4 Technical Ecstasy

Phenomenological Perspectives of Metal Music Production

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This chapter examines the lived experiences of UK-based record producers with notable credits in the metal genre:

- Romesh Dodangoda (Cardiff, UK): Bring Me the Horizon/Motorhead/Sylosis
- Mike Exeter (Birmingham, UK): Black Sabbath/Judas Priest/Cradle of Filth
- Tom Allom (London, UK): Black Sabbath/Judas Priest/Def Leppard
- Martyn Ford (Newport, UK): Skindred/Slipknot/Bullet for My Valentine
- Russ Russell (Northampton, UK): Dimmu Borgir/Napalm Death/SikTh
- Dave Chang (Reading, UK): Electric Wizard/Earthtone9/Orange Goblin
- Oz Craggs (Folkestone, UK): Feed The Rhino/Polar/Dead Harts

Interviews were conducted in 2014 to explore technology as a lens through which we can ask how knowledge is known rather than what is known. Importantly, the interviews prioritised asking participants how technology has influenced the experience of making recorded metal music.[1] The main impetus was to develop a deeper understanding of technological influence and the experience of using technology as part of their creative process. The intention was not to construct a production methodology for metal music but to use these lived experiences to explore the tensions caused by expectations and anticipations of the use of technology in the recording studio. The producers were asked to make sense of the music they work with and how it is defined by the objects (technology) that surround it, as well as their relationships with artists and recording studio occupants and the musical and metaphorical semantics of record production.

For these communities, production is understood to be an everyday activity.[2] This activity is situated within a life-world (recording studio) and enabled by a contextual influence (technology). Jonathan Smith et al. suggest that to be phenomenological, we must 'attend to the taken-for-granted experience of [an activity]'.[3] By asking record producers to consider the way in which they conduct their everyday activities, the small decisions that they may take for granted, or the techniques that they rarely

think twice about, we can start building a more holistic view of the impact of technology on record production and the development of the sound of recorded metal.

The Recording Studio

The recording studio should be understood as a space in which music and unique technologies meet. It is a world that provides the opportunity to create systems and technologies from the activity that is contained within it. The space itself is unashamedly technological, transforming sound waves produced inside it, designed to create new artificial waveforms that could not be formed elsewhere.[4] Music technology has the potential to act neutrally and purely facilitate production, but it can also be seen to no longer be neutral through repeated use and developed practices, collating a number of social-cultural meanings. The recording studio is not passive in the act of making music; it is a world that encourages unique cultural (musical) phenomena.

In *Nature of Technology*,[5] W. Brian Arthur defines technology as singular, plural and collective. Singular technology 'originates as a new concept'[6] and internalises development. Plural technology develops its constituent parts and practices (installing new parts into a computer, for example) and becomes plural by building around phenomena. In a collective sense, technology 'encompasses the entire collection of devices and engineering practices available to a culture',[7] uses natural phenomena and develops through multiple technologies working together. Phenomena here are the acoustic variables (sounds) that music production technology exploits. The act of exploitation validates objects as technological, and the recording studio is a technological space because it affords creativity. The recording studio therefore demonstrates technological plurality: multiple groups of technologies and people that work together to capture acoustic energy and transform it into electrical energy, and back again. It affords the capture of a performance; it is a tool affording the documentation of cultural phenomena. It is a space for communities to interact with technological objects that tend to only exist in those spaces, influenced by socio-cultural applications of technology.

Over the last century, the primary act of performing music in the recording studio has changed dramatically in response to various technological and socio-cultural practices.[8] As these practices have evolved, production technology has become an integral part of all levels of music-making and is readily

available to all musicians, professional or amateur. Personal computing affords musicians the ability to document their creativity away from recording studios outside of the temples of sound that have housed music production for the majority of the twentieth century.[9] Performers, songwriters and instrumentalists cross the threshold into music production with relative ease and understand how to recreate unique sonic aesthetics[10] whilst also employing the technology of studio production live on stage and in rehearsal rooms. Artists now expect more from recording studios and the people and technology that occupy them, forcing movement away from capturing whole performances to constructing them.

Because of these shifts, record producers have a very different role to play in the production of recorded music. They are not only facilitators of technical processes but creative overseers of unique projects that can encompass music-making over remote distances, time zones, multiple personnel and multiple socio-cultural influences. The relationship these producers have with the process has been dramatically changed by technology and has begun to normalise new approaches to making music in the studio environment. For example, contemporary recorded metal normalises performance-enhancing processes as a form of technological plurality rather than the singular documentation of performances.[11] It is the intersection of practice and the expectations of both technology and communities surrounding metal music that warrants a phenomenological analysis of metal music production.

Technological Ideologies

Significant literature surrounding the complex nature of contemporary metal recordings details how recordings are constructed from a technical perspective,[12] in-depth examinations of geographical and stylistic traits within productions,[13] and the analysis of discrete trends in the use of specific technology.[14] The producers who make up the sample of this chapter identified with all of the themes in the current literature but also a number of key descriptors that encapsulate the audible phenomena of metal music: impact; energy; precision; extremity. Historically, these audible phenomena are highly important to our understanding of the genre's technological narrative. Proto-metal artists drew inspiration from the sounds of the British blues scene in the 1960s and artists like Little Richard, Chuck Berry and The Kinks, incorporating cover versions into their live performances.[15] The ability to record isolated instruments on

multitrack tape changed the way in which metal artists thought about the sonic qualities of the artists they drew inspiration from, including the subtleties and nuances (or indeed the lack of dynamic subtlety) in drum performances, the ability to drive valve guitar amplifiers into high levels of harmonic saturation, and the movement away from direct injection recording.[16] Metal's audible phenomena were created as performative interpretations collided with new technological possibilities.

These audible phenomena tend to be determined by a dominant commercial ideology[17] that has the potential to influence the choices made by record producers, who are expected to create the sound the artist (and often audience) envisions, as well as achieve audible intelligibility within the final production.[18] This ideology is expressed in a number of ways but often returns to the way technology can (or does) act deterministically during the production process.[19] Artists seem to embrace this determinism and accept it as a primary feature of the creative process. One of the interviewed professionals, Martyn Ford, suggested this is a unique problem with contemporary metal music as it exists in the recorded format: 'The most overlooked thing in metal or rock is the song . . . By having a great production, you can almost get away with existing as a band.' This is not just a technological issue. At the heart of what Ford claims is a suggestion that metal music is made in ways that disassociate the musicality of the work from the audible phenomena; if a record *sounds* good, it must *be* good. The prevalence of online resources[20] that are dedicated to metal production tips and guides, as well as the close links that metal musicians have with the contemporary studio environment, has changed the role of the producer in the minds of the artist and audience, and indeed the importance of production in the making of a record. Technology has allowed musicians to become producers in their own right, as they can now visualise more of the process of making records, changing the way in which they are consumed. If Ford is right in his assumption, then the same could be said for how audiences are now experiencing recordings. Are they listening to the song or the sound of the song? The other participants raised this same issue in slightly different ways, suggesting the technology has influenced the way metal records are made:

> I'm not a massive fan of producers who aren't musicians, [record production] turns into technicalities with those kinds of people. (Exeter)

> I think people are using the technology to make the genre better. As long as you ask the question along the way, am I using this because I have to or because I can? I think that's what people have forgotten about along the way. (Craggs)

I'm not saying you can't make good records on tape anymore . . . but people's threshold of precision, not only in playing but in sound, people have got used to it now . . . if you tried to do [contemporary metal] on tape, people would go what the f**k is that? (Russell)

You do need a lot of production to get things sounding like a modern metal record. (Chang)

The genre's sound has changed over time, no matter the similarities in musical or stylistic approaches, but it seems that the producers who are making it are at odds with the use of technology. The technological advances give the perception that using technology is critical in a genre-specific capacity and affords the explicit audible phenomena of recorded metal in the twenty-first century. The producers themselves seem to want to use it as little as possible, or at least in the least noticeable ways. However, they know that audiences and artists now expect certain things from recordings. Ford suggests that one of those things is precision, particularly in relation to timing and quantised performances[21]:

I am going to nail it to the grid if it's full-on metal. That's where the power comes from, when everything lands together. It is machine-like, but that's how modern metal sort of is now. In fact, a lot of the bands we are talking about . . . wouldn't see the light of f**king day if that hadn't been done to it. (Ford)

The likening to machine only further implies the influence of technology on the audible and semantic phenomena surrounding metal production. The technological expectations that align with contemporary audible phenomena, namely: bass guitar distortion, brightness and heaviness of guitar timbres, and kick-drum sampling[22] start to support a view that production methods have become homogenised.[23] Oz Craggs draws on the idea that this homogeneity is explicitly linked to the idea of commercial ideologies:

The problem is I would love to sit here and say, 'I don't care about what other [records] sound like'. I wanna make things sound how I want it to sound, but it's not true. I think you always have to pay lip service to other stuff. (Craggs)

Heaviness becomes a conglomerate of these expectations and homogenous practices. As the outcome of these contemporary audible phenomena, it is linked intrinsically to the development of genre-specific production aesthetics that become more acute over time, and heaviness becomes a signifier of quality. As with Ford's assumption, if a record sounds heavier (i.e., it has more of the audible phenomena audiences expect), it is a *better* record. This is demonstrated in an early interview with Black Sabbath singer Ozzy Osbourne prior to the release of 1971's *Master of Reality*:

[*Master of Reality* is] the heaviest thing we've done. It's going to be heavier than before because that's what people want. I don't know if Led Zeppelin made a big mistake or not with their third album, but personally, I think a lot of people were disillusioned. . . . People want heavy music, the heavier, the better.[24]

This technological ideology demonstrates that recorded metal music embodies constant performative and sonic development through evermore overt showcases of energy, extremity, impact, precision and speed. These performative qualities have been prompted by technology that affords the ability to deal with, and create, heaviness more efficiently.

Forging the Sound of Metal

To understand how these technologically informed ideologies are established, it is important to trace the history of the technological decisions being made and the resulting audible phenomena, which began arguably in 1969 at Regent Sounds Studio on Denmark Street in London, UK. Now the location of a guitar shop, the small basement recording studio was the site of a short recording session for a band that needed to record demos after attracting record label interest. That band returned later that year to record their first full-length album, which was released on 13 February 1970. The band was Black Sabbath, and the recording engineer was Tom Allom. Allom was interviewed to explore his role as recording engineer on the first three Black Sabbath records under producer Roger Bain and as producer for artists such as Judas Priest and Def Leppard. *Black Sabbath* (1970) was mostly recorded live over the course of a single day using Regent Sounds' limited technological setup:

The equipment was so simple by comparison to today. It was a simple 12 in 4 out console, one 4-track [tape] machine, a couple of 1/4" [tape] machines, an EMT plate [reverb]. I think one limiter compressor, that's all we had; no outboard EQ, no, there might have been one. We might have had a Pultec. The EQ on the board was really basic, and . . . we had a nice complement of mics, and it was a brilliant little studio. (Allom)

Whilst the simplicity of this type of setup is to be expected of the time, it emphasises that the genre's sonic foundations were not dissimilar to any other recording made in the late 1960s and early 1970s; there was nothing remarkable about the technology used. Artists would record live, together in one room with some acoustic separation. These sessions would have captured multiple versions of full takes of songs, with the producer deciding which was the best performance. For Allom, using this technology was a test

of his ability to work within its limitations.[25] He highlighted that 'the final mixes of the first Sabbath album . . . were mixing a fifth-generation 4-track'. It meant that additional parts would be layered on top of the selected performance, thus creating some of the first signs of the audible phenomena we recognise now, primarily double-tracked rhythm guitar parts.

This shift begins to make recording multiple passes part of the production methodology of metal music. It makes the process non-linear, and non-linear production practices are increasingly evident in the way contemporary producers work. Some of the participants highlighted that the heaviness that audiences now expect is created when employing these non-linear or fragmented production practices:

> I think the expectation of the listener is one of clinical precision now. I think if you were to do a certain type of heavy band and not include the editing of tightness, maybe people would feel cheated, feel like it's not tight. The technology has made the performance element transcend. What was acceptable has now become unacceptable in some ways. (Craggs)

Craggs suggests that it just is not acceptable to make a record without intervention, whilst Ford suggests that because of the acceptance of non-linear production practices, some artists have adopted that into their writing and rehearsal approach: 'A lot of bands have never even played the song together. A lot of metal bands tend to do it that way these days'. This could be seen as removing a sense of creativity. For Allom, when working on some of the archetypal metal recordings, working in creative ways to fulfil artistic intention and swerving technical restrictions created new genre-specific audible phenomena: overdriven double-tracked guitar rhythms; the prominent bass guitar; drums that fill the extremes of the stereo space. Technological development that afforded new sounds and approaches embedded technology at the heart of metal music production. The earliest examples of recordings to exhibit these phenomena align with some of the earliest widespread availability of multitrack technology (four or eight tracks) in smaller recording studios.[26] Most interesting is that early metal artists were not using the technology in the more experimental ways that their contemporaries were outside of the genre.[27] There is little to suggest, by critically listening to early records by Black Sabbath or Coven, that the decisions made were meant to imitate the progressive sounds heard on records by The Beatles or Pink Floyd. Allom explained the practical impact of increased track count at Regent Sounds:

> The boss [at Regent Sounds Studio, London] had just bought us a second 4-track [tape] machine. . . . We decided to record the drums in stereo, which wasn't done very often in those days. It was just a simple pair of overheads, one on the snare,

and one on the kick. That was it. Then we did the basic tracks. It was bass and drums over two tracks and then guitar on track one and maybe a guide vocal on four. Then if you wanted to double the guitar, that would go on four, and you'd mix that lot to two tracks on the other machine and started over. (Allom)

Whilst limited compared with the affordances of contemporary recording technology, Allom was clearly excited by the possibilities the extra tape machine afforded.[28] Ford affirms the ways in which technological affordances present new opportunities for producers:

When eight tracks came out, they wouldn't say we aren't going to use eight tracks, that's cheating. Whatever is at your hands technology-wise, you are going to use it at some point to get a better result, or the best result you can. (Ford)

As an example of the space created and the resulting impact that each element of the mix has, 'Hand of Doom' from Black Sabbath's *Paranoid* (1970) features wide-panned, double-tracked overdriven rhythm guitar parts throughout. Not only does this create a dense and powerful guitar sound, but it allows the individual drum elements space to punctuate the mix (03:40–04:00). Without the ability to record individual elements of the instruments in detail, this sound would not have been created easily in the analogue domain. Allom's ability to control spatial imaging and overdub guitar riffs begins to set up a series of expectations that inform the construction – rather than the live capture – of contemporary metal recordings, putting 'the emphasis on carefully adding and shaping sounds is fundamental to the record's aesthetic quality'.[29] One of the drivers of recorded metal's unique production practices can also be its social consumption. It is driven by the live experience and the sound of a band in a venue, whether on stage or in the audience. Artists typically rehearse in practice rooms at loud volumes preparing for the sound they will have on stage, and recordings are often produced to sound 'mimetic of that form of large-scale space'.[30] The ability to orchestrate the position of the band in a recording with a sense of size and scale is key to creating the audible power of metal productions.

Fragmented Productions

These formative metal recordings not only allowed artists and producers to establish the audible phenomena of metal music, but they began to dictate some of the performative qualities that proliferate contemporary

recordings. Allom further emphasises 'tightness' as a musical aesthetic that was key to the sounds achieved at Regent Sounds:

> I didn't have any idea that that music was going to be so meaningful. When I think back at the time I did it, I remember being really impressed with how tight the band were. . . . It was almost a jazz band in a way, really amazing intricate patterns and everything. (Allom)

This points directly to the established production methodologies that have been developed for contemporary metal music. Performances that are virtuosic and create impact through precise musical synchronicity are integral to production of intelligible and impactful metal music.[31] These types of performances present one of the most challenging aspects of the genre's production and the element that contemporary technology often aims to create simple solutions for. These performances often rely on technology to be able to isolate minute detail and correct dynamic or temporal issues. The most isolated these edits or alterations become, the more fragmented and non-linear the production becomes. Fragmentation, particularly linked to multitrack technology, moves production further away from live performance and closer to total isolation and construction of individual instrumental parts that may have never even been played in the same acoustic space.[32] Typically, metal music exists decreasingly as a live phenomenon in the recording studio because of decreasing recording budgets and the increasing cost to maintain physical recording studios. The level of control now afforded by multitrack technology has promoted a movement away from using acoustic space to create the vast majority of contemporary metal recordings. Ford highlights this, drawing on his experience of playing with metal dub artist Skindred:

> I remember being in studios, and everyone played together. [Nine times out of ten] even the vocals Benji [Webbe] did ended up being the vocals we used, even if he was singing in the control room. We were all in separate booths. I miss that part; I do regret you can't do that [anymore]. You can do it, but it's going to cost. Setting up a whole band and capturing it as it is. In metal, you don't do that. (Ford)

Ford laments that the desire to make records this way has dissipated. He recognises that it will typically come down to cost and the availability of spaces that would accommodate this type of production style. There is much written about the changing finances of the music industry, and it would be safe to assume that bands in the genre are not going to be

commanding the types of budgets that would afford them the use of studios to make records in these ways. There are, of course, exceptions, but on the whole, the experience of the producers interviewed is fairly modest when discussing budgetary influences on the scope of records they make:

> The budgets just aren't there anymore to make the records and the way you'd ideally like to make them, and you have to adapt. Luckily, I've got [Longwave Studio, Cardiff], which when I've got a really tight budget allows me to adapt. The budgets have got smaller, but the expectations are still the same. [Record labels] want the same job done for less . . . You don't get as much time to work on a record now as you did a while ago. (Dodangoda)

> Technology has been a real double-edged sword; through me being able to build small control rooms in artists' homes, I'm pretty sure I've contributed to the decline of studios. It's not really my fault, it's record company models and downloading and stuff like that . . . you've got that side, but you've also got the illegal side of that which tech has allowed. But on the plus side, you've got the ability to record an album day in, day out, in your own home, and I can mix in my home. (Exeter)

> Interviewer: So that's a commercial issue then? You've mentioned the change in budgets quite a few times and record label models. Do you think that's forced a change in technology?

> People have embraced the technology; you don't have to go into a big studio to make a record, and . . . the technology has enabled artists to get far better value for money, spend a bit longer doing an album, spend a bit more time in pre-production. (Exeter)

> I am not one of these people that believes that having a DIY ethic is a good thing . . . I think there is an idea that [recordings] have to be done quicker and cheaper, and I think that's a sad state of affairs. (Craggs)

Mark Mynett's work on the production of contemporary metal music[33] supports the views expressed by the participants, recognising that record producers and engineers are often charged with creating an experience rather than capturing a performance that is the experience itself. It assumes that producers and artists alike are pre-empting the use of particular technological processes. The monumental shift away from recording performances of pieces of music has distinct advantages (e.g., performative inconsistencies are reduced, and records are made at significantly reduced cost) and disadvantages (e.g., homogenised production of dynamics and rigidity of mechanically edited performances).

Conclusion

The development of music technology has led to the dominant technological ideology that has been embraced by the participants, some more willingly than others, as part of the service they provide to artists. Tension between how technology is used and the perception of its use when producing metal music strengthens the case that contemporary music production has become increasingly fragmented and now constructs musical performances that adhere to idealistic representations. For metal music, these representations align with qualities such as extremity and precision, impact and energy. The dilemma that metal producers face is how they comply with the technologically influenced ideologies and how they assimilate them into their own practice. Recorded metal is now a separate entity from the live instance of the same music, as it is often influenced by a number of expectations and pressures. The interviewees highlighted how the uses of technology and a changing record industry have led to the establishment of accepted ideals for metal production, ideals that producers often feel obliged to provide.[34] Russ Russell surmised that technological development could only influence music to a finite point before it causes a problem:

> Evolution is not always progression . . . Some things accelerate you forward, and the same thing later down the line causes a massive pileup, and everything grinds to a halt for a while whilst everything sorts itself out. Then you carry on again. I think that's basically what's going on in music. The things that have helped have brought a whole new world of shit that has cluttered everything up; now, everyone is sorting it out again and forging ahead. (Russell)

The idea here is that perhaps technology has influenced the production of metal music to a pinnacle point, hence why homogenous production practices have been assimilated without resistance. This then presents an ethical dilemma that all producers face: how much do they let technology influence their approach and the recordings they make? It could be the case that music technology has advanced to a point that it removes the creative choices that informed many of the early, archetypal recordings made by the likes of Allom. It could also be that technology has restricted this creativity so that metal records cannot be made independently from the canon of contemporary metal productions. It seems appropriate to return to Arthur's *Nature of Technology*. Arthur suggests that bodies of technology 'give rise to the characteristic industries of an era'.[35] Metal music production has been defined by technological development, and the experience of the participants affirms that contemporary metal music production could indeed be

described as a characteristic industry, an industry of accepted ideals afforded by creative technological exploration that has been assimilated into the practice of contemporary record producers. This has resulted in the prominence of technologically reinforced performance practices and an increasing dependency on technology to produce metal music.

Notes

1. Jonathan Smith, Paul Flowers and Michael Larkin, *Interpretative Phenomenological Analysis: Theory, Method and Research* (Sage, 2009).
2. The term 'production' is used throughout this chapter to encapsulate the multifaceted range of activities and roles that are part of making of a record, including (non-exclusive): recording engineer, mix engineer, producer, arranger and performer (as a non-band member).
3. Smith, Flowers and Larkin, *Interpretative Phenomenological Analysis*, p. 13.
4. Allan Williams, 'Divide and Conquer: Power, Role Formation, and Conflict in Recording Studio Architecture', *Journal on the Art of Record Production* 1 (2007). www.arpjournal.com/asarpwp/divide-and-conquer-power-role-formation-and-conflict-in-recording-studio-architecture (accessed 12 September 2021).
5. W. Brian Arthur, *The Nature of Technology: What it Is and How it Evolves* (Simon & Schuster, 2009).
6. *Ibid*., p. 29.
7. *Ibid*., p. 28.
8. Susan Schmidt Horning, *Chasing Sound: Technology, Culture, and the Art of Studio Recording from Edison to the LP* (Johns Hopkins University Press, 2013).
9. Paul Théberge, 'The End of the World as We Know it: The Changing Role of the Studio in the Age of the Internet', in Simon Frith and Simon Zagorski-Thomas (eds.), *The Art of Record Production: An Introductory Reader for a New Academic Field* (Ashgate, 2012), pp. 77–90.
10. Duncan Williams, 'Tracking Timbral Changes in Metal Productions from 1990 to 2013', *Metal Music Studies* 1/1 (2015): 39–68.
11. Niall Thomas and Andrew King, 'Production Perspectives of Heavy Metal Record Producers', *Popular Music* 38/3 (2019): 498–517.
12. Mark Mynett, *Metal Music Manual: Producing, Engineering, Mixing, and Mastering Contemporary Heavy Music* (Routledge, 2017).
13. Jan-Peter Herbst, 'Historical Development, Sound Aesthetics and Production Techniques of the Distorted Electric Guitar in Metal Music', *Metal Music Studies* 3/1 (2017): 23–46.

14. Jan-Peter Herbst, 'Old Sounds with New Technologies? Examining the Creative Potential of Guitar "Profiling" Technology and the Future of Metal Music from Producers' Perspectives', *Metal Music Studies* 5/1 (2019): 53–69.
15. Cory Grow, 'Black Sabbath on Sixties Origins: "We Were Rejected Again and Again"', *Rolling Stone* (2016). www.rollingstone.com/music/music-features/black-sabbath-on-sixties-origins-we-were-rejected-again-and-again-192645 (accessed 12 September 2021).
16. This was a technique commonly used until the mid-1960s, which required guitarists and bass players to plug directly into the mixing console rather than record their instrumentally acoustically or using an amplifier.
17. Theodore Gracyk, *Rhythm and Noise: An Aesthetics of Rock* (Duke University Press, 1996).
18. Mynett, *Metal Music Manual*.
19. Merritt R. Smith and Leo Marx (eds.), *Does Technology Drive History? The Dilemma of Technological Determinism* (MIT Press, 1994).
20. For example, Nail The Mix. www.nailthemix.com (accessed 12 September 2021).
21. Quantisation in music production is the process of editing audio transients (a kick drum being played, for example) onto a strict time-aligned grid inside of a digital audio workstation. This creates perfectly in-time performances and removes subtle nuances of timing in a metronomic fashion.
22. Williams, 'Tracking Timbral Changes'.
23. Niall Thomas, 'Innovation and Tradition in Metal Music Production', *Metal Music Studies* 7/3 (2021): 423–43.
24. Martin Popoff, *Black Sabbath: Doom Let Loose, an Illustrated History* (ECW Press, 2006), p. 55.
25. These limitations would not necessarily have been limitations at the time.
26. Black Sabbath's *Black Sabbath* (1970); Blue Cheer's *Vincebus Eruptum* (1968); Budgie's *Budgie* (1971); Coven's *Witchcraft Destroys Minds & Reaps Souls* (1969); Elf's *Elf* (1972); Spooky Tooth's *Spooky Two* (1969).
27. Greg Milner, *Perfecting Sound Forever* (Granta, 2017), p. 157.
28. In comparison to contemporary computer software digital audio workstations that afford limitless track count allowing engineers and producers to recorded unlimited inputs.
29. Jan-Peter Herbst and Mark Mynett, '(No?) Adventures in Recording Land: Engineering Conventions in Metal Music', *Rock Music Studies* 9/2 (2022): 137–156.
30. Simon Zagorski-Thomas, 'The Stadium in Your Bedroom: Functional Staging, Authenticity and the Audience-Led Aesthetic in Record Production', *Popular Music* 29/2 (2010): 255.
31. Mynett, *Metal Music Manual*.

32. Michael Chanan, *Repeated Takes: A Short History of Recording and its Effects on Music* (Verso, 1995).
33. Mynett, *Metal Music Manual*.
34. Thomas and King, 'Production Perspectives'.
35. Arthur, *The Nature of Technology*, p. 85.