

The performance of machine aesthetics: acoustic reimaging of electronic music

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Abstract

This article explores the emergence of musical performance practices whereby electronic music styles, along with the musical and sonic characteristics inherent in their electronic production, are emulated through live musical performance using acoustic instrumentation. The article draws on Brummett's (1999) concept of 'machine aesthetics' to explore the emergence of these practices, whereby musicians emulate sonic and musical attributes of music usually produced by machines, without the use of machines. Utilising semi-structured interviews and musical analysis of records by Abstract Orchestra and GoGo Penguin, the article attempts to contextualise these practices within their broader function in popular music production and performance.

Introduction

Throughout the history of recorded music, developments in technology have consistently impacted on musicians' performance practices and techniques. There has been significant academic discourse related to the affordances and limitations of these technological developments on music practices, often highlighting how musicians embrace the (mis)use of technology and develop specific performance techniques to best exploit the available technology. The democratisation of music technology, and specifically the dominant influence of the Digital Audio Workstations in all stages of music production, incorporating linear and loop-based sequencer aesthetics, the foregrounding of digital audio files as source material, alongside the emergence of post-digital glitch aesthetics, has had a significant impact on the practices of a number of contemporary musicians in relation to their approaches to performance, composition, arrangement and production. The aesthetic characteristics imposed by these technologies can be considered as a type of machine aesthetics, whereby the inherent nature of the machine imposes musical and sonic characteristics that become inherent in the aesthetic consideration of the music. Whilst discussions around the impact of technology within music production are well established, an area that has been largely overlooked is how these aesthetic considerations have been embraced by musicians directly into their performance practice

to achieve musical and sonic characteristics integral to these technologies while explicitly avoiding their use.

Drawing on semi-structured interviews with musicians and producers in conjunction with analysis of recorded musical performances, this article explores the influence of these machine aesthetics on the practice of contemporary musicians, highlighting some of the innovative adaptations made by musicians. These include modifications of their acoustic instruments, innovative performance techniques and adaptations to their conceptual frameworks for composition and arrangement, all of which enable them to embrace the musical and sonic characteristics of machine aesthetics without relying on the use of machines. A discussion of the various modifications of acoustic instrumentations is beyond the scope of this article, which will instead predominantly focus on the latter two of these adaptations: performance techniques and conceptual frameworks.

The first section of this article attempts to define the broader concept of machine aesthetics, before presenting three specific examples of machine aesthetics in popular music production: (1) sample-based aesthetics; (2) Digital Audio Workstation (DAW)-based aesthetics; and (3) glitch aesthetics. The discussion then explores the performance of machine aesthetics through analysis of musical recordings by Abstract Orchestra and GoGo Penguin, two bands based in the northern English cities of Manchester and Leeds, respectively, who utilise the musicianship to both perform and record music that is significantly influenced by either sample-based hip hop or experimental electronic music. Finally, the findings from the analyses will be summarised and framed within the wider context of current popular music discourse.

Machine aesthetics

It is widely recognised that the development and application of technology, and more specifically machines, has had a momentous impact on the aesthetics of the production of popular music. While the term machine is often applied to equipment with physical moving parts – a definition which the majority of early audio recording and playback technology would adhere to – the emergence of digital technology and computing during the latter part of the 20th century led to the term taking on new meaning. For example, in the preface to *The Music Machine*, while describing the concept of machine music as an ‘ancient idea’ (1989, p. xi), Curtis Roads affirms the status of digital technology as ‘the music machine of the present’ (1989, p. xi). The proliferation of digital technology, including both hardware and software in the form of DAW, has therefore led to the common interpretation of the term ‘machine’ to rely less on the specific requirement of physical moving parts, and instead shift towards a focus on the ability of the technology to automate tasks. As such, machines have some form of control or influence on the process that can be seen to either limit or overcome the physical (in)capabilities of the human. In the context of popular music production, the term ‘machine’ is most commonly used to reference technologies that are designed to facilitate the recording, manipulation, organisation and/or playback of sound,¹ such as digital samplers and sequencers, rather than acoustic instruments that may be used to create or perform music.

¹ It should be noted that many of these technologies were often not designed to allow for all of these functions, but were used to do so none the less, thus changing the nature of the original design’s intentions, as discussed in the case of digital sampling by Oliver (2016).

Despite the piano being a classic example of a 'music machine', with levers and hammers transferring the subtle movement of the human fingers into the percussive striking of strings, it is rarely described as such owing to the dominance of the 'machines' of audio recording and playback technology such as magnetic tape recorders, digital samplers and DAWs.

As the discussion in this article relates to the impact of both analogue and digital electronic music technology, the concept of machine aesthetics within popular music is useful. By comparing and contrasting the three specific categories of machines aesthetics in popular music production, which are defined in the following section, this article aims to explore these aesthetic considerations beyond the analogue–digital binary. Furthermore, by analysing the implementation of these aesthetics in music performance, the article aims to demonstrate how machine aesthetics are able to function beyond the machines themselves, echoing Brummett's assertion that machine aesthetics can exist in artefact that embody 'qualities that facilitate the experience of machine aesthetics' (1999, pp. 10–11) despite not being created from or by machines, thus enabling the main crux of the article; that it is possible for musicians to create performances and audio recordings which exhibit the characteristics of machine aesthetics without the use of machines.

Sample-based aesthetics

Machines have had a significant impact on popular music aesthetics through both the design of their interface, in so far as this dictates the interaction between the machine and the human operator, and through the sonic characteristics imparted on the audio signals that pass through them. The limitations imposed by the design of machines have influenced the development of certain musical stylistic conventions which have then been frequently embraced and exploited by musicians and producers. A prime example of this is the memory limitations of early digital samplers, which determine the total sample time available. This in turn influenced and facilitated the need for looping and repeating sections alongside other creative approaches for musicians and producers, and gradually became part of their aesthetic repertoire and preferences. Even when technological developments have been able to overcome these types of limitations, artists would commonly seek to intentionally self-impose the restrictions from previous technologies to achieve the desired musical and sonic characteristics. A pertinent example of this process of self-imposing limitations of previous technologies in action can be observed in the development of hip hop music production practices.

Long before the emergence of hip hop as recorded practice, hip hop was only ever experienced as a live phenomenon whereby DJs would extend existing musical performances on vinyl records via the affordances offered through the interface of the turntable and audio mixer (Katz 2012). As hip hop DJing techniques became established as an essential component in the creation of the music, DJs were able to apply and adapt these DJ-based methods and approaches to the emerging technology of digital sampling. The rise of more affordable, and therefore accessible, digital samplers in the early to mid 1980s allowed hip hop producers to continue the practice of extending and manipulating breakbeats, along with other pre-existing recorded musical sounds, in both the time and frequency domains. The practice of

using vinyl records as sound sources for sampling² also became an established practice alongside the activity of crate digging.³ Furthermore, the specific use of digital sampling technology within hip hop was predominantly reliant on (re)using recordings of pre-existing human musical performances, most notably in the form of breakbeats. The application of digital sampling within hip hop was therefore musically and sonically in stark contrast to many other electronic music genres of the time, where digital technology was predominantly utilised to specifically foster what Butler describes as a 'mechanistic ethos that ... favors the removal of [the] human element' (2006, p. 184). Many other forms of electronic music primarily embraced the use of digital sequencing and processing technologies to achieve rhythmic precision and sonic clarity that would in most cases have otherwise been impossible to realise through human performance and pre-existing analogue recording technologies.⁴ In the case of hip hop production, however, the techniques developed by DJs using vinyl records, turntables and mixers were transferred and applied to new digital sampling technologies. As breakbeat sections of funk records became the fundamental source material of choice for hip hop DJs, it was perhaps inevitable that instead of using digital technologies to achieve strict rhythmic accuracy and clarity, hip hop DJs used them in ways which would emulate aspects of human imperfections to capture and (re)create rhythmic grooves. As such, they maintained a consistent musical aesthetic between the DJing practices of live hip hop performance and sample-based practices of hip hop record production, leading to scholars such as Williams to describe hip hop production 'as a special case of musical borrowing [which] ... extend[s] rather than replace[s] existing musical practices' (2013, pp. 3–5).

The conceptualisation of rhythm and groove inherent in the breakbeats of funk records, which formed the foundations for the development of hip hop music, provided an aesthetic framework through which new techniques were developed with the emergence of new technologies, tools and machines throughout the latter part of the 20th century. The software and hardware design of digital samplers, most notably the Akai MPC range, created 'sonic, rhythmic, and motivic implications for the musical outputs' (Exarchos 2023, p. 58) of hip hop producers. Using these digital samplers to (re)organise sounds and rhythms in ways which 'exaggerated [the] rhythmic expressivity of the machine ... evok[ing] the human touch of the pre-digital era' (Danielsen 2013, pp. 1–3) therefore became a common aesthetic in hip hop production. While there has been wide ranging and ongoing discourse about the role of rhythm, and more specifically rhythmic deviation, within hip hop production (e.g. Danielsen 2012, 2013; Greenwald 2002; Oliver 2015, 2016), there has perhaps been a less detailed and nuanced consideration for the impact and importance of the sonic and timbral changes which occur during the digital sampling process. These changes arise owing to a number of factors, including pitch and frequency changes inherent in adjusting the playback speed of a digital sample,⁵ audio artefacts

² This is another example of mis-use of the technology, as the intended design of these digital samplers was not to sample from existing recordings, just as the turntable was not designed to be a performative instrument.

³ Crate digging refers to the practice of sourcing often rare, obscure and unique vinyl records to be used as sample material for hip hop production and is discussed in Schloss (2004).

⁴ This is explored in great detail in Brøvig-Hanssen and Danielsen (2016).

⁵ During the mid 1990s DAWs and digital samplers were able to 'time stretch' audio, allowing independent control of the pitch and playback speed, with inherent artefacts of the digital processing.

of aliasing and quantisation distortion owing to sample-rate and bit depth limitations of early digital samplers, and the unique sonic characteristics of audio filters and envelope modulators found in some of the commonly used digital samplers.⁶ Walser's (1995) seminal article analysing the Bomb Squad's productions for Public Enemy draws attention to the clashing timbres through the use of multiple, contrasting samples sources, arguing that the carefully considered construction of the music itself has meaning, perhaps even more than the lyrics. Drawing on Burke (1824) and Jameson's (1991) understanding of the 'sublime' as evoking a 'simultaneous response of fear and pleasure' (Krimms 2000, p. 74), Krimms expands on Rose's (1994) discussion of 'layering' within hip hop music production to coin the term '*hip hop sublime*' (2000, p. 73), which he uses to describe the sonic characteristics of both pitch-based dissonance and conflicting timbral qualities present in sample-based music. In his comprehensive study of sample-based hip hop producers who were active during what many refer to as the golden age of hip hop, around the late 1980s into the early 1990s, Schloss (2004) also describes how the rhythmic, timbral and textural sonic artefacts of the digital sampling process developed an established hip hop musical aesthetic. Schloss suggests that the motivations behind the use of digital sampling by hip hop musicians cannot be reduced to a lack of access to both musical instruments and a formal music education, and instead presents sampling practice as an aesthetic choice deeply embedded in hip hop's historical cultural practices. This adherence to the aesthetic of sampling with the participants in Schloss' study leads him to argue that to be considered authentic, a 'lack of samples – the use of live instrumentation ... must be justified' (2004, p. 67). In recent years, however, there has been a significant shift towards the use of live instrumentation in the production process of hip hop music. Although this practice is commonly attributed to overcoming legal issues with clearing samples, there are also arguably additional creative freedoms available to producers working with original musical performances from session musicians interpolating musical samples (see Williams' 2013 discussion of Dr Dre). While the process of recording live music performances within hip hop production may be well established, these recordings would often then require significant audio processing to ensure that they conform to the desired sonic aesthetic of sample-based hip hop; or as Exarchos states, that the 'newly recorded live performance benefits from a sonic "distancing", which can be expressed through mixing practices that imbue spatial and temporal qualities in their staging' (2023, p. 14). However, as will be evidenced in this article, there are also examples of musicians embracing the musical and sonic characteristics of the sample-based aesthetic and incorporating these directly into their musical performance practice, without relying on analogue or digital audio processing. I would argue that these practices should be understood as an extension, rather than rejection, of pre-existing sample-based and DJ-based aesthetics firmly rooted in hip hop cultural practices.

While sample-based hip hop provides a unique and interesting context within which to explore sample-based machine aesthetics in the production of popular music, other types of machine aesthetics can also be found within popular music. Two further examples can be observed in DAW and glitch aesthetics, which will be discussed below.

⁶ The MPC 3000 was a commonly used digital sampler which had these features.

DAW aesthetics

Both digital and analogue sequencers had a significant impact on the aesthetic considerations for the production of electronic music, and arguably all forms of popular music. Sequencers allowed musicians to achieve relatively precise and reliable rhythmic timing, and consistent, repeatable performance of musical phrases; however, as these sequencers were in the first instance predominantly non-linear devices, they also had a significant influence on the composition process. Despite techniques such as repetition, looping and even copy and paste being possible in the era of analogue magnetic tape recording, these techniques were both complex and time intensive. The design of sequencers and DAWs on the other hand, specifically facilitated these types of compositional approaches and despite the dominance of the linear timeline found in the majority of DAWs, the *copy and paste* aesthetic has prevailed as the dominant compositional tool within popular music production. Prior acknowledges this impact that DAWs have on conceptual frameworks within popular music production, describing how the 'digital shifts the way [musicians, producers and engineers] conjure up musical forms and structures, as well as the thought processes that give rise to them' (2009, p. 87). One example of this can be observed in the preference inside DAWs to represent audio or MIDI as blocks (often referred to as regions or clips). These blocks, by their very nature, encourage additive forms of music composition. Describing the impact of DAWs on the compositional process of singer songwriters, Marrington, drawing on Spicer (2004), defines this approach as an "accumulative" form of composition, in which the constituent parts of the music are gradually introduced one layer at a time' (2017, p. 80). There are further examples that demonstrate the inherent impact of the DAW in popular music composition and production, such as Mooney's (2011) observations of the prevalence of popular music releases having a tempo of 120 beats per minute and being in a 4/4 time signature, specifically owing to these being the default settings of the majority of DAWs. Brøvig-Hannsen discusses the use of DAWs and the incorporation of cut-and-paste aesthetics in electronic music production, as one example of what she terms *opaque mediation*, described as an 'exposure of the relevant mediating technology' (2013, p. 159) by the artist or producer, which is situated in contrast to the transparent mediation commonly sought after in traditional music recording practices that seek to capture a live musical performance.

The DAW Ableton Live, quite possibly the most common DAW for electronic music production, differs from many other DAWs in that it is primarily based around a non-linear loop-based, or clip-based, 'session view', rather than the linear timeline view favoured by most other DAWs. This design further facilitates and prioritises loop-based compositional approaches, and can be considered to be more akin to early music sequencer systems that relied less on visual linear representations of music structures. This design also encourages user interactions with these loops through clip and loop triggering during the compositional process, drawing on aspects of live DJ performance practices, and is one of the reasons why Ableton Live is often considered as a 'Performance-Oriented DAW' (Hermes 2022, p. 18), blurring the somewhat outdated notional boundary between performance and production processes. The DAW features discussed here significantly impact the compositional process of the majority of popular music practices; especially electronic music production, in terms of the predominance of looping, copy and paste, triggering and the foregrounding of digital organisation of musical ideas.

Furthermore, however, the predominance of digital recording technology also gave rise to the potential for significant, unintended impact on the sonic characteristics of the audio, through the sonic artefacts of digital failure, which will be discussed in the following section.

Glitch aesthetics

Alongside the development of sample-based music and DAW-aesthetics discussed in the previous sections, the prevalence of digital technology within music production in the 1990s facilitated not only the artistic freedom to record, manipulate and play back sound in ways which were either impossible, or very complex and time consuming, to do in the analogue domain, but also introduced a new range of limitations, with explicit sonic consequences when these limitations were breached. The absolute physical limit of 0dBFS⁷ in digital audio recording gave rise to digital clipping, a type of distortion entirely different to that inherent in analogue audio systems. As a signal begins to exceed limits within an analogue system, harmonic distortion, or saturation, occurs which generally adds odd and/or even harmonic content to the audio signal. This analogue distortion is often considered to have a 'musical' quality, as the harmonic components added have a direct relationship to the original audio signal. Digital clipping, however, is anharmonic, and therefore produces unnatural sonic artefacts which bear no direct relationship to the original audio signal. Whereas the sonic impact of analogue distortion can often be described using terms such as 'warm' or 'rich', digital clipping creates harsh, high-frequency, brittle sonic artefacts. Furthermore, as all digital sounds are essentially just an array of zeros and ones, when digital audio files become corrupt, or physical playback systems fail, such as with the skipping of a scratched CD, the sonic characteristics of these failures again bear no direct relationship to the encoded audio signal, and therefore can sound extremely abrupt and harsh. These emergent sounds of digital failure, however, provided inspiration to some musicians and during the 1990s new music genres began to develop in response to the embracing of these sounds. What was initially referred to as 'Post Digital' music by Cascone (2000) became more commonly known as glitch music, which embraced the abrasive sounds of digital failure, such as digital glitches, and foregrounded these in their music. While glitch producers experimented with and embraced these sonic characteristics of digital failures as a foundation for a new aesthetic, over time as the genre became more established, many of these sonic characteristics also began to spread outside of the experimental music scenes and permeate into wider popular music production. Kelly notes this trend, describing how the 'explicitly glitch- and error-driven scene rapidly became assimilated by the wider fields of electronic and popular music production ... these sounds are now simply another part of the sound palette of the digital music producer' (2009, p. 10). Likewise, Brøvig-Hanssen and Danielsen describe how musicians 'started to embrace the sounds of the skips, stuttering, and signal dropout as musical material in their own right ... fascinated with the rhythmic and sonic complexity of glitches' (2016, pp. 2–3). Kelly (2009) discusses of the use of cracked playback technologies within music production, which he frames as a resistance to the idea of the mediation of

⁷ dBFS stands for Decibels Full Scale.

the playback technology becoming transparent, with artists instead embracing and foregrounding the sonic characteristics of playback devices. With glitch aesthetics, it is the malfunction of digital playback devices that are embraced as a sonic and musical foundation. Glitch aesthetics also correlate directly with Brummett's concept of Chaotech, one of his categories of machines aesthetics which he describes as 'demand[ing] functional failure on the part of the machine' (1999, p. 99).

In this section some general ideas and concepts relating to machine aesthetics have been established. Following this, three example characteristics of machines aesthetics in popular music – sample-based aesthetics, DAW-based aesthetics and Glitch aesthetics – have been presented. The section that follows will analyse musical examples from two groups of musicians who have adopted one or more of these machine aesthetics into their performance practices.

Abstract Orchestra

Based in the city of Leeds in the UK, the members of the Abstract Orchestra describe their project as 'an all-star Hip-hop Big Band [that] strives to merge great musical arrangements with incredible Hip-hop to create an amazing live experience' (Abstract Orchestra 2019). The band were formed by band leader and saxophonist Rob Mitchell and the 13 plus members drawn from a network of highly accomplished session musicians, the majority of whom have a jazz background. While the band's formation was initially focused on live performances of renditions or interpretations of classic sample-based hip hop using live instrumentation, they eventually went on to release their debut LP *Dilla* (2017). The LP comprised a selection of (re)arrangements of a number of hip hop songs produced by the acclaimed late hip hop producer James Dewitt Yancey, better known as J Dilla. According to Mitchell (2014b), the recording session for the LP was in fact the band's first rehearsal of his arrangements, which the band then went on to perform during their international tour. Further LP releases have followed in recent years with a similar approach, including *Madvillain Vol. 1* (2018) and *Madvillain Vol. 2* (2019), which are based on interpretations of the work of Madvillain, a collaborative project between the emcees and producers Madlib and MF DOOM. For these releases, however, the band performed and adapted the arrangements a number of times as part of their tour before the studio recordings took place.

Mitchell's approach to the arrangement for this project is interesting in that he deconstructs the original compositional production process of sample-based hip hop, which is usually based on the steps of firstly sourcing of sample material through crate digging, then recording these samples onto a digital sampler, and finally using a sequencer to rearrange the material to construct a new, original musical composition. Mitchell describes his arrangement process as a form of reverse crate digging:

I take one of my favourite [hip hop] tunes, and I go crate digging, but backwards. I find the original samples ... do a little arrangement of those tunes ... so for example ... Full Clip [by] Gang Starr. We take the sample by Cal Tjader ... take the Isaac Hayes original intro, that massive intro with all the horns, then I'll arrange it up for the Abstract Orchestra ... It's like crate digging but backwards. (Mitchell 2014a)

By describing his approach to applying a jazz-based practice of big band arrangement to the reconstruction, or perhaps more accurately, a reinterpretation of hip

hop records, using language and terminology explicitly related to sample-based hip hop production, Mitchell is clearly situating the work of the Abstract Orchestra directly within the aesthetic practices of sample-based hip hop. The Abstract Orchestra therefore achieve their hip hop sound through the extension and adaptation of practices of digital sampling, and as evidenced through Mitchell's statements, are firmly rooting their musical work within the pre-existing context of hip hop cultural practices. Abstract Orchestra's approach here also signifies the strong correlation between jazz and hip hop music. Jazz has been a commonly exploited sample source within hip hop production, so much so that *jazz hip hop* is also commonly recognised as its own sub-genre. Furthermore, there is a long tradition of jazz musicians performing on hip hop tracks, as can be seen in examples from projects by The Roots and Guru in the 1990s through to Kendrick Lamar in the mid 2010s. This relationship between the musical styles and languages allows for a shared understanding of the desired aesthetic, and perhaps more importantly, a willingness to strive to achieve that aesthetics through utilising the musical skills and 'chops' of the musicians.

One example of a sonic and musical aesthetic of hip hop music is the technique of DJ cutting and crossfading. Whilst this was initially applied to allow for the extension of breakbeat sections of funk records, it was then adapted to allow for abrupt switching, or cutting between different sections of two records to (re)construct an original arrangement. This technique continued to be expanded and adapted through the implementation of DJ scratching, whereby control of the crossfader allowed DJs to quickly modify the amplitude envelope of audio signals on the record with one hand, while simultaneously controlling the speed and direction of playback by rocking the vinyl record forwards and backwards underneath the stylus with their other hand. The introduction of digital sampling technology allowed hip hop producers to edit and rearrange samples to emulate the sound of DJ-based techniques such as this, through taking advantage of the affordances offered through working in the digital domain. The sonic characteristics of the digital drop out is described by Brøvig-Hanssen and Danielsen (2016) as sounds abruptly stopping to absolute digital silence. This contrasts with both the usual reverberation decay time present in the performance of a musical rest in an acoustic recording and also the audible noise level of all analogue recording technology even without an audio signal present. Examples of the use of adapted DJing techniques, such as the digital drop out, as compositional practices were common in many of the sample-based hip hop recordings on which Abstract Orchestra's arrangements and tribute LPs are based. These techniques therefore had to be interpreted and transcribed into Mitchell's arrangements for the musicians to perform. Examples of these can be heard across the *Dilla* LP. On the sixth track titled 'Raw Shit', which is an interpretation of the track of the same name on the Jaylib⁸ album *Champion Sound* (2004), at both 1:04 (see Fig. 1) and 1:16 all of the instruments abruptly cut out, emulating both the digital drop outs present on the instrumental track of original record and the DJing practice of briefly cutting off the music using the cross fader on the first beat of the bar to add interest and anticipation.⁹

⁸ Jaylib is the artist name of a collaborative project between J Dilla and fellow hip hop producer Madlib.

⁹ This practice shares many similarities with the rhythmic feature known as the 'one drop' in reggae music.

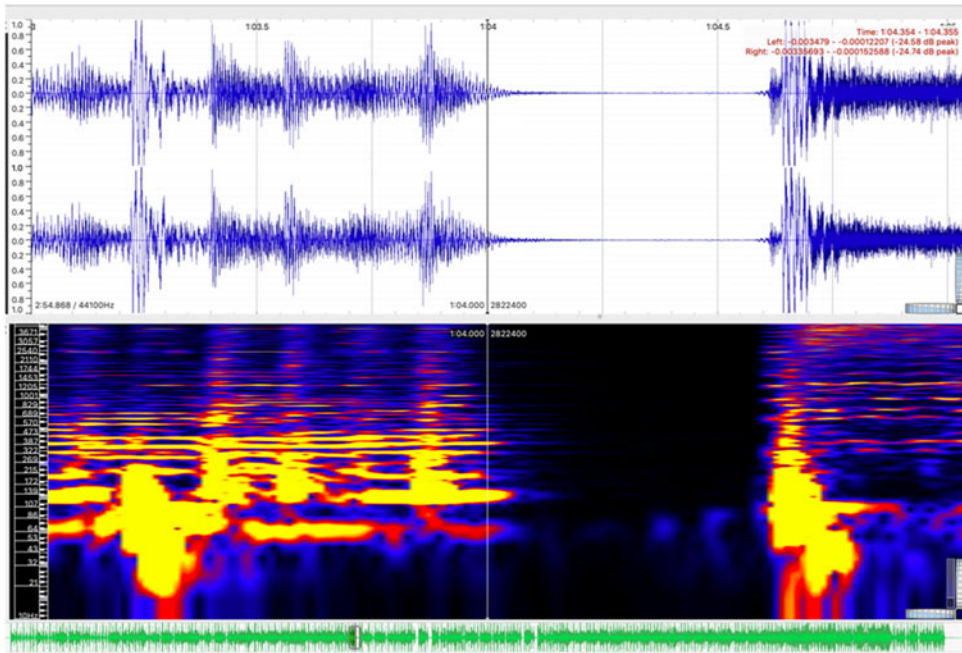


Figure 1. Audio Waveform and Melodic Spectrogram of 'Abstract Orchestra - Raw Shit' 1:02-1:06 showing the emulated digital drop out using Sonic Visualiser software.

Towards the end of the fifth track on the *Dilla* LP titled 'Dilla Mix 2', during a section which is an arrangement of 'Last Donut Of The Night' from the Dilla album *Donuts* (2006a), at 5:11 (see Fig. 2) there is an abrupt switching between the single held note played by the horn section, supported by two downbeats on the kick drum and bass guitar, and the following flute trill, which is supported by a single snare and tambourine hit. This phrase is repeated four times, emulating the previously discussed DJing practice of cutting backwards and forwards between two records, or samples, fragmenting and combining the original musical material to create a new arrangement, in a form of call and response. The emphasis on the short decay (release) of the horn section on these *cuts* is evident, emulating digital sample chopping, and while this has clearly been achieved through the physical control applied by the musician's performance techniques, it also appears to be taking advantage of the relatively dead acoustic space that the horn section has been recorded in, to avoid the common reverb tail and extended decay from horn stabs recorded in a more live space, or achieved through the use of artificial reverb frequently found in the recordings of the sample material.

Alongside the emulations of DJ-based sampling practices, much of the Dilla and Madvillain productions which have been interpreted by Abstract Orchestra are based on grooves that utilise microrhythmic deviations. These grooves are described by Brøvig-Hanssen and Danielsen as "'seasick' grooves' (2016, p. 101), whereby samplers, sequencers and digital audio workstations are used to manipulate rhythmic elements so they are significantly off the grid, leading to a very specific, loose rhythmic feel. Whilst Pedersen comments on the potential for such microrhythmic deviation from the grid to create an 'easygoing, laid-back or funky feeling' (2009, p. 1);

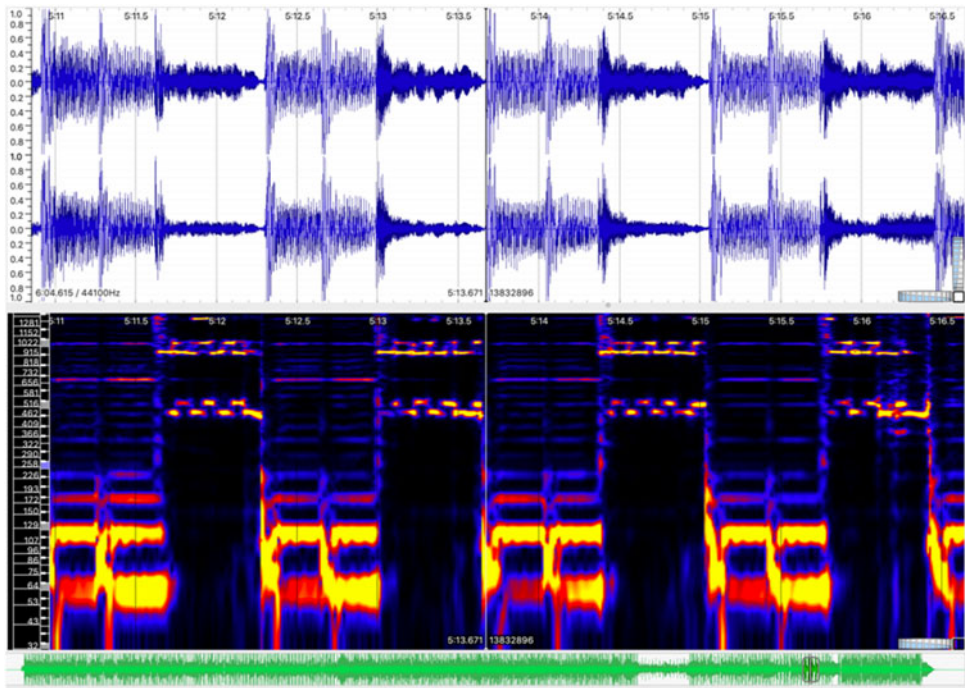


Figure 2. Audio Waveform and Melodic Range Spectrogram of 'Abstract Orchestra - Dilla Mix 2' 5:115-:17 showing the emulated sample cutting using Sonic Visualiser software

more significantly these rhythmic gestures and their sophisticated placement can be crucial in obtaining an authentic hip hop production. As D'Errico argues, there is a need to 'examine the intricate details of the beat' (2012, p. 2) to fully understand how musicians and listeners experience and appreciate hip hop music. This recognises the complex rhythmic frameworks specifically related to the use of digital sampling to layer, and restructure, different sources with different rhythmic features and characteristics. Additionally, owing to the unusual rhythmic placement and phrasing, these types of grooves can often be difficult, if not impossible, for musicians to perform. Drummer and music producer Questlove describes his experience working with hip hop artist and producer D'Angelo, specifically mentioning both his technical and ethical struggles when incorporating these microrhythmic techniques into his drum performance during recording sessions.

it was the hardest thing ever ... because he wanted me to drag the beat, but then he would drag the beat behind me so now I've got to [re]programme my mind ... I started having issues, like what if other drummers, like the musician community's gonna laugh at me. (Questlove quoted in *Questlove talks Drums, Dilla, and D'Angelo* | Red Bull Music Academy 2014)

Despite the technical challenges of performing grooves created through the use of digital sampling, examples of these grooves are evident on much of the *Dilla* LP. On track 12 titled 'Love Jones', which is an interpretation of the track of the same title from Dilla's album *The Shining* (2006b), the drums, performed by drummer Joost Hendricks, emulate the unstable pattern of the original J Dilla record. In this performance, the kick drum consistently falls outside both the 16th-note and



Figure 3. Audio waveform of Bar 3 of 'Abstract Orchestra - Love Jones' against a 4/4 105 BPM (16th note) grid (top) and 12/8 157.5 BPM (24th note) grid (bottom) using Avid Pro Tools software.

24th-note¹⁰ grids (see Fig. 3). This type of groove, by being neither straight, not completely swung, replicates the grooves commonly associated with the *percentage swing* quantisation feature of the Akai MPC, but as mentioned earlier, were often achieved through manual drum triggering by Dilla in his work. Furthermore, the live drum performance here maintains consistent form in feel and groove which is testament to the musicianship of Joost Hendricks. Additional to the kick drum pattern, the open hi-hat on the downbeat every two to four bars anticipates the beat by coming in slightly early. Furthermore, on track eight titled 'Fantastic', an interpretation of the track 'Untitled/Fantastic' from the Slum Village album *Fantastic Vol. 2* (2000), at 0:27, the variation of the kick drum pattern also falls outside of both regular grids (see Fig. 4).

Beyond the rhythmic complexities of performing live renditions of sample-based hip hop, the performance of music created on machines creates other challenges for musicians using acoustic instrumentation which have to be taken into account. Mitchell describes the challenges of taking sound sources created using different forms of technologies such as synthesisers and digital samplers, and translating them to acoustic instrument performance, taking into consideration both the timbral characteristics of the sound sources, and the physical limitations of the human performing musician. As most sample-based music is based on the use of loops, and/or electronic synthesised sound sources, it is common for both the sonic characteristics of the instrument's sound, as well as the phrasing of these loops, to pose difficulties for musicians to perform them owing to the physical limitations of both human performers and their acoustic instruments. Mitchell describes how these considerations impact his approach to arrangements for the Abstract Orchestra.

¹⁰ A 24th-note grid relates to a strict swung groove.

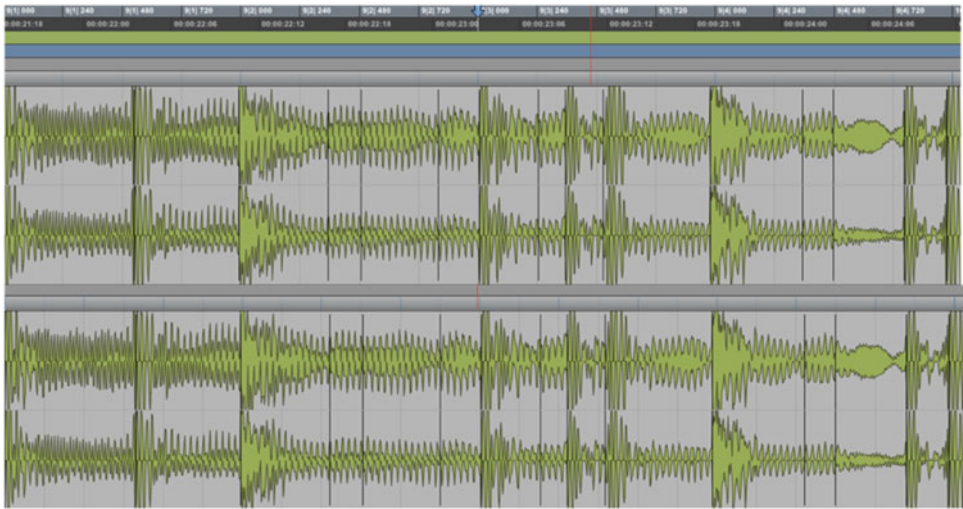


Figure 4. Audio waveform of Bar 10 of 'Abstract Orchestra - Fantastic (2017) against an 88.2 BPM 4/4 (16th-note) grid (top) and 132.3 BPM 12/8 (24th note) grid (bottom) using Avid Pro Tools software.

[You] have to use a little imagination in translating a synth line into perhaps muted trumpets and flutes to create a similar sound. With sixteen musicians in front of you, it's important to try wherever possible to arrange the music for them and not simply copy it on a synth or sampler ... One of the factors to consider is the physical element of playing loops; this can't be done for 4 minutes on wind instruments on each tune, it's too physically demanding. So again, imagination is needed to distribute the music through the ensemble. (Mitchell 2014b)

Digital samplers such as the Akai MPC, used by many producers including Dilla, 'create noteworthy affordances in producer's workflows ... [which] are in turn mapped to a number of predictable sonic signatures' (Exarchos 2023, p. 58). What is evident here is that, despite the potential challenges posed to the musicians, these sonic signatures have been translated across to the performance practices of the Abstract Orchestra. Dilla's interaction with his 'machine', an Akai MPC digital sampler and sequencer, demonstrate both an embracing of the restrictive nature of the hardware design and interface, but also a form of rejection of some aspects of the software, or what Exarchos calls the 'operating script' (2023, p. 59), of the machine in the way he chooses to bypass many of the 'corrective' features available, most notably quantisation. While many producers would use the quantisation features within digital sequencers to create off-set swung grooves, Dilla would purposefully avoid using this feature, and instead perform the triggering of the samples 'live' during the recording process with the quantisation turned off, capturing the rhythmically imperfect performance of his hits on the sampler's pads. This, alongside the specific way he would chop up the sample material and assign these snippets to sampler pads, formed the foundation for his sonic signature. Dilla did this by demonstrating a form of mastery of the interface of the digital sampler by transcending the limitations of its use. In doing so, he references the lineage of the human imperfection of funk grooves, as well as the DJing practices that gave rise to hip hop music. In many ways Abstract Orchestra can be seen to be extending Dilla's approach by embracing his part-human, part-machine aesthetics of sample-

based hip hop while simultaneously eliminating the use of technology to create the music.

GoGo Penguin

GoGo Penguin are a three-piece acoustic electronica band from Manchester, UK, consisting of drummer Rob Turner,¹¹ pianist Chris Illingworth and bassist Nick Blacka. Much like the Abstract Orchestra, the band members all have a jazz background; however, despite the band using standard acoustic jazz trio instrumentation, they are heavily influenced by electronic music, thus providing an ideal example of musicians who embrace various aspects of machine aesthetics in their practice. During an interview discussing their 2016 album *Man Made Object* (GoGo Penguin 2016) with their then new record label Blue Note, pianist Illingworth gives an insight into the aesthetics considerations of the band, describing how inspiration for the album title came from a 'fascination with ideas of robotics, transhumanism and human augmentation...we're recreating electronic music on acoustic instruments. It's like a man-made object that has become humanized' (Illingworth, quoted in Blue Note 2016). In the same interview drummer Turner also explains how many of the ideas for the album started off as electronic music created on a DAW on his laptop, and describes how the band would then have to 'find ways of replicating it acoustically' (Turner, quoted in Blue Note 2016).

During my interview with Turner, he describes his development process as a young jazz drummer heavily inspired by electronic music artist such as Aphex Twin adapting the concept of rudiments, patterns and shapes from the jazz tradition, and applying them in new ways to develop a unique approach to composition:

I used to ... try to play this kind of stuff ... It's more like built in tiny, tiny blocks ... so thinking like a sequencer, and then trying to think of like stutter effects ... and learning them as rudiments, so that kind of comes a lot from the jazz thing ... a kind of Beebop context anyway ... You learn the ride pattern, and you start to learn all these variations and shapes, so that you can mess around with it So I ... applied that but with electronic things, so starting with a breakbeat, and going ok, well, you can have a beat repeater, or you can treat it like it's being triggered on a sample. So like learning to be able to play one break in many different forms but paying more attention to the method than the actual result ... You can kind of use it in a live ... it becomes like a compositional technique. (Turner 2017)

The process being described by Turner here exemplifies how machines aesthetics can directly impact on the ways in which a musician functions both in terms of how they conceptualise, and also realise their musical practice. The impact of both DAW and sample-based aesthetics have been superimposed into formal jazz traditions by Turner to enable him to embody the functions of machines into his practice as a drummer.

On the second track of GoGo Penguins album *V2.0* titled 'Garden Dog Barbecue' (2014) a number of electronic music characteristics are present. After the established motif of the repeating piano part, with synth-like fifth power chordesque stabs in the left hand interlaced with syncopated descending melodic phrases in the right hand, at 0:26 the bass part begins to play a continuously rising pitch (see Fig. 5) to build tension alongside a gradual and subtle increase in tempo and opening of the hi-hat over eight bars. This pitch rising technique in the bass clearly draws on the

¹¹ In 2022 Rob Turner was replaced by drummer Jon Scott.

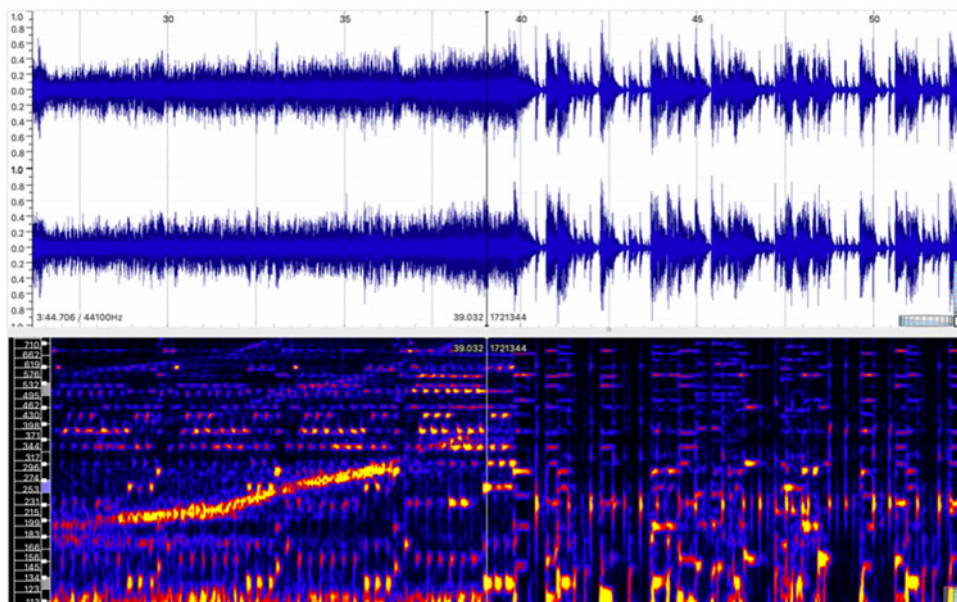


Figure 5. Audio Waveform and Melodic Spectrogram of 'GoGo Penguin – Garden Dog Barbecue' 00:2000–:55 showing the uplifter performed by the upright bass using Sonic Visualiser software.

production technique frequently found in EDM, commonly referred to as an 'uplifter'. Solberg defines an uplifter as 'a sound being gradually pitched further and further in an upward direction, indicating that the section is headed towards "something", and the effect is, as the name points out, to lift the intensity in the section higher' (2014, p. 70). This uplifter is followed by drastic change of rhythmic and musical feel achieved through significant increase in tempo, with frenetic drum patterns which reference chopped breakbeat samples commonly used in jungle and drum 'n' bass genres accompanied by rhythmic phrases played in unison by the bass and piano, later embellished with harmonised major thirds on the piano, emulating common synth bass sounds of 1990s drum 'n' bass. What is achieved here is not a direct emulation of an EDM production, as there are a clear sonic and musical distinctions between acoustic drums, upright bass and piano and the array of electronic and synthetic sounds utilised in EDM. Furthermore, the implementation of an uplifter in EDM is often used in conjunction with other audio processing techniques such as filtering. As these audio processing techniques are not present on the GoGo penguin track, instead the realisation here is achieved through borrowing musical ideas from electronic music and applying them with acoustic instrumentation to create something unique. While this is somewhat in contrast to the previous example of Abstract Orchestra, in which the musical representation is more strictly aligned to the 'original' hip hop versions that are being interpreted, the sonic presentation of the Abstract Orchestra is however, still clearly perceived as a big band live performance. Similarly here, despite the clear electronic and sample-based productions influences on the music, due to the musical and sonic characteristics of the acoustic instrumentation, and the foregrounding of these as a performance, it is still likely to be perceived as a jazz-based musical experience for the listener.

In the fifth track of GoGo penguin's album *V2.0* titled 'One Percent' (2014) the band take direct influence from glitch aesthetics, especially that of skipping CDs within their instrumental composition and performance. With the main rhythmic and melodic motif of the song clearly established and explored in the main body of the song, at around 5.00 the rhythmic phrasing of all the instruments in unison begins to jump, emulating the sound of a scratched CD skipping. The rhythmic phrases start to bear almost no resemblance to the tempo of the preceding sections, with scatter-gun style repetition of notes jumping back into a few seconds of 'normal' playback of the main motif, before again abruptly skipping again until the end of the song at 5.36 (see Fig. 6). In an interview with GoGo Penguin's producer and engineer Brendan Williams he recounts the process of recording the track.

It's many takes until they got the take, but it is largely the one take. They just hammered it and hammered it.....That final section is completely nuts, but it was kind of the result of probably 20–25 takes until they got it. ... they were definitely talking about [the concept of] broken CD players, absolutely. It was the same arrangement every time, and they rehearsed their arses off. I imagine they committed that to memory. (Williams 2017)

GoGo Penguin drummer Rob Turner also specifically discussed how they physically scratched CDs of their recorded performances and memorised the sonic results to create the track. He also emphasises their resistance to relying on digital technology to composite a take out of their performances.

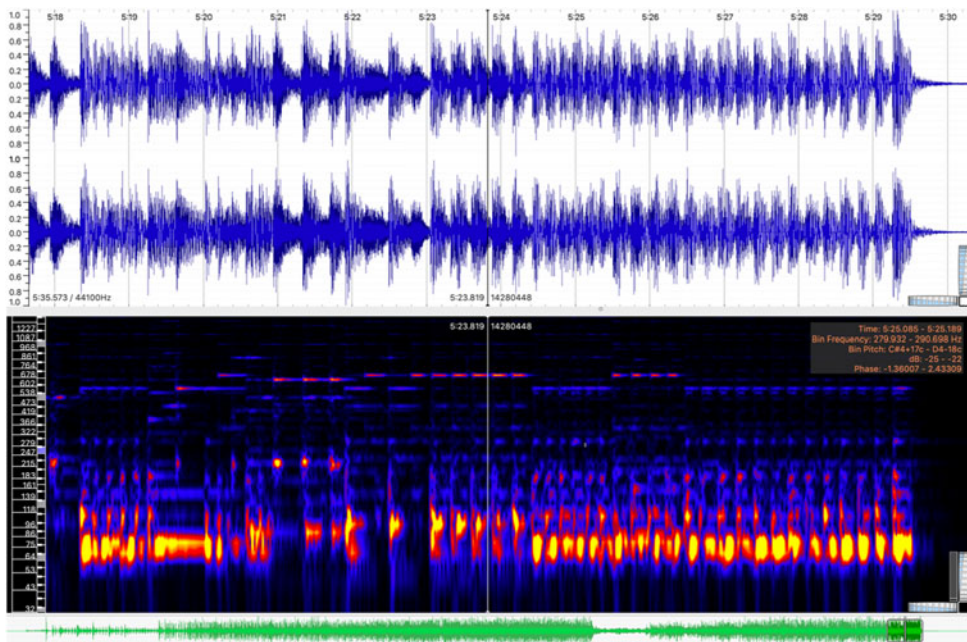


Figure 6. Audio Waveform and Melodic Spectrogram of 'GoGo Penguin – One Percent' 05:17:05–:30 showing the emulation of glitches caused by the playback of a scratched CD using Sonic Visualiser software.

You can kind of figure out how a CD will skip if you scratch it ... Basically you bounce your track to a CD, scratch the CD, put it back in, see what it sounds like and then transcribe them ... It took ages ... We spent hours and hours just playing it over and over, and then in the studio it's about 7 takes, and Brendan was like 'we'll just cut it' and we were like 'no, we're not gonna cut it'. (Turner 2017)

Turner's affirmation that despite being aware that they could have easily used digital audio technology to composite the perfect take, they instead decided to capture it as a single take clearly demonstrates how important the perceived authenticity of performance is for the members of GoGo Penguin. Despite the fundamental influence of electronic music evident throughout their work, their musicianship, and having control of the musical and sonic presentation of their art, is clearly at the forefront of their identity as a band.

Conclusion

While Abstract Orchestra and GoGo Penguin both demonstrate the performance of machine aesthetics within different genres and stylistic conventions, and therefore reference different aspects of machines aesthetics in their work, it is notable that they both realise the implementation of machine aesthetics within a jazz framework, in regards to both instrumentation and also musical approach. Abstract Orchestra could therefore be considered to be extending an existing practice of jazz, borrowing sonic and musical characteristics from hip hop by incorporating them directly into their musical performances. The overtly conscious effort to base the vast majority of their music output on (re)interpretations of revered hip hop artists such as Dilla and Madvillain also directly frames their work within a hip hop context. This could be considered an attempt to prove themselves, and live performance with acoustic instrumentation, as an authentic form of hip hop, despite not adhering to the classic notions of sample-based hip hop production. For GoGo Penguin to be so significantly influenced by experimental electronic and post-digital/glitch aesthetics, while simultaneously stringently adhering to a 'true', unmediated performance during the recording process demonstrates a somewhat different approach to that of Abstract Orchestra. GoGo Penguin demonstrate a significant symbiosis of aesthetic considerations, embracing both traditional musicianship and authenticity in performance, alongside musical and sonic characteristics inherently formed and shaped by machine aesthetics. The result is something unique with a strong footing in both sides. Instead of trying to prove themselves as authentic electronic music producers, the members of GoGo Penguin are drawing on, adapting and combining different musical aesthetics to create something new and unique.

The albums created by both Abstract Orchestra and GoGo Penguin demonstrate the importance for what Sanden describes as a delineation between perceived binaries of 'recorded' and 'live', along with associated binaries such as 'natural versus artificial' and 'human versus machine' (2013). GoGo Penguin and Abstract Orchestra are able to forefront both machine aesthetics and live performance in their recorded output, while minimising the impact of the mediating recording technology in the process. This perhaps offers a modern example of liveness in popular music production, which could be seen to demonstrate how Auslander (1999, 2012) considers the concept of 'liveness' as a continuously changing and evolving concept.

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