writing tool can be explained by BoC's preference for more traditional methods of generating musical ideas through jamming and capturing onto tape (BoC cited in Hara, 2005). Whilst there are obvious limitations with tape compared to digital media, one could argue that these characteristics are easily replicated with a DAW using a disciplined approach. Furthermore, there is the added frustration of tending a computer system to

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[34] Oblique Strategies are a deck of cards each featuring a remark or statement, first introduced in 1975 by Brian Eno and Peter Schmidt. For more details see: http://www.rtqe.net/ObliqueStrategies/OSintro.html [last accessed on 17th May 2017].

maintain productivity, where software and hardware require frequent updates (Ellis cited in Martin, 2014: 239). Digital recording surpasses analogue tape in terms of convenience, editing and manipulation, yet it is these limitations and simplicity that BoC crave. Unlike the multifaceted nature of a DAW, there is no ambiguity with a tape recorder's role - its sole function is to record and playback sound. There is also the consideration of cost, where tape is comparatively expensive, forcing decisions to be made faster to reduce listening and performance fatigue (Marenco, 2015). Musicians such as Jenkinson, deliberately constrains the way they use their DAW to behave as a tape-recording device.

> Another deliberate restriction is that I try to use the software with a tape-recorder mentality. I don't do hundreds of takes and then compile. You may get something technically perfect, but it won't have any soul. I'm old school, I don't mind mistakes. (Jenkinson cited in Tingen, 2011)

Jenkinson explains how he approaches a DAW as a tape-recorder to constrain him from perfecting his performance through multiple, composite takes, and post-editing in the digital domain. It forces him to work quicker by committing to performances that embrace imperfection and idiosyncrasies rather than technical perfection; these qualities contribute to the character of the composition, as often found on many classic recordings. Introducing limitation to a domain clearly has its advantages, where instruments such as modular synths offer seemingly endless exploration, the absence of any constraints is likely to deplete productivity; 'Everybody I know that buys a modular synth stops putting records out essentially' (Hebden cited in Obkircher, 2014).

3.4.3 Old and characterful

It was commonplace for some interviewees to amass older pieces of equipment in their workflow amongst newer technologies; even the decrepit or partially-working instruments were as likely to feature amongst their tools to enable them 'to sound different than the majority of modern music' (BoC cited in Tilkin, 2013), since 'current music […] is becoming indistinguishable because all the producers are basically using the same tools' (BoC cited in

Döringer and Herrmann, 2013). These observations were discussed earlier in *Homogenisation of technologies* (p.71). Despite the limitations and unreliability of older technologies, BoC prefers it over newer equipment as described in the following account:

> A couple of old synths, that we really loved so much, died during the recording. At that point we opted for what any insightful and smart person would have done: we replaced them with older, even more shabby synths. (BoC cited in Il Mucchio, 2013)

Replacing old faulty instruments with even older, less-reliable equipment defies logic and sense. However, BoC's preference for older technologies can be understood through Zeiner-Henriksen's sociotechnical observations on The Chemical Brothers' use of their old ARP 2600 analogue synthesiser (2014: 32-34). Whilst digital synthesisers were more stable and easier to control than their analogue counterparts, the bright, polished digital sounds were undesirable for 90s electronic dance music, whereas the inherent instability of analogue synthesisers was deemed characterful, and easily manipulated using performable controls. Furthermore, The Chemical Brothers' deliberate dissociation with mass-produced and mass-consumed digital synthesisers maintains their positioning within an 'underground' subculture. Thornton describes 'underground' as a subcultural quality and value that is 'authentic and pitted against the mass-produced and mass-consumed' (Thornton, 1995: 117). One would suspect that BoC and The Chemical Brothers persevere with these older instruments despite their temperament and prone to failure, to maintain authenticity in their work. Hip-hop musician and producer J-Zone sees these failures as a means of challenging his skills as a producer. For his album, *Peter Pan Syndrome* (2013), he rejects using the latest studio technologies, taking instead an approach where outdated, obsolete, and broken equipment become his main compositional tools: 'what you don't have in equipment, you have to compensate in brain power and creativity' (The Onion Ring Pimp, 2013). Not only does older equipment instil character in J-Zone's music, but their technical limitations promote creative approaches to overcome their deficiencies. In the following account, BoC raises the all-familiar debates over preferences for and against analogue or digital technologies:

I think the digital world suffers from being just so literal, so deliberate and sober. As with digital photography, people have gotten used to applying simulated filters onto their pictures just to inject a bit of romance into the thing, because the raw pictures are so flat. But in the analog realm these beautiful things just happen by themselves without your conscious effort. You could say the wobbles and flutters in our music are equivalent to something like weeds overgrowing an old building. Nobody puts the weeds there, but nature comes along and makes the scene very tragic and beautiful. (BoC cited in Pareles, 2013)

BoC acknowledge the nostalgic-inducing characteristics derived from the imperfections and variations found in the non-linearity of analogue technologies. If 'weeds' were analogous to the non-linearity of tape, their assertion that 'nobody puts the weeds there' implies that these analogue qualities are not added but simply inherent to the medium. Their reference to simulated filters in digital photography may also suggest their disapproval of digital audio plug-ins that attempt to simulate these qualities by adding them onto the source material. BoC are known to use a 1950s Grundig reel-to-reel tape machine to record ideas with deliberate amounts of tape saturation as a method for antiquating sounds, 'if you sample back the playback, it's got a thousand years' grain on it' (BoC cited in Hutton, 2005). These interesting quirks and deviations are not exclusive to analogue technologies – some digital technologies also generate unusual results, often through the aliasing effects of low bit digital sampling, or unexpected audio artifacts from signal processing. Hebden has worked with similar tools that produce characterful results such as Cool Edit,[35] an obsolete Windows-based audio editor that he continued using in 2013 (Hebden cited in Red Bull Music Academy, 2013). 'I do a lot of time-stretching and stuff in Cool Edit, and I really like it – it's kind of shit, but good shit' (Hebden cited in Inglis, 2003); one suspect the results are crude but clearly appealing to Hebden. It is perhaps these interesting idiosyncratic qualities in constrained technologies that instil *personality* – qualities that are absent in most modern DAW environments that offer precision over character. There is also the added consideration of tactility in physical instruments that offer direct access to parameter controls for the user, against the constrained interfaces of software instruments. For this reason,

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[35] Cool Edit is a digital audio editor developed by Syntrillium in 1995 to later become Adobe Audition. Little information is available online regarding Syntrillium since it was purchased by Adobe in 2003, but its release history can be found at: http://homerecording.com/bbs/user-forums-by-brand/cool-edit-pro-adobe-audition-forum/cool-edit-audition-release-history-235201/ [last accessed on 3rd October 2016].

BoC avoid using software emulations of analogue synthesisers, as it does not enable them to work the same way as they do with hardware instruments (BoC cited in Micallef, 2002). Whilst most artists would agree that constraints promotes creative actions, Jenkinson argues that limitation in human capability is not so well received. 'But when those limitations are human i.e., other people saying "no" – it's not the kind of thing you can overrule' (Jenkinson cited in Reidell, 2012).

3.5 Concluding Thoughts

Although technologies are extensively used in these musicians' practices, there was a unanimous view that the development of compositional ideas should remain the primary objective whereas the tools are a secondary consideration. Innovations in music were dependent on how musicians approach their instruments rather than the instruments themselves - they simply serve to facilitate a process. Most interviewees rejected the focus often placed on equipment which they believed, fueled a culture of consumption rather than creativity. There were also criticisms regarding the way in which new technologies were being developed to mainly serve consumer convenience, where modern DAWs were in danger of homogenising music-making through their designs. The interviewees saw it necessary to develop rapport with their tools to not only transcend their work beyond the influences of the technologies used, but to work fluently and proficiently. It was not unusual to find that these were older tools, since users wanted to continue using the instruments they were most familiar with, even if the tools were obsolete; in most cases, these older technologies instilled character through their idiosyncrasies. It was evident that these musicians had developed their own methods of working over time, sometimes by subverting these technologies to find unique and original approaches. Their intimate understanding of these technologies alongside the use of creative constraints helped promote creativity. These musicians agreed on retaining writing tools that enabled them to work spontaneously to minimise technically

considerations by even omitting or constraining the use of a computer, although there was acknowledgement that the acquisition of equipment was sometimes necessary to help achieve specific compositional aims.

Conclusion

The main purpose of this paper is to offer an exploration on the creative practices of professional electronic musicians using their interviews collected from existing published materials. The accounts of established electronic musicians supported the themes discussed throughout the paper, illustrating areas of commonalities and diversity in approaches. I have offered interpretations of these accounts based on my personal experiences in electronic music production practice, pedagogy, and research, to identify points of significance, and groupings of themes across the sample set. These provide further discussion for contextualisation to establish potential links with other related literature. The researcher's role is not to interfere or skew the data, but to present the findings as they emerge in a manner that is comprehensible.

The unconventional use of IPA on a sample set of published interviews sourced from different contexts, required support from the tools in discourse analysis to make sense of semantics; coupled with the researcher's inside perspective on electronic music production practice, the method provided sufficiently detailed interpretations of the accounts with links to broader themes. IPA used in this manner allows only those themes that surfaced through the questioning methods of other interviewers and not the researcher. In most cases, the interviews were conducted as promotional features where emphasis in the questioning was often focused on the music they were promoting, which diverged onto creative practice, and their tools. If creative work were to be considered through Csikszentmihalyi's tripartite model (1997), the accounts reveal nodal themes mostly focused on the *individual* and their methods of attaining *novelty* in creative work, with less attention on areas concerning the cultural *domain* and *field* of experts. However, it can be argued that these musicians have already repeatedly proven their ability to contribute creative works in the cultural *domain*, and as long established professional musicians, they are firmly positioned amongst the *field* as experts themselves. Whilst there are instances in these accounts where the interviewees gaze

towards the domain and field, the work is primarily focused on music-making through the experience of the individual.

The research identified three superordinate themes which concerned the following areas: compositional approaches, conditions for creativity, and technological mediation. The compositional approaches explored in chapter one revealed how musicians went to great lengths to attain the sounds they wanted by adopting complex transformation processes to shape their work. Particular attention was placed on finding individuality in their sounds, which perhaps can be understood as an effort to stand out amongst other homogenised works created on newer technologies. The development of curation skills was pivotal since considerable time was spent on listening and selecting sounds throughout the creative process. To defy the binary precision of machines, human qualities in feel and performance were instilled in the work by experimentation with randomness, errors, and imperfections. The conditions composers forge to facilitate creative work was illustrated in chapter two, where it reveals the paramount importance of maintaining self-motivation and enthusiasm – a significant factor, particularly for those who work alone. Heuristic practices were adopted where the pursuit of self-interests through exploratory learning, enabled them to evolve through the development of new skills and knowledge. Hence, their published works were thought of as experiments rather than refined works of perfection. Chapter three illuminated growing frustrations and general disinterest in equipment amongst these musicians, challenging popular ideas on the relationships between technology and musicians; it perhaps illustrates the differences between professional and amateur practitioners and their priorities. Technology was considered secondary to the development of compositional ideas, where familiarity and fluency with older tools was chosen over new technologies that offered easy solutions.

The paper recognised tensions between professional electronic musicians and the democratisation of new technologies that facilitate in easy music-making by offering simple solutions to complex processes. It illustrates the increasing challenges they confront, where their work must stand out to compete against

those created on newer technologies that enable those with less skill to achieve comparable works. Conversely, musicians also recognise the benefits in technological innovations where new creative options previously unavailable become possible. These electronic musicians do not reject new technologies, but rather maintain their attention on developing creative ideas, only enlisting new equipment where necessary to acquire results not attainable with existing tools. Technologies are adopted to enable users to translate their ideas effectively and fluently. These professional electronic musicians approach their practice on the foundations of learning and development to help them continually evolve and change to produce interesting work.

The informal learning resources used in this research have shown richness and depth in their content. Looking beyond the promotional contexts from where these interviews originate are clues that provide glimpses into professional practice. Most online sources are convenient and easily accessible but not permanent, requiring solutions in digital archives to ensure future access to these sources. Whilst these materials help further our understanding in professional work, they do not provide a complete discourse on electronic music production practice; neither will it offer explicit instructions on how to make music. Furthermore, the explored themes are specific to these individuals and do not ultimately explain the universal. As Slater (2016) suggests, 'the binary perception of informal and formal learning is over-simplistic'; a rounded musical education should include both approaches of attaining knowledge. The paper will hold value to amateur electronic musicians interested in maintaining their own production practices.

Bibliography

2001 (1968) Directed by Stanley Kubrick [DVD]. Warner Home Video.

Ableton (2016) *Loop: Overcoming Creative Blocks* [Video]. Available online: https://m.youtube.com/watch?v=sTLHeZFgd1U [Accessed 29/8/2016].

Amon Tobin (1997) *Bricolage* [Audio CD]. Ninja Tune.

Amon Tobin (1998) *Permutations* [Audio CD]. Ninja Tune.

Amon Tobin (1998) Like Regular Chickens. *Permutations* [Audio CD]. Ninja Tune.

Amon Tobin (2000) *Supermodified* [Audio CD]. Ninja Tune.

Amon Tobin (2002) *Out from Outwhere* [Audio CD]. Ninja Tune.

Amon Tobin (2011) *ISAM* [Audio CD]. Ninja Tune.

Barrett, F.S., Grimm, K.J., Robins, R.W., Wildschut, T., Sedikides, C. & Janata, P. (2010) Music-Evoked Nostalgia: Affect, Memory, and Personality. *American Psychological Association*, 10(3), 390-403.

Bertelsen, O.W., Breinbjerg, M. & Pold, S. (2009) Emerging Materiality: Reflections on Creative Use of Software in Electronic Music Composition. *Leonardo,* 42(3), 197–202.

Boards of Canada (1998) *Music Has the Right to Children* [Vinyl]. Warp.

Boards of Canada (2002) *Geogaddi* [Audio CD]. Warp.

Brandy (2002) *Full Moon* [Audio CD]. Atlantic.

Brett, T. (2015) Autechre and Electronic Music Fandom: Performing Knowledge Online through Techno-Geek Discourses. *Popular Music and Society*, 38(1), 7–24.

Broome, J. (2015) Using Hip Hop Music to Enhance Critical Discussions on Postmodern Art. *Art Education,* 68(5), 34-39.

Butler, M.J. (2006) Unlocking the Groove: Rhythm, Meter, and Musical design in Electronic Dance Music. Bloomington: Indiana University Press.

Cascone, K. (2000) The Aesthetics of Failure: 'Post-Digital Tendencies in Contemporary Computer Music'. *Computer Music Journal*, 24(4), 12-18.

Cellan-Jones, R. (2014) *Stephen Hawking Warns Artificial Intelligence Could End Mankind*. Available online: http://www.bbc.co.uk/news/technology-30290540 [Accessed 8/5/2017].

Chadabe, J. (2000) Remarks on Computer Music Culture. *Computer Music Journal*, 24(4), 9.

Chanan, M. (1995) Repeated Takes: A Short History of Recording and its Effects on Music. London: Verso.

Chic (1978) Le Freak. *Le Freak/Savoir Faire* [Vinyl]. Atlantic.

Cohen, J. R. & Ferrari, J. R. (2010) Take Some Time to Think This Over: The Relationship Between Rumination, Indecision, and Creativity. *Creativity Research Journal*, 22(1), 68-73.

Collins, N. (2006) Handmade Electronic Music: The Art of Hardware Hacking. New York: Routledge.

Csikszentmihalyi, M. (1996) Creativity: Flow and the Psychology of Discovery and Invention. New York: Harper Perennial.

Cycling 74 (1999), *Max MSP* (Version 7). Available online: http://cycling74.com/products/max/ [Accessed 25/11/2014].

Danielsen, A. (ed) (2010) *Musical Rhythm in the Age of Digital Reproduction* [eBook]. Farnham: Ashgate Publishing Limited. [Downloaded 2/12/2014].

Deci, E. L. & Ryan, R. M. (1985) Intrinsic motivation and self-determination in human behavior. New York: Plenum.

De La Soul (1989) *3 Feet High and Rising* [Vinyl]. Big Life.

De La Soul (1991) *De La Soul is Dead* [Audio CD]. Tommy Boy.

Dellaira, M. (1995) Some Recorded Thought on Recorded Objects. *Perspectives of New Music,* 33, 1/2, 192-207.

Duignan, M., Noble, J. & Biddle, R. (2010) Abstraction and Activity in Computer-Mediated Music Production. *Computer Music Journal*, 34(4), 22–33.

Eindhoven, J. E. & Vinacke, W. E. (1952) Creative Processes in Painting. *Journal of General Psychology*, 47, 139–64.

Eno, B. (1999) *The Revenge of the Intuitive*. Available online: http://archive.wired.com/wired/archive/7.01/eno.html [Accessed 25/11/2014].

Eno, B. (2007) The Studio as Compositional Tool. In Cox, C. and Warner, D. (ed) *Audio Culture: Readings in Modern Music.* New York: Continuum International Publishing, 127-130.

Eno, B. (2011) *Composers as Gardeners*. Available online: http://edge.org/conversation/brian_eno-composers-as-gardeners [Accessed 4/11/2014].

Equipboard (n.d.) *Equipboard.com*. Available online: http://equipboard.com [Accessed 21/5/2017].

Eraserhead (1977) Directed by David Lynch [DVD]. Davidlynch.com

ESG (1991) UFO. *ESG* [Vinyl]. Pow Wow Records.

FACT Magazine (2016) *Against the Clock.* Available online: http://www.factmag.com/tag/against-the-clock/ [Accessed 21/12/2016].

Ferreira, P. P. (2008) When Sound Meets Movement: Performance in Electronic Dance Music*. Leonardo*, 18, 17–20.

Fisher, M. (2012) *Burial: Unedited Transcript*. Available online: http://www.thewire.co.uk/in-writing/interviews/burial_unedited-transcript [Accessed 22/11/2016].

Folkestad, G., Hargreaves, D. J. & Lindström, B. (1998) Compositional Strategies in Computer-Based Music-Making. *British Journal of Music Education,* 15, 83-97.

Four Tet (2003) *Rounds* [Audio CD]. Domino Records.

Frith, S. (1986) Art Versus Technology: The Strange Case of Popular Music. *Media, Culture & Society,* July 1986 8, 263-279.

Firth, S. (1996) *Performing Rites.* Cambridge, MA: Harvard UP.

Frith, S. (2007) *Taking Popular Music Seriously: Selected Essays*. Hampshire: Ashgate Publishing Ltd.

Future Music Magazine (2012) *James Holden in the Studio with Future Music 2006.* Available online: https://www.youtube.com/watch?v=GtwJWhXceVg [Accessed 11/12/16].

Gearslutz (n.d.) *Gearslutz.com*. Available online: https://www.gearslutz.com [Accessed 21/5/2017].

Ghazala, Q. R. (2004) The Folk Music of Chance Electronics: Circuit-Bending the Modern Coconut. *Leonardo Music Journal*, 14, 97-104.

Griffiths, P. (2002) *Modern Music and After: Directions since 1945*. Oxford: Oxford University Press.

Gruber, H.E. (1988) The Evolving Systems Approach to Creative Work, *Creativity Research Journal*, 1/1, 27–51.

Hunt, G., Moloney, M. & Evans, K. (2010) Youth, Drugs and Nightlife. New York: Routledge.

Huurdeman, H.C., Kamps, J., Samar, T., de Vries, A.P., Ben-David, A. & Rogers, R.A. (2015) Lost but Not Forgotten: Finding Pages on the Unarchived Web. *International Journal on Digital Libraries,* September 2015, 16(3/4), 247-265.

Inglis, S. (2002) *Oval. Markus Popp: Music as Software,* Sound on Sound. Available online: http://www.soundonsound.com/sos/oct02/articles/oval.asp [Accessed 2/11/2015].

IRCAM (n.d.) Institut de Recherche et Coordination Acoustique/Musique. Available online: http://www.ircam.fr/www_ircam.html?&L=1 [Accessed 3/5/2016].

Jeskola (2015) *Buzz.* Available online: http://jeskola.net/buzz/ [Accessed 12/12/16].

J-Zone (2013) *Peter Pan Syndrome* [Audio CD]. Old Maid Entertainment Inc.

Katz, M. (2004) *Capturing Sound: How Technology Has Changed Music.* London: University of California Press Limited.

Kostelanetz, R. (2003) *Conversing with Cage*, 2nd edition. London: Routledge.

Kozbelt, A. (2009) Ontogenetic Heterochrony and the Creative Process in Visual Art: a Précis. *Psychology of Aesthetics, Creativity, and the Arts,* 3/1, 35-37.

Kvifte, T. (2007) Digital Sampling and Analogue Aesthetics. In Melberg, A. (ed) *Aesthetics at Work*. Oslo: Unipub, 105–128.

Lepper, M. R., Greene, D. & Nisbett, R. E. (1973). Undermining Children's Intrinsic Interest with Extrinsic Rewards: A Test of the "Overjustification" Hypothesis. *Journal of Personality and Social Psychology,* 28, 129–137.

Lynskey, D. (2012) *33 Revolutions Per Minute.* London: Faber and Faber.

Malone, T. & Lepper, M. R. (1987) Making Learning Fun: A Taxonomy of Intrinsic Motivations for Learning. In Snow, R. and Farr, M. J. (Ed), *Aptitude, Learning, and Instruction Volume 3: Conative and Affective Process Analyses.* New Jersey: Hillsdale.

Marenco, C. (2015) *The Producer's Perspective: Why I Prefer Recording to Analog Tape.* Available online: http://performermag.com/home-recording/the-producers-perspective-why-i-prefer-recording-to-analog-tape/ [Accessed 12/12/2016].

Martin, A. (2014) The Role and Working Practice of Music Producers: An Interpretative Phenomenological Analysis. PhD thesis. The University of Hull.

Martin, M. W. (2000) Meaningful Work: Rethinking Professional Ethics. Oxford: Oxford University Press.

Mass Appeal (2006) Rhythm Roulette. Available online: https://www.youtube.com/playlist?list=PL_QcLOtFJOUgNxURr8B4lNtf_3e9fWZzl [Accessed 16/12/2016].

McIntyre, P. (2008) The Systems Model of Creativity: Analyzing the Distribution of Power in the Studio. *Journal on the Art of Record Production*, 3: 1-13.

McIntyre, P. & Morey, J. (2011) Working out the Split: Creative Collaboration and Assignation of Copyright across Differing Musical Worlds. *Journal on the Art of Record Production*, 5: Available online: http://arpjournal.com/'working-out-the-split'-creative-collaboration-and-assignation-of-copyright-across-differing-musical-worlds/ [Accessed 26/1/ 2014].

McIntyre, P. & Morey, J. (2014) The Creative Studio Practice of Contemporary Dance Music Sampling Composers. *Dancecult: Journal of Electronic Dance Music Culture,* 6(1): 41–60.

McIntyre, P. (2015) Tradition and Innovation in Creative Studio Practice: The Use of Older Gear, Processes and Ideas in Conjunction with Digital Technologies. *Journal on the Art of Record Production*, 9: Available online: http://arpjournal.com/tradition-and-innovation-in-creative-studio-practice-the-use-of-older-gear-processes-and-ideas-in-conjunction-with-digital-technologies/ [Accessed 21/5/2017].

McNamee, D. (2010) *Hey, What's that Sound: Auto-Tune,* The Guardian. Available online: https://www.theguardian.com/music/2010/apr/06/auto-tune [Accessed 21/9/2016].

Mooney, J. (2010) Frameworks and Affordances: Understanding the Tools of Music-Making. *Journal of Music, Technology and Education*, 3(2/3): 141-154.

Moore, A., Moore, D., Pearse, S. & Stansbie, A. (2013) Tracking Production Strategies: Identifying Compositional Methods in Electroacoustic Music. *Journal of Music, Technology & Education*, 6(3).

Morey, J. (2012a). The Bridgeport Dimension: Copyright Enforcement and its Implications for Sampling Practice". In Marshall, L. & Kärjä, A.V. (ed) *IASPM-*

Norden Music, Business & Law Anthology. Helsinki: IASPM Norden & Turku: International Institute for Popular Culture.

Morey, J. (2012b). Copyright Management and its Implications for the Sampling Practice of UK Dance Music Producers. In Stahl, G. and Homan, S. (ed) *IASPM Journal*, T*he Digital Nation: Copyright, Technology and Politics*, 3(1): 48–62. Available online: http://www.iaspmjournal.net/ index.php/IASPM_Journal/article/view/589 [Accessed 1/10/2015].

Native Instruments (2011) *Jeremy Ellis performs on Maschine Mikro* [Video]. Available online: https://www.youtube.com/watch?v=0K2aynMMBpo [Accessed 1/8/2016].

Native Instruments Reaktor (Version 5.5) (1998). Available online: http://www.native-instruments.com/en/products/komplete/synths/reaktor-5/ [Accessed 5/11/2014].

Negus, K. & Pickering, M. (2004) *Creativity, Communication and Cultural Value.* London: Sage.

Neill, B. (2002) Pleasure Beats: Rhythm and the Aesthetics of Current Electronic Music. *Leonardo*, 12, 3-6.

Nevels, D. L. (2012) Using Music Software in the Compositional Process: A Case Study of Electronic Music Composition. *Journal of Music, Technology and Education*, 5(3), 257-271.

Niu, W. & Sternberg, R. (2006) The Philosophical Roots of Western and Western Conceptions of Creativity. *Journal of Theoretical and Philosophical Psychology*, 26, 18-38.

Oliver, P. (2003) *Continuum Encyclopedia of Popular Music of the World*, Vol. 2, 416-416 1/2.

Perkel, J.M. (2015) The Trouble with Reference Rot. *Nature,* 5/7, Vol. 521, 111-112.

Pothoulaki, M., MacDonald, R. & Flowers, P. (2012) An Interpretative Phenomenological Analysis of an Improvisational Music Therapy Program for Cancer Patients. *Journal of Music Therapy,* 49(1), 45-67.

Phuture (1987) Acid Tracks. *Acid Tracks* [Vinyl]. Trax Records.

Ratcliffe, R. (2011) New Forms of Hybrid Musical Discourse: An Exploration of Stylistic and Procedural Cross-Fertilisation Between Contemporary Art Music and Electronic Dance Music. *Proceedings of the International Computer Music Conference 2011,* University of Huddersfield, UK, 31 July – 5 August 2011. Available online: http://hdl.handle.net/2027/spo.bbp2372.2011.047 [Accessed 28/9/2017].

Ratcliffe, R. (2014) A Proposed Typology of Sampled Material within Electronic Dance Music. *Dancecult: Journal of Electronic Dance Music Culture,* 6(1), 97–122.

Red Bull Music Academy (2013) *Lecture: Brian Eno (New York, 2013)* [Video]. Available online: https://vimeo.com/65663692 [Accessed 28/9/2016].

Red Bull Music Academy (2014) *Couch Wisdom: Questlove on J Dilla's Sampling Technique* [Video]. Available online: https://www.youtube.com/watch?v=T-h1K34Y468#t=107 [Accessed 20/3/2016].

Robjohns, H. (2010) *Analogue Warmth,* Sound on Sound. Available online: http://www.soundonsound.com/techniques/analogue-warmth [Accessed 6/5/2017].

Robson, C. (2002) *Real World* Research*: A Resource for Social Scientists and Practitioner-Researchers*, 2nd edition. Oxford: Blackwell Publishers Limited.

Roland (n.d.) *Roland Interview Gary Numan*. Available online: http://www.roland.co.uk/blog/gary-numan-interview/ [Accessed 12/6/2016].

Roland Music (1982) Roland TB-303 Oscar Peterson Advert [Photograph]. Available online: http://www.tb303.ch/140,0,tb-303-geschichte,index,0.html [Accessed 3/6/2015].

Schiffrin, D., Tannen, D. & Hamilton, H. E. (ed) (2001) *The Handbook of Discourse Analysis*. Oxford: Blackwell Publishers Limited.

Schloss, J. G. (2004) *Making Beats: The Art of Sample-Based Hip-Hop.* Middletown, CT: Wesleyan University Press.

Schoon, A. (2014) Digital Hustling: ICT Practices of Hip Hop Artists in Grahamstown. *Technoetic Arts: A Journal of Speculative Research,* 12(2+3), 207–217.

Slater, M. & Martin, A. (2012) A Conceptual Foundation for Understanding Musico-Technological Creativity. *Journal of Music, Technology & Education*, 5(1), 59-76.

Slater, M. (2015) Nests, Arcs and Cycles in the Lifespan of a Studio Project. *Popular Music*, 34, 67-93.

Slater, M. (2016) Processes of Learning in the Project Studio. In King, A. and Himonides, E. (ed) *Music, Technology, and Education: Critical Perspectives.* New York: Routledge, 9-26.

Smith, J. A., Flowers, P. & Larkin, M. (2009) *Interpretative Phenomenological Analysis: Theory, Method and Research.* London: SAGE Publications Ltd.

Söderman, J. & Folkestad, G. (2004) How Hip-Hop Musicians Learn: Strategies in Informal Creative Music Making. *Music Education Research*, 6(3), 313–26.

Spitfire Audio (2016) *Creative Cribs – Olafur Arnalds* [Video]. Available online: https://www.youtube.com/watch?v=2jTHNuvuQC0 [Accessed 22/11/2016].

Squarepusher (1996) *Feed Me Weird Things* [Audio CD]. Rephlex.

Squarepusher (1997) *Burningn'n Tree* [Audio CD]. Warp Records.

Squarepusher (2004) *Ultravisitor* [Audio CD]. Warp Records.

Squarepusher (2006) *Hello Everything* [Audio CD]. Warp Records.

Squarepusher (2012) *Ufabulum* [Audio CD]. Warp Records.

Squarepusher (2014) *Squarepusher x Z-Machines.* [Video]. Available online: https://www.youtube.com/watch?v=7MluikyEQF4 [Accessed 7/5/2017].

Stravinsky, I. (1947) The Composition of Music, *Poetics of Music*, chapter 3

Taylor, G. (2003) *Introduction.* Available online: http://www.rtqe.net/ObliqueStrategies/OSintro.html [Accessed 3/1/2017].

The Onion Ring Pimp (2013) *J-Zone in the Studio: Limitations and Mistakes.* [Video]. Available online: https://www.youtube.com/watch?v=14X4JOdEKJI [Accessed 3/4/2016].

Théberge, P. (1997) Any Sound You Can Imagine: Making Music / Consuming Technology. Middletown, CT: Wesleyan University Press.

Thompson, P. (2012) An Empirical Study into the Learning Practices and Enculturation of DJs, Turntablists, Hip Hop and Dance Music Producers. *Journal of Music, Technology & Education* 5(1), 43-58.

Tinger, P. (2005) *Brian Eno: Recording Another Day on Earth*, Sound on Sound. Available online: http://www.soundonsound.com/sos/oct05/articles/brianeno.htm [Accessed 18/10/2014].

Viel, M. (2000) Keyboard Magazine Presents Vintage Synthesizers: Pioneering Designers, Groundbreaking Instruments, Collecting Tips, Mutants of Technology, 2nd edition. San Francisco: Miller Freeman.

Wallas, G. (1926) *The Art of Thought*. New York: Harcourt Brace.

Warner, T. (2003) Pop Music: Technology and Creativity. Aldershot: Ashgate.

Weisbard, P.H. (2011) Oldies but Goodies: Archiving Web-Based Information. *Feminist Collections: A Quarterly of Women's Studies Resources.* Spring 2011, 32(2), 14-20.

White, P. (1997) *Emagic Audiowerk8*, Sound on Sound. Available online: http://www.soundonsound.com/sos/1997_articles/jul97/audiowerk8.html [Accessed 8/3/2015].

Zeiner-Henriksen, H. T. (2014) Old instruments, new agendas: the chemical brothers & the Arp 2600*. Dancecult: Journal of Electronic Dance Music Culture* 6(1), 26–40.

Appendix A: Amon Tobin

4DJ - Amon Tobin: Deadly, in a Virtual Sort of Way (2002) Directed by Dom Phillips. Faction films.

Amon Tobin (2011) *Making of ISAM Sounds* [Video]. Available online: https://www.youtube.com/watch?v=jbJwyTkCJk0 [Accessed 28/1/2015].

Beatport News (2014) *In Conversation with Amon Tobin* [Video]. Available online: https://www.youtube.com/watch?v=oxVVm75k_8Q [Accessed 28/1/2015].

Beatport Team (2011) *Plugged in: Amon Tobin on Kyma*. Available online: https://news.beatport.com/plugged-in-amon-tobin-on-kyma/ [Accessed 16/3/2015].

Bleep (2011) *Bleep Investigates… Amon Tobin & Tessa Farmer*. Available online: https://bleep.com/stream/Amon%20Tobin%20and%20Tessa%20Farmer [Accessed 16/3/2015].

Bell, C. (2013) *Amon Tobin Marches to the Post-Dubstep Beat of his Own Drum*. Available online: http://www.an-mag.com/tobin/ [Accessed 17/3/2015].

Brassell, A. (2011) *AmonTobin Interview*. Available online: http://www.kmag.co.uk/editorial/features/amon-tobin-interview-0611.html [Accessed 28/1/2015].

Buchanan, S. (2007) Amon Tobin Interview. *Fat Planet Podcast* [Podcast]. January. Available online: http://stuartbuchanan.com/music/2007/02/27/amon-tobin-interview-podcast/ [Accessed 17/3/2015].

Clarke, P. (2004) *Amon Tobin Interview*. Available online: http://www.bbc.co.uk/dna/collective/A2872523 [Accessed 16/3/2015].

Cyrus (2011) *Amon Tobin*. Available online: http://www.cyrusshahrad.com/amon-tobin/ [Accessed 17/3/2015].

Daultrey, S. (2011) *Electronic Fairytales – Amon Tobin Interview*. Available online: http://www.clashmusic.com/feature/electronic-fairytales-amon-tobin-interview [Accessed 28/1/2015].

DeLeo, S. (2011) *The Reverb Interview: Amon Tobin*. Available online: http://www.heyreverb.com/blog/2011/10/18/amon-tobin-tour-2011/40143/ [Accessed 18/3/2015].

Encore! (2011) Presented by Eve Jackson [TV Programme]. France 24. 22 June. Available online: http://www.france24.com/en/20110615-en-culture-Amon-Tobin-isam-Electronic-musician-latest-project/ [Accessed 28/1/2015].

Foley Room: Found Footage (2007) Directed by Marrianne Allard and Julien Elie [DVD]. Ninja Tune.

Fox 11 (2013) *Exclusive Fox 11 DJ 'Amon Tobin' Behind the Scenes at the LA Greek Theatre* [Video]. Available online: http://www.myfoxla.com/story/21388608/exclusive-fox-11-dj-amon-tobin-behind-the-scenes-at-the-la-greek-theatre [Accessed 28/1/2015].

Hillyard, K. (2011) *Interview #685: Amon Tobin*. Available online: http://magazine.ilikemusic.com/interview/Amon_Tobin [Accessed 16/3/2015].

Hodge, R. (2008) *Amon Tobin (Treasure Island Music Festival 2008)*. Available online: http://somafm.com/articles/ti-amontobin.html [Accessed 28/1/2015].

Kerr, D. (2007) *Amon Tobin - Ever Falling*. Available online: http://www.theskinny.co.uk/clubs/interviews/amon-tobin-ever-falling [Accessed 18/3/2015].

Kim, S. (2012) *Invented Sounds Applied to the Masses: The Rise of Amon Tobin*. Available online: http://www.mtviggy.com/interviews/invented-sounds-applied-to-the-masses-the-rise-of-amon-tobin/ [Accessed 28/1/2015].

Less Than 3 (2012) *Interview Amon Tobin*. Available online: http://blog.lessthan3.com/2012/07/interview-amon-tobin/ [Accessed 28/1/2015].

Lost in a Supermarket (2012a) *The Next Level: LIAS Exclusive Interview with Amon Tobin vol 1.* Available online: http://lostinasupermarket.com/2012/04/the-next-level-lias-interview-with-amon-tobin-vol-1/ [Accessed 2/4/2015].

Lost in a Supermarket (2012b) *The Next Level: LIAS Exclusive Interview with Amon Tobin vol 2.* Available online: http://lostinasupermarket.com/2012/04/the-next-level-lias-exclusive-interview-with-amon-tobin-vol-2/ [Accessed 2/4/2015].

Lost in a Supermarket (2012c) *The Next Level: LIAS Exclusive Interview with Amon Tobin vol 3.* Available online: http://lostinasupermarket.com/2012/05/the-next-level-lias-interview-with-amon-tobin-vol-3/ [Accessed 2/4/2015].

McKnight-Abrams, A. (2011) *Amon Tobin x Tessa Farmer.* Available online: http://www.dazeddigital.com/artsandculture/article/10445/1/amon-tobin-x-tessa-farmer [Accessed 18/3/2015].

McLean, R. (2008) *You Don't Know Part 1: Amon Tobin*. Available online: http://www.theskinny.co.uk/clubs/interviews/you-dont-know-pt-1-amon-tobin [Accessed 18/3/2015].

Murphy, B. (2011) *Amon Tobin*. Available online:
http://www.emusician.com/artists/1333/amon-tobin/44376 [Accessed 1/2/2015].

Myers, M. (2011) *KEXP Documentaries – "Electronic Innovators" – Amon Tobin*. Available online: http://blog.kexp.org/2011/09/29/kexp-documentaries-electronic-innovators-amon-tobin/ [Accessed 18/3/2015].

Nightmarecast24 (2005) Amon Tobin Interview with IGN. *Ubisoft Forums*. 21 January. Available online: http://forums.ubi.com/showthread.php/197707-Amon-Tobin-Interview-With-IGN-Forums [Accessed 16/3/2015].

Ninja Tune (2011) *Amon Tobin ISAM (Extended trailer)* [Video]. Available online: https://www.youtube.com/watch?v=WLrt7-kIgIM [Accessed 28/1/2015].

Osh (2011) *Amon Tobin Interview*. Available online:
http://guestlist.net/interviews/1908/amon_tobin_interview [Accessed 16/3/2015].

Phil (2012) *Amon Tobin Interview*. Available online:
http://metrojolt.com/amon-tobin-interview [Accessed 28/1/2015].

Pollard, V. (2011) *Amon Tobin: Journeys into Live Music*. Available online:
http://www.mutek.org/en/magazine/266-amon-tobin-journeys-into-live-music
[Accessed 16/3/2015].

RBMAradio (2012) *Fireside Chat - Amon Tobin* [Audio]. Available online:
https://www.rbmaradio.com/shows/fireside-chat/episodes/amon-tobin
[Accessed 16/3/2015].

Roland, M. (2015) *Amon Tobin Interview*. Available online:
http://electronicsound.co.uk/uncategorized/amon-tobin-interview/ [Accessed 25/1/2016].

Rolling Stone (2012) *Amon Tobin Brazilian Artist Turns up the Bass* [Video].
Available online: https://www.youtube.com/watch?v=xSdcGtSWGBE
[Accessed 28/1/2015].

Roosendaal, D. (2002) *Amon Tobin - I'm Just Very Enthusiastic.* Available
online: http://www.kindamuzik.net/interview/amon-tobin/amon-tobin-i-m-just-very-enthusiastic/1862/ [Accessed 16/3/2015].

Ryce, A. (2012) *Amon Tobin: Chaos Theory*. Available online:
http://www.residentadvisor.net/feature.aspx?1669 [Accessed 28/1/2015].

Sam F (2012) *Amon Tobin – ISAM Live Spectacle* [Video]. Available online:
https://www.youtube.com/watch?v=0zMI-qbmIPk&x-yt-cl=84838260&x-yt-ts=1422327029 [Accessed 28/1/2015].

Silent ip (2010) *Amon Tobin Home Studio* [Video]. Available online: https://www.youtube.com/watch?v=OYBfeWI54Mk [Accessed 28/1/2015].

Solipsistic Nation (2008) *Solipsistic Nation No.82: Amon Tobin* [Audio]. Available online: http://solipsisticnation.com/solipsistic-nation-no-82-amon-tobin/ [Accessed 16/3/2015].

Staff, E. (2012) *Interview: Amon Tobin*. Available online: http://www.electronicbeats.net/en/features/interviews/interview-amon-tobin/ [Accessed 28/1/2015].

Steinberg (2011) *Electronic Pioneer Amon Tobin's Latest Masterpiece*. Available online: https://www.steinberg.net/en/artists/stories/2011/amon_tobin.html [Accessed 28/1/2015].

Telford, L. (2012) *Amon Tobin "We tried to think very hard about what colour each track might be".* Available online: http://www.thevine.com.au/music/interviews/amon-tobin-we-tried-to-think-very-hard-about-what-colour-each-track-might-be-20120420-232311 [Accessed 16/3/2015].

The Creators Project (2012) *Amon Tobin ISAM Live Spectacle* [Video]. Available online: http://thecreatorsproject.vice.com/creators/amon-tobin [Accessed 16/3/2015].

Thill, S. (2011) *Amon Tobin's ISAM Merges Music, Meat, Machines in 3-D Show, Creepy Hardcover*. Available online: http://www.wired.com/2011/06/amon-tobin-isam/ [Accessed 28/1/2015].

Thorsen, T. (2005) *Q&A - Chaos Theory Composer Amon Tobin.* Available online: http://www.gamespot.com/articles/qanda-chaos-theory-composer-amon-tobin/1100-6117182/ [Accessed 16/3/2015].

TransmeetTv (2008) *Amon Tobin @ Teatar &td + Interview* [Video]*.* Available online: http://www.transmeet.tv/amon-tobin/ [Accessed 16/3/2015].

Turnmaster, T. (2013) *Interview with Amon Tobin* [Video]. Available online: https://www.youtube.com/watch?v=fkguIe7jHyA [Accessed 28/1/2015].

Weidenbaum, M. (1998) *Evolution & Permutation*. Available online: http://disquiet.com/1998/07/28/amon-tobin/ [Accessed 16/3/2015].

Wired (2009) *Amon Tobin and the Music of 'Infamous'* [Video]. Available online: https://www.youtube.com/watch?v=yqWvheuVf6w&x-yt-cl=84838260&x-yt-ts=1422327029 [Accessed 28/1/2015].

Young, S. (2003) *Amon Tobin*. Available online: http://www.soundonsound.com/sos/apr03/articles/amontobin.asp [Accessed 28/1/2015].

Appendix B: Boards of Canada

Anderson, D. (1998) *Boards of Canada*. BOCPages. Republished online: http://bocpages.org/wiki/Space_Age_Bachelor_1998_interview [Accessed 12/3/2015].

Broc, D. (2002) *Another Miracle of the Post-Modern Sensibility*. BOCPages. Republished online: http://bocpages.org/wiki/Another_Miracle_of_The_Post-modern_Sensibility [Accessed 12/3/2015].

Cagnetti, F. (2005) *Wide Use of Guitars*. BOCPages. Republished online: http://bocpages.org/wiki/Wide_Use_of_Guitars [Accessed 13/3/2015].

Chamberlin, D. (1999) *Children Have the Right to Film*. BOCPages. Republished online: http://bocpages.org/wiki/Children_Have_the_Right_to_Film [Accessed 12/3/2015].

Clarke, P. (2005) *Around the Campfire*. BOCPages. Republished online: http://bocpages.org/wiki/Around_The_Campfire [Accessed 12/3/2015].

Collin, S. (2013) *Harvest from Heaven.* Available online: https://docs.google.com/document/d/1ea4iN6Mh9y3n9iBzLse7vhYnC8xXLPPYdbH8L-TafrM/edit?pli=1 [Accessed 13/3/2015].

Cookie Scene (2002) *In an Imaginary Place Out in the Country*. BOCPages. Republished online: http://bocpages.org/wiki/In_An_Imaginary_Place_Out_In_The_Country [Accessed 12/3/2015].

Davenport, N. (2005) *Splendid Isolation*. BOCPages. Republished online: http://bocpages.org/wiki/Splendid_Isolation [Accessed 13/3/2015].

Detourn, G.(2005) *Above Board!* BOCPages. Republished online: http://bocpag es.org/wiki/Above_Board! [Accessed 13/3/2015].

Döringer, M. & Herrmann, T. (2013) *The Charms of the Sphinx.* Available online: http://de-bug.de/musik/interview-boards-of-canada-the-charms-of-the-sphinx/ [Accessed 13/3/2015].

FACT (2013) *Boards of Canada Reveal Studio Processes behind Tomorrow's Harvest, Hint at Collection of Early Material.* Available online: http://www.factmag.com/2013/06/12/boards-of-canada-reveal-studio-processes-behind-tomorrows-harvest-hint-at-collection-of-early-material/ [Accessed 9/2/2015].

Georgopoulos, A. (2002) *Country Comfort*. BOCPages. Republished online: http://bocpages.org/wiki/Country_Comfort [Accessed 12/3/2015].

Hara, M. (2005) *Sweet and Sour Melodies Wander Around between Positive and Celebrative Sounds and Swaying Sadness.* BOCPages. Republished online:
http://bocpages.org/wiki/Sweet_and_Sour_Melodies_Wander_Around_between_Positive_and_Celebrative_Sounds_and_Swaying_Sadness [Accessed 13/3/2015].

Hector-Jones (1998) *Board Clever.* BOCPages. Republished online: http://bocpages.org/wiki/Board_Clever [Accessed 10/3/2015].

Hodgkinson, W. (2005) *Two for the No-Show.* BOCPages. Republished online: http://bocpages.org/wiki/Two_for_the_No-Show [Accessed 13/3/2015].

Hoffmann, H. (2005a) *Boards of Canada*. Available online: http://pitchfork.com/features/interviews/6151-boards-of-canada/ [Accessed 9/2/2015].

Hoffmann H. (2005b) *Stirred Up the Ashes*. BOCPages. Republished online: http://bocpages.org/wiki/Stirred_Up_The_Ashes [Accessed 13/3/2015].

Hutton, E. (2005) *Emotional Abuse*. BOCPages. Republished online: http://bocpages.org/wiki/Emotional_Abuse [Accessed 13/3/2015].

Il Mucchio (2013) *Interview*. Available online: http://www.twoism.org/forum/viewtopic.php?f=2&t=11103 [Accessed 13/3/2015].

Leloup, Y. (1998) *Two Aesthetes of Electronic Music.* BOCPages. Republished online: http://bocpages.org/wiki/Two_Aesthetes_of_Electronic_Music [Accessed 12/3/2015].

Marchese, S. (2006) *Peering Out from Behind the Curtain*. BOCPages. Republished online: http://bocpages.org/wiki/Peering_Out_from_Behind_the_Curtain [Accessed 13/3/2015].

Micallef, K. (2002) Northern Exposure. BOCPages. Republished online: http://bocpages.org/wiki/Northern_Exposure [Accessed 12/3/2015].

Mulvey, J. (2002) *The Most Mysterious & Revered Men in Electronica.* BOCPages. Republished online: http://bocpages.org/wiki/The_Most_Mysterious_%26_Revered_Men_in_Electronica [Accessed 12/3/2015].

Murnin, B. (2005) *It's Our Take on a Pop Record*. BOCPages. Republished online: http://bocpages.org/wiki/It%27s_our_take_on_a_pop_record [Accessed 13/3/2015].

Murray, R. (2012) *Archive Piece: Boards of Canada.* Available online: http://www.clashmusic.com/features/archive-piece-boards-of-canada [Accessed 9/2/2015].

Nicholls, S. (2001) *Big Country.* BOCPages. Republished online: http://bocpages.org/wiki/Big_Country [Accessed 12/3/2015].

Nicholls, S. (2002) *The Colour & the Fire.* BOCPages. Republished online: http://bocpages.org/wiki/The_Colour_%26_The_Fire [Accessed 12/3/2015].

Pareles, J. (2013) *Brothers Who Make Electronica by Hand.* Available online: http://www.nytimes.com/2013/06/12/arts/music/tomorrows-harvest-by-boards-of-canada.html?pagewanted=all&_r=0 [Accessed 9/2/2015].

Passet, R. (1998) *A Bunker Full of Memories.* BOCPages. Republished online: http://bocpages.org/wiki/A_Bunker_Full_of_Memories [Accessed 12/3/2015].

Pattison, L. (2013) *Boards of Canada: 'We've become a lot more nihilistic over the years'.* Available online: http://www.theguardian.com/music/2013/jun/06/boards-of-canada-become-more-nihilistic [Accessed 9/2/2015].

Peel Session (1998) [Radio Programme]. BBC Radio 1, 16 June. Available online: https://www.youtube.com/watch?v=J2Ajjt4WryY [Accessed 10/9/2015].

Poolman, K. (2002) *Play Twice Before Listening*. BOCPages. Republished online: http://bocpages.org/wiki/Play_Twice_Before_Listening [Accessed 12/3/2015].

Poolman, K. (2005) *The Last Secret of Pop*. BOCPages. Republished online: http://bocpages.org/wiki/The_Last_Secret_of_Pop [Accessed 13/3/2015].

Sherburne, P. (2002) *Stoned Immaculate*. BOCPages. Republished online: http://bocpages.org/wiki/Stoned_Immaculate [Accessed 12/3/2015].

Southern, R. (2000) *Boards of the Underground.* BOCPages. Republished online: http://bocpages.org/wiki /Boards_of_The_Underground [Accessed 12/3/2015].

The Cosmic Crofter (1998) *The Age of Aquarius*. BOCPages. Republished online: http://bocpages.org/wiki/The_Age_of_Aquarius [Accessed 10/3/2015].

Tilkin, K. (2005) *Cross Out the Inappropriate*. BOCPages. Republished online: http://bocpages.org/wiki/Cross_Out_the_Inappropriate [Accessed 13/3/2015].

Tilkin, K. (2013) *Boards of Canada: 'Talk to the Hand, Chokri!'*. Available online: http://www.twoism.org/forum/viewtopic.php?t=11216 [Accessed 13/3/2015].

Volkskrant (2013) *Interview.* Available online: http://www.twoism.org/forum/viewtopic.php?p=216313#p216313 [Accessed 13/3/2015].

Young, R. (2005) *Protect and Survive*. BOCPages. Republished online: http://bocpages.org/wiki/Protect_and_Survive_(interview) [Accessed 13/3/2015].

Appendix C: Squarepusher

Assar, V. (2012) Tom Jenkinson is Squarepusher. *Tape Op,* 89, 40-44. Available online: http://www.vijithassar.com/blog/wp-content/uploads/2012/05/Squarepusher-Tape-Op-Interview.pdf [Accessed 15/3/2015].

Barcode (1997) *Squarepusher: Aphex Twin Clone, but Plays Bass Better and is Equally Innovative. Real Name, Tom Jenkinson…* Available online: http://www.barcodezine.com/Squarepusher%20Interview.htm [Accessed 15/3/2015].

Blanning, L. (2012) *Interview: Squarepusher*. Available online: http://www.redbullmusicacademy.com/magazine/squarepusher-interview [Accessed 15/3/2015].

Dax, M. (2013) *"Testing things to destruction is probably the best way to test things" – Max Dax Talks to Squarepusher*. Available online: http://www.electronicbeats.net/en/features/interviews/testing-things-to-destruction-is-probably-the-best-way-to-test-things-max-dax-talks-to-squarepusher/ [Accessed 15/3/2015].

Fallon, P. (2012) *High Five: Squarepusher*. Available online: http://www.xlr8r.com/features/2012/05/high-five-squarepusher/ [Accessed 15/3/2015].

Green, T. (2015) *10 Questions for Musician Squarepusher*. Available online: http://www.theartsdesk.com/new-music/10-questions-musician-squarepusher [Accessed 10/3/2015].

Griffiths D. (2012) Squarepusher. *Future Music,* FM258, 58-63.

Gritt, E. (2013) *Squarepusher "I need to perform my old material with a new twist… I don't want to end up like Status Quo"*. Available online: http://blogs.independent.co.uk/2013/03/26/squarepusher-"i-need-to-perform-my-old-material-with-a-new-twist…-i-don't-want-to-end-up-like-status-quo"/ [Accessed 15/3/2015].

Gross, J. (1999) *Perfect Sound Forever Online Music Magazine Presents… Squarepusher* Available online: http://www.furious.com/perfect/squarepusher.html [Accessed 10/3/2015].

Hillyard, K. (2013) *Interview #799: Squarepusher*. Available online: http://magazine.ilikemusic.com/iterview/Squarepusher_2013 [Accessed 15/3/2015].

Hutchings, N. (2015) *Super Fury Animal: Squarepusher Interviewed*. Available online: http://thequietus.com/articles/17497-squarepusher-interview [Accessed 29/4/2015].

i-D magazine (2004) *Squarepusher Interview from i-D magazine*. Available online: http://www.hijackbristol.co.uk/board/the-forum/squarepusher-interview/?wap2 [Accessed 15/3/2015].

Juno Plus (2010) Interview: Squarepusher. Available online: http://www.junodownload.com/plus/2010/10/13/interview-squarepusher/ [Accessed 15/3/2015].

Koss, I. (2001) *Going Spastic with Squarepusher.* Available online: http://www.ink19.com/issues/september2001/inkSpots/squarepusher.html [Accessed 15/3/2015].

Leloup, J. & Legrand, S. (1997) *Interview Squarepusher*. Available online: http://jeannoel.roueste.free.fr/techno/interviews/square/square.html [Accessed 15/3/2015].

Lustman, D. (2015) *Drew Lustman (aka FaltyDL) Interviews Squarepusher about Risks, Rewards, and Letting Records Speak.* Available online: http://www.self-titledmag.com/2015/04/24/drew-lustman-aka-faltydl-interviews-squarepusher-about-risks-rewards-and-letting-records-do-the-talking/ [Accessed 29/4/2015].

Merrill, D. (2012) *Tom Jenkinson aka Squarepusher talks with KBOO's Don Merill* [Audio]. Available online: http://kboo.fm/audio/by/title/tom_jenkinson_aka_squarepusher_talks_with_kboo_s_don_merrill [Accessed 15/3/2015].

Mettler, M. (2015) *Squarepusher doesn't just make Electronica, he makes the Software to make it.* Available online: http://www.digitaltrends.com/music/squarepusher-interview-the-software-behind-damogen-furies/ [Accessed 29/4/2015].

Micallef, K. (2014) *Squarepusher: Recording 'Music for Robots'.* Available online: http://www.emusician.com/album-profiles/1378/squarepusher-recording-music-for-robots/48119 [Accessed 10/3/2015].

Mills, J. (2010) *Running the Voodoo Down: An Interview with Squarepusher*. Available online: http://thequietus.com/articles/05374-squarepusher-shobaleader-one-interview [Accessed 15/3/2015].

Modulations, Cinema for The Ear (1998) Directed by Iara Lee [DVD] Music Video Distributors. Available online: https://www.youtube.com/watch?v=rRKuJ-r-F-A [Accessed 15/3/2015].

Morning Becomes Eclectic (2012) [Radio Programme]. KCRW, 31 August. Available online: http://www.kcrw.com/music/shows/morning-becomes-eclectic/squarepusher [Accessed 15/3/2015].

Morpurgo, J. (2012) *Squarepusher Grapples with Pop, Pomposity and LEDs.* Available online: http://www.factmag.com/2012/05/13/squarepusher-on-grappling-with-pop-pomposity-and-leds/ [Accessed 15/3/2015].

Muggs, J. (2013) *Squarepusher: Pushing the Boundaries.* Available online: http://www.mixmag.net/words/features/squarepusher-pushing-the-boundaries [Accessed 10/3/2015].

Murray. R. (2012) *Dreams Recurring: Squarepusher.* Available online: http://www.clashmusic.com/feature/dreams-recurring-squarepusher [Accessed 10/3/2015].

MusicTech.net (2015) Squarepusher Interview – Brutal Sound. Available online: http://www.musictech.net/2015/09/squarepusher-interview/ [Accessed 10/9/2015].

Ned Rush (2014) *Squarepusher/Keith Fullerton Whitman Interview* [Audio]. Available online: https://www.youtube.com/watch?v=AqdxBI-3zCU [Accessed 15/3/2015].

NPR (2014) *The Coming Robot Army Just Wants to Rock*. Available online: http://www.npr.org/2014/04/06/298371748/the-coming-robot-army-just-wants-to-rock [Accessed 10/3/2015].

Pitchfolk (2012) *Squarepusher discusses his Ufabulum live show* [Video]. Available online: https://www.youtube.com/watch?v=UOr1fAsbvCI [Accessed 15/3/2015].

Radio Active Jazz (2014) [Radio Programme]. Radio Active FM, 4 May. Available online: https://www.mixcloud.com/LoveRhino/squarepusher-interview-radio-active-jazz-show-parts-1-2/ [Accessed 15/3/2015].

Reidell, S. (2012) *Artist on Artist: Squarepusher talks to STV SLV of the Hood Internet*. Available online: http://www.chicagoreader.com/chicago/squarepusher-hood-internet-interview-ufabulum-tom-jenkinson/Content?oid=7809456 [Accessed 15/3/2015].

Sherburne, P. (2012) *Squarepusher Q&A- A Chat with Electronic Music's Own David Foster Wallace*. Available online: http://www.spin.com/blogs/squarepusher-qa-chat-electronic-musics-own-david-foster-wallace/ [Accessed 10/3/2015].

Simsek, K. (2012) *Squarepusher: Augment*. Available online: https://karasimsek.wordpress.com/2012/07/23/squarepusher-interview-notion-58/ [Accessed 15/3/2015].

Steven, R. (2015) *Sight and Sound: An Interview with Squarepusher*. Available online: http://www.creativereview.co.uk/cr-blog/2015/april/squarepusher [Accessed 29/4/2015].

Sylvester, D. (2012) *Squarepusher*. Available online:
http://exclaim.ca/Music/article/squarepusher [Accessed on 10/3/2015].

Tantum, B. (2012) *Interview: Electronic Music's Iconoclastic Squarepusher*.
Available online: http://www.timeout.com/newyork/clubs-nightlife/interview-electronic-musics-iconoclastic-squarepusher [Accessed 15/3/2015].

The Creators Project (2011) *Meet Squarepusher* [Video]. Available online:
http://www.dailymotion.com/video/xjnewp_rencontre-avec-squarepusher_music [Accessed 15/3/2015].

The Culture Show (2006) [TV Programme]. BBC2, 14 October. Available
online: https://www.youtube.com/watch?v=uZ0LL1SJ-6U#t=78 [Accessed
15/3/2015].

Tingen, P (2011) *Squarepusher.* Available online:
http://www.soundonsound.com/sos/may11/articles/sqpshr.htm [Accessed
15/3/2015].

V Knid Esq (2004) Squarepusher Interview. *Erutofon*. 3 March. Available
online: http://www.no-future.com/erutufon/showthread.php?t=7237 [Accessed
15/3/2015].

Warp (2014) *Squarepusher x Z-Machines EP 'Music for Robots' will be
released in April*. Available online: http://warp.net/news/squarepusher-music-for-robots/ [Accessed 15/3/2015].

Wyse, P. (2004) *We're Jammin': Squarepusher.* Available online:
http://www.theguardian.com/music/2004/mar/11/popandrock [Accessed
15/3/2015].

Appendix D: Four Tet

!K7 Records (2007) *Four Tet DJ-Kicks EPK (!K7)* [Video]. Available online: https://www.youtube.com/watch?v=oweLOqYsIZc [Accessed 4/2/2015].

Attack Magazine (2013) *Four Tet Twitter Q&A*. Available online: http://www.attackmagazine.com/four-tet-beautiful-rewind-twitter-qa/ [Accessed 8/2/2015].

Benji B, Four Tet Takeover (2014) [Radio Programme]. BBC Radio 1, 8 May. Available online: http://www.bbc.co.uk/programmes/p01ynl5p [Accessed 5/5/2015].

Bennett, M. (2010) *Four Tet Interview*. Available online: http://www.clashmusic.com/feature/four-tet-interview [Accessed 8/2/2015].

Beta, A. (2013) *Four Tet.* Available online: http://pitchfork.com/features/interviews/9132-four-tet/ [Accessed 7/2/2015].

FACTmagazine (2007) *Four Tet - Me & My Instrument* [Video]. Available online: https://www.youtube.com/watch?v=TCE02hdVf40 [Accessed 4/2/2015].

FACTmagazine (2012) *Four Tet – Inside my Record Bag* [Video]. Available online: https://www.youtube.com/watch?v=1ru9Vf8L8Y4 [Accessed 4/2/2015].

Four Tet (2013) *"how long did it take to make/finish "Beautiful Rewind"?" About 7 months* [Twitter]. 18 October. Available online: https://mobile.twitter.com/FourTet/status/391291663211307008?ref_src=twsrc%5Etfw [Accessed 8/2/2015].

Future Music Magazine (2010) *Four Tet on the Yamaha Tenori-On* [Video]. Available online: https://www.youtube.com/watch?v=M20ukzn_rsw [Accessed 3/2/2015].

Future Music Magazine (2013) *Four Tet in the Studio with Future Music* [Video]. Available online: https://www.youtube.com/watch?v=QEUGilncRJs [Accessed 3/2/2015].

Ghezawi, K. (2012) *Interview: Four Tet*. Available online: http://thequietus.com/articles/10408-four-tet-interview [Accessed 8/2/2015].

Gonsher, A. (2012) *Q&A Four Tet's Kieran Hebden on Having Music Around Him at All Times, Remixing Opera, and Sticking with Vinyl*. Available online: http://blogs.villagevoice.com/music/2012/02/four_tet_interview_mister_saturday_night.php [Accessed 8/2/2015].

Guardian Music (2011) *Paul Morley meets Four Tet* [Video]. Available online: https://www.youtube.com/watch?v=giCIPvgfyfY [Accessed 4/2/2015].

Hodgkinson, W. (2003) *Four's Mores.* Available online:
http://www.theguardian.com/music/2003/dec/12/1 [Accessed 3/2/2015].

Inglis, S. (2003) *Four Tet.* Available online:
http://www.soundonsound.com/sos/jul03/articles/fourtet.asp [Accessed 7/2/2015].

Joyce, C. (2013) *Making the 'Rounds': Four Tet looks back at his Masterpiece.* Available online: http://www.spin.com/articles/four-tet-rounds-reissue-kieran-hebden-interview/ [Accessed 8/2/2015].

Les Frères du Son (2011) *Les Frères du Son Rencontrent: Four Tet* [Video]. Available online: https://www.youtube.com/watch?v=Aenb-yi89BU [Accessed 4/2/2015].

McGlynn, D. (2010) In the Studio with Four Tet. *Future Music,* FM227 58-62.

MinimumWastage's Channel (2011) *Four Tet Interview on Fabriclive 59, Burial & Thom Yorke at Field Day 2011* [Video]. Available online: https://www.youtube.com/watch?v=z8pPz6obBDU [Accessed 4/2/2015].

Muro TVmusic (2012) *Muno.pl pres. Four Tet (interview) @ Audioriver Festival 2010* [Video]. Available online: https://www.youtube.com/watch?v=Uw0TNAGQaFY [Accessed 4/2/2015].

Obkircher, F. (2014) *Four Tet Breaking Out of the Cycle*. Available online: http://www.groove.de/2014/01/07/four-tet-interview-english/ [Accessed 7/2/2015].

Oscarthefuzz (2010) *SpecialTen07 – Four Tet Interview.4mv* [Video]. Available online: https://www.youtube.com/watch?v=YgJVXDZBhJM [Accessed 4/2/2015].

Red Bull Music Academy (2013) *Studio Science: Four Tet on his Live Set* [Video]. Available online: https://www.youtube.com/watch?v=9KIvnLBF7vU [Accessed 4/2/2015].

Soluzionisemplici (2011) *Bastioni Gran Sasso - Four Tet @ Radiation Records* [Video]. Available online: https://www.youtube.com/watch?v=jc8Ct4W-ork [Accessed 4/2/2015].

Strashnov, M. (2011) *The Self-Titled Interview: Four Tet, Featuring a Stream of his New FABRICLIVE Mix*. Available online: http://www.self-titledmag.com/2011/09/19/the-self-titled-interview-four-tet-featuring-a-track-by-track-breakdown-and-stream-of-his-new-fabriclive-mix/ [Accessed 8/2/2015].

The Creators Project (2013) *Four Tet: Looking Backward, Moving Forward* [Video]. Available online: https://www.youtube.com/watch?v=801iT1PMga8 [Accessed 4/2/2015].

The Making of Tongues (2010) Directed by Sarah Sea & Fay Buzzard [Video] Domino Recording Co. Available online: https://www.youtube.com/watch?v=mAn3JXr8MKE [Accessed 4/2/2015].

Timandbarrytv (2014) *Beat This Episode 19 Four Tet* [Video]. Available online: https://www.youtube.com/watch?v=TUDsVxBtVIg [Accessed 4/2/2015].

Whitney, J. (2003) *Manitoba & Four Tet: Be Careful What You Wish For* [Video]. Available online: https://www.youtube.com/watch?v=6OyJmW_NJkU [Accessed 4/2/2015].

XLR8R (2009) *XLR8R TV Ep. 109: Four Tet does something brilliant* [Video]. Available online: https://www.youtube.com/watch?v=wvOZBvaG5W0 [Accessed 4/2/2015].

Appendix E: Artists Biography

Amon Tobin

Amon Tobin is a Brazilian musician signed to the Ninja Tunes record label. Having released eight studio albums, scored for video games ('Tom Clancy's Splinter Cell: Chaos Theory', and 'inFamous') and film soundtracks (*Taxidermia*, and *Pax Americana and the Weaponization of Space*), he also works collaboratively under the pseudonyms, 'Two Fingers' and 'Eskamon'. His work is best known for its extensive use of field recordings and sound design techniques, earning him recognition at IRCAM in Paris where he was invited to perform.[36] His critically acclaimed live show ISAM is an all-electronic audio-visual installation of his work, featuring Tobin performing onstage in a large cubic structure with synchronized 3D video projection mapping. Tobin's studio is currently based in rural California outside San Francisco where he lives and works.

Kieran Hebden

Kieran Hebden, also known as Four Tet, is an English post-rock, electronic musician and founder of record label TEXT. He first emerged as a member of the group Fridge, before establishing himself as a solo artist releasing eight solo studio albums to date. His earlier compositions draw influence from hip-hop, electronica, jazz, and folk music, incorporating a mixture of samples and live instrumentation. His more recent work is heavily influenced by house music, following his DJ residencies at Plastic People and Fabric nightclubs in London. Hebden also worked collaboratively with jazz drummer 'Steve Reid' on several live improvised albums. Based in New York, he currently runs his own record label, performs internationally as a DJ, and produces for other artists including Neneh Cherry and Omar Souleyman.

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[36] IRCAM is the French Institute for Research and Coordination Acoustic / Music based in Paris. For more information, see: http://www.ircam.fr/?&L=1 [last accessed on 10th November 2015].

Tom Jenkinson

Squarepusher is the pseudonym adopted by UK-based musician Tom Jenkinson, signed to Warp Records. Having released fourteen albums to date, Jenkinson is an accomplished multi-instrumentalist; his virtuosic electric bass guitar performances feature prominently in his work. His music fuses live instrumental playing with electronic elements derived from custom digital signal processing (DSP), drawing influence from drum and bass, jazz, acid house, and electroacoustic music. He also records as a member of the band Shobaleader One, and collaborated on a project 'Music for Robots' where he composed a repertoire performed by 'Z-Machines' comprising of three robots.[37] Squarepusher live shows feature Jenkinson performing on bass guitar and live electronics, supported by a drummer. The performance incorporates a large LED backdrop displaying a visual representation of his music, rendered live using custom DSP written by Jenkinson. He is currently based in the UK where he works and lives.

Michael Sandison and Marcus Eoin

Boards of Canada (BoC) are a Scottish duo consisting of brothers Michael Sandison and Marcus Eoin, also signed to Warp Records. They have released four albums and several EPs on Warp, and are known to only give occasional rare interviews. Their reticence to speak to the media fuels misconceptions on their identities and meanings behind their music. Coupled with their obscure back catalogue of earlier work released on their own label Music70, they have gained a cult-like following of loyal fans. Their music is mostly down tempo drawing influence on nostalgia, nature, and childhood themes, using live instrumentation and sampling through new and old recording technologies to deliberately degrade the sound. Their studio is based in an undisclosed rural region outside Edinburgh.

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[37] A short video documenting the development of Squarepusher's collaboration with Z-Machines can be found at: https://www.youtube.com/watch?v=7MluikyEQF4 [last accessed on 7th May 2017].

Appendix F: Example of Nvivo Data Collection

The following scans include screen captures of Nvivo data collection for IPA to identify emergent nodal themes. The thematic organisation of the content emerged using logical groupings of nodes which were refined into possible chapters. The purpose of these scans is not to provide a conclusive account of the research method, but rather give some insight into the process undertaken.

Home Create Data Analyze Query Explore Layout View

Compositional Methods and Processes

Summary | Reference

Reference 1: 2.40% coverage

AKJL: Do you feel close to the generation that worked with home studios?

"Perhaps, in a way. Our original approach to recording with our old equiment was an inferior version of what others did later on with their home studios. But if we were close to the spirit of that generation, it was by luck, and only at times, since we always pushed ahead a little isolated, off in a corner, drawing inspiration from rock music as well as electronic music."

Reference 2: 2.34% coverage

AKJL: What made you finally go back to electronic music?

"It was more natural for us. We always worked hard, polishing off our tracks all the time, even those that had more of a "rock" feel to them. For a month or two we would come back to the tracks, changing a sound here, adding one there. We sampled ourselves all the time, heading for a sound that was almost entirely electronic, and it was easy to take that to its logical conclusion."

Reference 3: 3.93% coverage

"Yeah! The technology allowed us to simpify our way of working. With the sampler, you have total control over your music. You can take the sound of an instrument, and make it sound however you like, with the ability to go back again. For example, on our last album, there are some tracks where we have used a piano. Through sampling, we've transformed the sound of the piano in lots of different ways, to the point where it sounds like a very very old piano, or even to the point where no one listening to the album would think that there was a piano there. It's the same story with guitars. We played electronic and acoustic instruments on "Music has the right to children", but we completely reworked their sound electronically."

Reference 4: 1.42% coverage

AKJL: Do you use samples from TV programmes?

"We try to avoid it. We do it sometimes. But, on the whole, we make our own melodies and vocal samples using the people here. Even tunes that sound like samples are really made by us, but destroyed by the sampling process."

Reference 5: 1.87% coverage

Yes, we do work with rhythms, but for us it's just as a vehicle for carrying strange and beautiful melodies. We try to vary the effects; that's particularly important for live performance. Also, we like rhythms that are strong, almost binary, because that really goes with our aim of creating dark, obsessive backdrops to go with our melodies.

Reference 6: 2.78% coverage

On the one hand, we have melodies and almost naïve vocals; on the other, a process of corruption of these melodies and vocals, by means of a certain ambience, or through

NODES › Nodes › Compositional Methods and Processes

Amon 20030400 Sound on Sound

Studio Tan

Released in October 2002, *Out From Out Where* was some 18 months in the making, the work being particularly intensive in the last six months. Amon is something of a night owl when it comes to writing his material, working through the small hours to put a track together in one block. "I'll start in mid-afternoon and work through to the next day. Usually by then, I'll have got the arrangement. Then I'll pull it apart, work on the production and mix it over the course of the next two or three weeks. I might change the arrangement, but usually most of it's done in one go in a couple of days. Even though it's laborious, it's also quick if you know what you're doing. I've also got more confident, so I won't be spending 1000 hours looking for the exact right snare. If something actually works, I'll use it, but if I'm slightly uncertain about it, I'll throw it away until I find something I'm completely certain about.

"When I first started, I used to throw out a lot, but maybe because I've now got more control of my sounds, now the music is closer to the original idea I had in the beginning. Before I'd find a sound and just put it with another sound to see what happens. Sometimes it would lead somewhere and sometimes it wouldn't, whereas now that random element is somewhat tapered, so the ratio has improved, but I might throw away maybe one in four tracks."

Does the writing process begin with a basic loop or sound, or does he try to realise a strong preconceived idea in his head? "It's a bit of both. When I first started, it was much more finding a sound that inspired me to find more sounds to go with it. Now I find it a lot more satisfying if I have a framework to work inside or a goal to achieve with the music, and then try to find the sounds to fit in there, manipulating them until they do. It doesn't always work like that, so I still stumble across sounds that make me think 'Oh, I know exactly what would work with that,' and off I go." But does he have definite sounds in his head that he tries to recreate? "Oh definitely, mainly different types of beats, but also bass sounds or more abstract ideas of the types of noises I want. Sometimes I'll have an idea for a melody and that gets really tricky; for example, I'll find three or four saxes that have the right notes, so I'll try and piece them all together."

Needing Treatment

Amon has a pragmatic and highly effective way of dealing with the discrepancies between the tone and production of the samples. "It's amazing what you can do with filters; I look at it as being a bit like watercolours, when you've got various different blotches and then you use a wash to bring it all together. I also use a lot of effects in my stuff for that reason — it's not particularly because I love delays and reverbs or whatever. Processing is the answer. I'll take a lot of samples to make a melody, then process it with one type of filter or modulation effect, re-record it, cut it up, and by then it will sound like one sample — but sometimes if it doesn't, it can be really interesting anyway."

Filters and EQ also play a big part in isolating specific sounds or instruments within a sample. "You can take out an entire frequency that holds an instrument, so that you can no longer hear it, or you can hear it in such a background way that it becomes an interesting subliminal part. Unfortunately that means it can sometimes sound really harsh, because the EQ has to be so extreme. Some people have even said it's a characteristic of my sound. I love that — here's something I f**ked up, and someone relishes that!

SOURCES › Internals › Amon 20030400 Sound on Sound