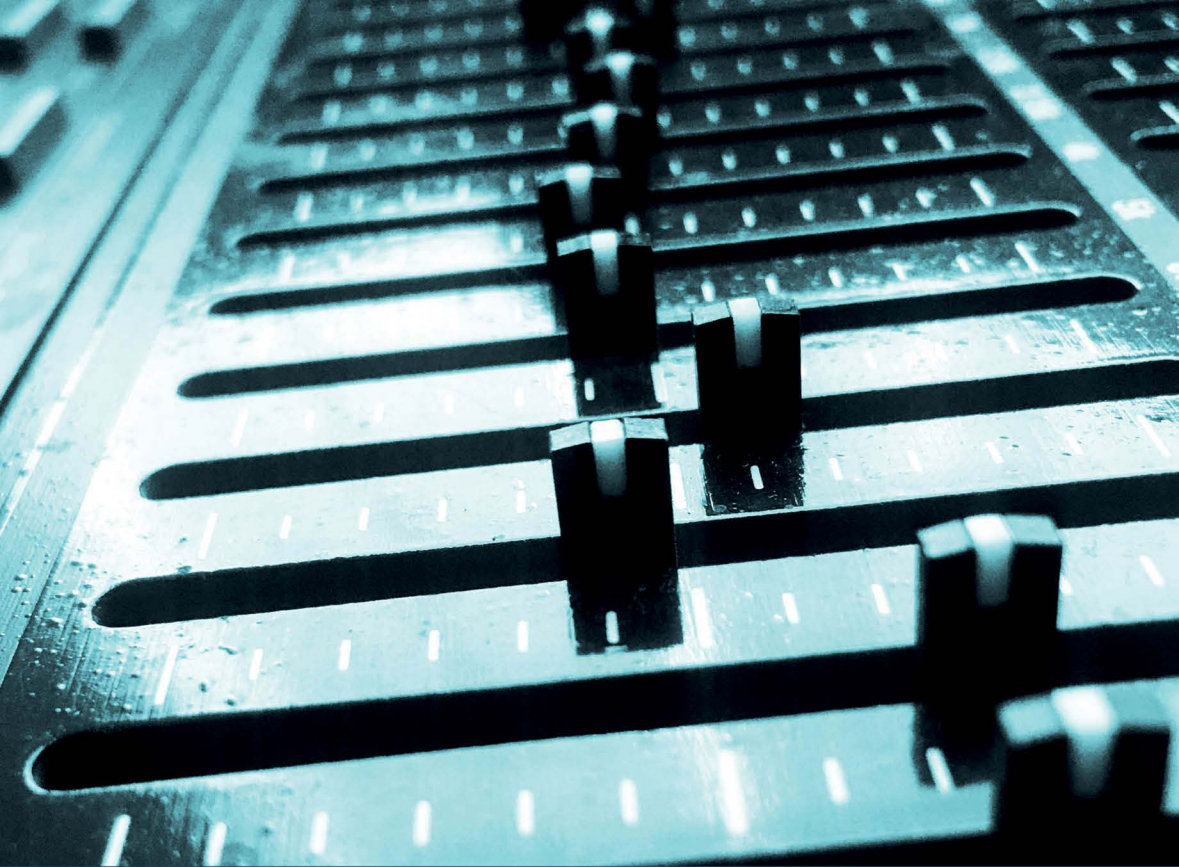




Heaviness in Metal Music Production, Volume I

How and Why It Works

Jan-Peter Herbst and Mark Mynett

A **Focal Press** Book



HEAVINESS IN METAL MUSIC PRODUCTION, VOLUME I

Heaviness in Metal Music Production, Volume I: How and Why It Works provides an in-depth analysis of the art and craft of producing heaviness, the fundamental musical quality in metal music. Using primarily ethnographic research which draws on interviews and engineering documentation from various producers across different generations, the distinguishing feature of the study is the song 'In Solitude', which was written, recorded, and produced by the researchers themselves.

Written by practising musicians, producers, and experts in music technology and musicology, this book offers a comprehensive understanding of the interplay between structural, performative, and technological components of a metal recording; the perceptual and discursive factors determining heaviness; and the relationship between creative freedom and technical demands in contemporary metal music production.

Heaviness in Metal Music Production is a rigorous academic study that advances the field of metal music production research through an innovative and methodologically robust approach. At its core is an unprecedented experiment in which eight leading producers each mixed the same song, with their processes meticulously documented and analysed through in-depth interviews. This study not only provides unique insights into the conceptualizations and craft of heaviness in metal music production but also sets a new standard for empirical research in the discipline. As a result, it serves as a vital resource for scholars, researchers, and students in audio engineering and metal music studies, making it essential supplementary reading for advanced undergraduates, postgraduates, and academics engaged in these fields.

This two-volume set offers a well-rounded insight into the production of heaviness in theory and practice.

Jan-Peter Herbst is Professor of Music at the University of Huddersfield, the UK. His background as a rock guitarist has led him to specialize in the study of electric guitar playing and metal music production. Herbst has edited *The Cambridge Companion to Metal Music* (2023).

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DATA AVAILABILITY

All data of the research project can be accessed via this link: <https://huddersfield.box.com/s/8gren2ma4kesvf5vwip2axzz1v8sawur>

Find out more about the research project at www.himmp.net.

All videos related to the production analysis discussed in this book, as well as interviews with professional musicians, managers, journalists, and concert promoters about heaviness, are available on our YouTube channel, <https://www.youtube.com/@HiMMP-Research>.

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1

INTRODUCTION

On Wednesday, 16 October 1969, a new era began in the world of popular music. Under their new name, Black Sabbath, the heavy blues rock band formerly known as Earth entered Regent Sounds Studios in London to record their self-titled debut album (*Black Sabbath*, 1970a). Vocalist Ozzy Osbourne recalled: ‘Our manager at the time suggested that we stop off at this recording studio and do these songs we were working on’ (Grow 2020). This was not the band’s first studio experience. Legend has it that Black Sabbath’s first manager, Jim Simpson, overheard the band jamming during a soundcheck and, enthused by the quality of the riffs, asked them to continue their development the following day. Owing to the band’s well-documented ‘recreational substance use’, however, Simpson was invariably met with confusion when referring to specific riffs, as the band had already forgotten the ideas they had jammed. To address this loss of material, Simpson began booking the band into studios close to each day’s venue to capture the jam sessions on tape. Reportedly, these recordings were of production quality comparable to the eventual Black Sabbath albums. Quite simply, this is how Black Sabbath sounded, and if microphones were placed in front of them, this was the result.

Contrary to their previous studio sessions designed to prevent improvised song ideas from being lost, Black Sabbath entered Regent Sounds Studios on that pivotal day in October 1969 with their manager’s intention to record a full debut album. The band, en route to a show in Switzerland, had only a single day to complete the entire recording, which reportedly took between eight and 12 hours. As both the band and their first record producer, Rodger Bain, were similarly inexperienced in the studio, the album was recorded as a live performance using the band’s standard equipment. Osbourne’s vocals

were recorded in a separate booth, while the rest of the band laid down the backing track live, much as they had done in their earlier jam sessions. Most of the songs that ended up on the released record were first takes, as there was little time for retakes or corrections. The only additional time was spent overdubbing the rhythm guitar on certain songs to create a stereo effect, indicating that Black Sabbath now had fixed compositions rather than solely improvised ideas.

Just prior to the recording of this album, Regent Sounds Studios had been upgraded with a second four-track tape machine. With these new technological resources at their disposal, producer Bain persuaded the sound engineer Tom Allom to capture the drum overheads in stereo, using two Neumann U64 microphones, supplemented by a snare microphone and an AKG D12 on the kick (RecordProduction.com 2015). Such a setup was rare, marking the first time Allom had recorded drums in stereo (Mittur 2017). The bass was also recorded in an unconventional manner for the period, though not entirely by choice; a film production team located on the floor above Regent Sounds was so disturbed by the band's sheer volume that they requested Geezer Butler to plug his instrument directly into the mixing console. Upon hearing his bass clearly through the studio monitors, Butler quickly agreed to bypass the amplifier (Grow 2020). Aside from this change in amplification, Butler's playing was notable for its strict alignment with Tony Iommi's guitar riffs. Butler described his approach: 'I always wanted to back the riff to make it deeper and heavier, so I'd play the same that Tony is playing' (Stolz 2017: xviii). The guitar itself was recorded with a single microphone positioned on a full stack of two 4 × 12 speaker cabinets in a tiny room at what was described as 'excruciating' loudness levels. A technical issue prompted Iommi to use his backup guitar—a Gibson SG with high-output humbucker pickups—instead of his main Fender Stratocaster with single-coil pickups (Grow 2020). This combination of a powerful amplifier and a high-output guitar generated a sound that was highly distorted by the standards of the time. To enhance the heaviness further, Iommi applied vibrato to his chords. Butler's bass was also intentionally distorted to match Iommi's guitar tone, a technique that, as Butler noted, was 'unheard of in those days' (Stolz 2017: xviii). It was precisely this combination of heavily distorted guitar and bass, along with innovative unison playing, that created what Iommi referred to as the 'wall of sound' (Iommi 2012: 62).

The second studio day was devoted to mixing and mastering the album, albeit without the band's presence. Sound-processing options were notably limited. With only four tracks to balance, signals had to be combined during the overdub process, and the console's functionality was rudimentary: a single mid-band equalizer in the 3 kHz range; two adjustable panorama knobs for channels 1 and 2; preset panorama switches for channels 3 and 4;

and two sends for Elektromesstechnik plate reverb units. Engineer Allom described the setup as ‘practically useless’ (RecordProduction.com 2015; Matera 2011). The limited production tools available to the team support the notion that Black Sabbath’s recorded sound closely mirrored their live performances.

The entire record, including the cover artwork, was produced on a modest budget of £500 (Wright 2013). Despite the short production time and low cost, the record had an immense impact, topping the charts in the United Kingdom, United States, and Germany and achieving gold and platinum status in these countries. It is widely regarded as foundational to the metal music genre. *Black Sabbath* (Black Sabbath 1970a) may have been produced under basic recording conditions; yet, it defined the core ingredients of the nascent genre: powerful sounds, precise and controlled performances, and a thick wall of distortion that made it sound exceptionally heavy for its time. With their ‘massive guitar and bass wall of sound’, Sabbath sought to ‘out-heavy’ their hard rock contemporaries, notably Led Zeppelin (Iommi 2012: 76), whose signature sound relied on powerful drumming. The concept worked, and, soon, Sabbath became the benchmark for heaviness, envied by rock bands like Status Quo and Ten Years After. Status Quo frontman Francis Rossi recalled: ‘The only one that did sound heavy was them. They were kind of thick sounding. The bottom end seemed very huge, and they sounded thunderous in a way. It was weighty’ (Grow 2020). Ten Years After bassist Leo Lyons echoed this sentiment: ‘Everybody wanted the loud, distorted guitars. That, to me, is what heavy was about. It was like a race at the time to be the heaviest’ (Grow 2020). To satisfy their quest for heaviness, Sabbath took advantage of the new opportunities afforded by rapidly advancing recording technologies, including improved tape machines, mixing consoles, and processing equipment. As a result, their second album, *Paranoid* (Black Sabbath 1970b), took ten days to produce. The band’s influential third album, *Master of Reality* (Black Sabbath 1971), benefited even more from these advancements, allowing them to experiment with lower guitar and bass tunings to intensify their heaviness (Dome 2016; Pop-off 2006: 55).

Metal journalist Ian Christe notes that, before Sabbath’s seminal early records, the term ‘heavy’ referred ‘more to a feeling than a particular musical style. . . . Jimi Hendrix and the Beatles often wrote songs that pointed toward a heavy break, a bridge between melodies that tried to resolve conflicting emotions and ideas’ (2003: 10). By contrast, Black Sabbath, alongside their contemporaries and subsequent metal bands, transformed ‘heavy’ into a sustained musical style that permeated entire songs. Heaviness thus became a defining quality of the metal genre—shaped not only by musical composition and performance but increasingly by production technologies as well.

1.1 Example of a Modern Metal Production

Fifty years on, the world of metal music production looks very different. Yet, despite major shifts, the core attributes of Black Sabbath's debut album—its wall of distortion, powerful sounds, and tight performances—remain foundational in many metal productions. A production documentary of Damnation's Hammer's *Unseen Planets, Deadly Spheres* (2019), featured in *Sound on Sound* magazine (Mynett 2018a, 2018b, 2018c), illustrates the sophistication of contemporary recording, mixing, and mastering methodologies aimed at maximizing sonic impact and heaviness.

The first difference between these two distinct production methodologies lies in the now-standard practice of extensive pre-production, which involves test recordings and detailed sound refinement—a phase that the early Sabbath skipped entirely. For producer Mark Mynett, pre-production began by differentiating the rhythm tones of the two guitarists: one guitar had a pronounced low-end, while the other was brighter and more cutting. With distortion causing the guitars to occupy much of the available sonic space, the combined tones of both guitars would largely shape the sound of the other instruments. To achieve maximum impact and enhance sound quality on smaller speakers and headphones, parts of the bass guitar were positioned within the electric guitar's attenuated mid-frequency range, and the high-end 'clank' from the bass's percussive fingered style was controlled to avoid masking the guitar's note onsets. Additional considerations included positioning the bass guitar and kick drum within the low-end and tuning the snare to cut through the wall of guitars. Given the high level of precision expected in contemporary metal production, each instrument was recorded separately from the drums and performed to a click track. To further enhance performance, the band rehearsed with programmed tempo maps for weeks prior to recording, with the drummer accustomed to playing with his cymbals raised to reduce bleed into the tom microphones.

During pre-production, the producer prepared high-quality guide tracks to provide the musicians with the best possible context and feel during tracking. Final pre-production tasks included selecting a tonally appropriate drum kit, choosing a louder snare, and preparing the drums by re-heading, tuning, and acclimatizing them in the studio a few days before recording. The kick drum's batter head was fitted with a slam pad to enhance attack, and a digital tuner was used to achieve ideal pitch alignment between the batter and resonant heads of the toms, which were tuned at specific musical intervals. The optimal position for the drum kit in the recording space was determined by assessing the snare's resonance by ear and using a pair of closely positioned microphones. Once the (15) microphones were placed on the kit, samples of each drum shell (i.e., kick, snare, and toms) were recorded, capturing different hit velocities and variations to be integrated as sub-mixed samples during the mixing stage. The bass guitar

was recorded using both a direct injection (DI) signal and a microphone in front of an amplifier. The guitars were quad-tracked, with four performances captured by two microphones each, along with the direct signal as a fallback for potential re-amping—a common technique where the direct signal is re-sent to an amplifier to change the model, settings, cabinet, or microphone choice or placement. In the end, despite the extensive pre-production time, the recording took ten days.

The mixing phase was equally intricate. Before it could commence, the polarity and phase of the drum, guitar, and bass tracks were adjusted using a digital phase-alignment tool. The drum tracks were gated to eliminate spill from other instruments and then processed with equalization and various stages of compression and distortion to boost the signal's higher-order harmonic content. Drum samples from both the recorded kit and commercial libraries were used to further enhance punch and help the drums cut through the guitar wall. The bass track was split into four layers, each serving a distinct frequency range and purpose—low-end control, note definition, and distortion level—to ensure a smooth blend with the rhythm guitars. The eight guitar tracks were carefully balanced and tonally adjusted in response to the specific qualities of different playing techniques. Similar attention was given to the vocals; beyond standard compression and equalization to create an 'in-your-face' sound, slight delays and detuning were applied to add thickness and width. The final mastering stage included frequency-dependent multi-band compression, tailored equalization for the stereo centre and side channels, digital tape saturation, and peak limiting. Additionally, the frequency spectrum was 'inflated', using psychoacoustic enhancement to achieve greater fullness and perceptual loudness.

1.2 Advances in Metal Production

A comparison between typical contemporary metal production and one of the earliest metal recordings from the late 1960s reveals considerable development, demonstrating a more sophisticated, methodical, and even 'academic' approach in modern production. Capturing the sound of a live band is no longer enough; today's metal production often necessitates a 'better than live'—or 'hyperreal'—quality, which is, in many cases, almost necessary for the acceptance and success of contemporary metal bands. Compositions, arrangements, and performance styles are tailored to the demands of recording. As many scholars have argued, records are not mere recordings (Gracyk 1996; Zak 2001), and in no genre is this truer than in metal. With hyperreal productions that emphasize clarity, definition, intelligibility, and sonic weight, Mynett asserts that 'metal is the least acceptable when delivered with poor production, as the music's defining quality "heaviness" will inevitably be vastly compromised' (2016: 68). In this genre, production

rarely aims to recreate a believable acoustic performance environment but instead constructs a new, highly effective sonic reality. Frequently, the sounds are close, direct, and ‘in your face’, compressed into a unified space with little depth (Mynett 2019b: 73). Unlike productions from the 1960s to 1980s, which sought to simulate live performance authenticity, contemporary metal exaggerates detail and scale to create a ‘larger-than-life’ impact (Mynett 2019b: 71). Metal production has shifted, as Niall Thomas and Andrew King explain, ‘away from traditional, performance-focused recording towards a more fragmented, technologically architectural approach’, relying on ‘innovative processing and architectural approaches to recording, and mixing, the instrumental elements of the genre’ (2019: 499). This view aligns with Daniel Turner’s observation that ‘extreme music can tolerate extreme mixing methods’ (2009). Metal compositions have become more diverse, with increased speed and enhanced performance quality, signalling a marked increase in heaviness that is supported by ever more extreme, radical, and non-realistic production techniques (Thomas and King 2019: 501).

Some scholars argue that in popular music, aesthetic values and commercial interests often conflict, with overt commercialism perceived as inauthentic and rejected by audiences (Moore 2002; Frith 1996: 42). This dualism is less apparent in contemporary metal, where artistic and commercial values often overlap despite an overall aesthetic of extremity. As Izhaki notes in his mixing manual, ‘Intelligibility is the most elementary requirement when it comes to sonic quality. . . . Sonic quality is . . . a powerful selling point. . . . The majority of people appreciate sonic quality more than they ever realize’ (2013: 5). Metal’s compositional complexity and high technical demands in performance require production clarity to ensure these elements are fully perceivable. Likewise, contemporary metal culture emphasizes genuine virtuosity and musicianship (Hannan 2018; Phillipov 2012: 64). Without clarity, these complex performative gestures and advanced standards of musicianship may become unintelligible and detract from the genre’s virtuosity.

Although core elements such as distorted guitars, drums, bass, and vocals have remained constants in metal, technological advances have considerably influenced its development (Cope 2010: 95; Williams 2015: 40). It is safe to say that metal producers have overwhelmingly embraced digital technology. As producer Russ Russell puts it, ‘I think a lot of metal has been born directly from the breakthroughs in technology and a lot of the technology has been inspired by the developments in heavy metal. . . . I think that relationship will continue’ (Thomas 2015: 217). Practical considerations, such as efficiency and the powerful functionality of digital audio workstations (DAWs) like Pro Tools, have made them the standard for professional metal music production in the 21st century. Long-time Metallica producer Bob Rock explains: ‘The record companies are giving out less money to make records. The time factor is even worse than it’s ever been, and if you’re making records these

days, you've got to use Pro Tools because it's the standard' (Brown 2017: 64). Moreover, as Rock observes, digital technology often benefits metal more than analogue does:

It didn't sound good in the beginning but eventually Pro Tools sounded great. That was a major change. It was suddenly less tape. Quickly, it was no tape. Personally, I love digital, the transients are maintained. I don't have to EQ as much. The whole argument to analog and digital. There's a sound to analog. To me, it's a plug-in now. . . . I don't have to fight it. I make warm records now. My records are big and fat. And digital.

(Rock in Dick 2017)

According to Rock, analogue tape creates a warm sound by attenuating transients—those small peaks at the start of a note—which is well suited to some genres (Rose 2014). However, this warmth is less ideal for metal, where a lack of punch and a softened sound can detract from the genre's impact. Metal benefits from digital equipment that can deliver clear, loud, and intense sounds (Reyes 2008: 126). Additionally, the editing capabilities of digital production suites far surpass those of analogue tape, which requires manual, time-consuming, and often irreversible cuts. Digital editing allows for more precise and flexible control, enabling waveforms to be visualized, crossfaded, and digitally manipulated—whether by quantizing, shifting, compressing, or stretching elements (Zagorski-Thomas 2014: 62). For these reasons, even veteran engineers like Andy Wallace have eventually embraced digital music production:

For many years I used Pro Tools purely as a playback tape machine, but I now use Pro Tools more intensively, because the ability to do really precise editing is such an advantage. I actually got used to doing really precise edits, moving things forwards and backwards by milliseconds.

(Wallace in Tingen 2014)

Historically, the advent of multi-track tape recording marked a paradigm shift from capturing a live performance to producing a crafted record (Wicke 2009). Each increase in available tracks, expanding from 2, 4, 8, 16 to 24 and beyond, progressively elevated music production into an art form. Engineering became integral to the musical artefact, embodying what Theodore Gracyk (1996: 31–36) describes as 'autographic art': the definitive form of music in its recorded and produced state. In the digital age, the industry-standard DAW, Pro Tools, has evolved from its original two-channel format in 1989 (then known as Sound Tools) to support hundreds of tracks, facilitated by advances in computational power and digital signal processing. Since the 2010s, DAWs have commonly offered over a hundred tracks,

as evidenced by the detailed documentation of metal productions in *Sound on Sound*'s 'Inside Track' column, where track counts have increased considerably. Today, a professional metal production typically exceeds a hundred tracks. For example 'Prayers/Triangles' from Deftones' *Gore* (2016) comprises 115 tracks, including 30 drums, 9 drum effects, 6 bass tracks, 30 guitars, 4 electronic elements, 15 vocals, 14 vocal effects, and 3 mix tracks (Tingen 2016). Behemoth's orchestral black/death metal album *I Loved You at Your Darkest* (2018) employs around 300 tracks per song (Has 2018), while Devin Townsend's *Empath* (2019) reportedly used an astonishing 700 tracks (Bacon 2019). Such high track counts facilitate intricate productions, nuanced processing, and extensive layering and reinforcement. Given these capabilities, metal producers were among the early adopters of digital production. Notably, Ricky Martin's (1999) hit 'Livin' La Vida Loca' was the first global chart-topping single produced entirely in Pro Tools (Strachan 2017: 42), but it is worth noting that bands like Metallica and Motörhead had already transitioned to digital production in the early 1990s.

While digital music production, newer technologies, and the historical relationship between technological advances and increased heaviness in recorded metal music hold undeniable value, technology alone is neither the sole nor necessarily the most important factor in shaping the music's quality or heaviness. Research in science and technology studies, particularly actor-network theory (Latour 2005), demonstrates that technology interacts with its users by offering 'affordances'—actionable properties or functionalities as perceived by the human actor (Gibson 1979)—that influence perception, workflow, and decision-making (see Strachan 2017; Zagorski-Thomas 2014). Although affordances define a range of possible uses, they do not prescribe a single application. Most technologies encompass multiple affordances, one of which typically aligns with the designer's intended 'script' for the technology (Zagorski-Thomas 2014: 15). However, this intended script can be disregarded, as users may employ technology in unintended, innovative ways (Akrich and Latour 1992; Silverstone and Hirsch 1994). Thus, users are guided by, but not confined to, the technology's designed application.

The history of recorded (rock) music includes numerous examples where the subversion of intended uses, particularly in creating distortion and other 'unintended' artefacts that defy high-fidelity ideals, has spurred musical innovation (see Bennett 2019; Cunningham 1996; Herbst and Mynett 2021b; Moorefield 2005; Zak 2001). Deviating from intended usage and engineering norms has often led to new standards and creative breakthroughs (see Herbst and Mynett 2021b). Recordists and artists can employ technology within its inherent limitations, which are seldom rigid and can be extended by exploring unplanned applications or functionalities. In essence, while technology establishes the framework and capabilities for music production, users retain significant agency in manifesting their creative visions. This agency is evident

in the continued use of similar or even identical microphones over decades and the reliance on classic analogue tools, such as compressors, equalizers, and mixing desks, whether in hardware form or as digital emulations, all yielding unique sonic results. If technology alone were the driving force in (metal) music production, a constant influx of new tools would be essential for musical development, which does not appear to be the case (see Herbst and Mynett 2021a, 2021b).

1.3 A Brief Overview of the Literature on Metal Music Production and Heaviness

Scholars broadly agree that the pursuit of increasing heaviness is a defining feature of the metal genre. Harris M. Berger was among the first to observe that

[m]etal history is most often summed up by metalheads as a progressive quest for ever-heavier music. A rich and complex concept differentially interpreted across scenes, ‘heavy’ refers to a variety of textural, structural, and affective aspects of musical sound and is crucial for any understanding of metal.

(1999: 58)

The distorted electric guitar has long been regarded as the cornerstone of heaviness (Walser 1993: 41–44; Berger and Fales 2005), though the aggressive use of double-kick drums and extreme vocal styles also contribute to this aesthetic (Berger 1999: 58). Despite the frequent use of ‘heavy’ and ‘heaviness’ in scholarly discussions, a general definition or clear understanding of the term remains elusive (see also Volák 2022: 53). Berger (1999: 58) notes that ‘heavy’ can encompass a range of characteristics, spanning composition, arrangement, performance, emotion, and sound.

Until recently, the multidisciplinary field of metal music studies has documented relatively little about how metal is crafted in record production and how production techniques, as well as subgenre-specific engineering methods, shape its sound and listener perception. Mark Mynett’s *Metal Music Manual* (2017) provides the most comprehensive introduction to contemporary metal production, supplemented by a series of focused research articles (Mynett 2011, 2012, 2016, 2019a, 2019b, 2020, 2022). Niall Thomas’s (2015) doctoral dissertation on technology’s influence on heavy metal recording, based on interviews with metal producers, is another valuable resource (see also Thomas and King 2019). Jan-Peter Herbst’s studies on sonic signatures in metal, also interview-based, give historical insight into metal production’s early phases and the role of the distorted electric guitar (Herbst 2017, 2018, 2019a, 2019b, 2019c, 2020a, 2020b, 2020c, 2021). Timbral changes

in metal history have been analysed from a psychoacoustic perspective by Duncan Williams (2015). Ian Reyes's (2008) doctoral dissertation explores the digital turn in 'heavy music production', examining rock and metal production practices and the lo-fi aesthetic in black metal (see also Reyes 2013). Méi-Ra St-Laurent's (2019) investigation expands on Reyes's work to a 'mid-fi' aesthetic adopted by a new generation of black metal bands that move away from deliberately raw production. Additional resources in the grey literature include Daniel Turner's (2012) unpublished master's thesis and a related article (Turner 2009) analysing the mixing approach of producer Andy Sneap and Emilio Rizzi's (2016) master's thesis on genre-specific mixing techniques to enhance metal's heaviness. Despite the importance of production in contemporary metal, it is surprising how few studies have focused specifically on production techniques. Turner noted in 2012 that a comprehensive study of metal production methodologies was 'virtually non-existent' (2012: 5). Although progress has since been made, Mynett rightly describes the field as still in an 'embryonic phase' (2020: 293).

1.4 The Research Project 'Heaviness in Metal Music Production'

This book originates from the research project 'Heaviness in Metal Music Production' (HiMMP), conducted between 2020 and 2024, which investigated how perceptual heaviness is created, controlled, and utilized in metal music production. As the preceding considerations suggest, heaviness exists in a broader musical framework encompassing composition and arrangement, performance, and technological application. Consequently, production methodologies and perceptions of heaviness are influenced by historical context and develop over time (Berger and Fales 2005). Although this study focuses on contemporary metal production, these contextual factors are integral to understanding the genre. Our analysis centres on three main areas: identifying the compositional, performative, and production/sonic elements that define heaviness; examining how these elements have been managed across different periods and subgenres; and exploring how technical requirements, production conventions, and audience expectations impose constraints and influence practices within the genre.

This investigation explores the varied practices of engineering and producing metal music, both historically and in the present. However, it is beyond the project's scope to serve as a manual for metal music production. To gain the most value from this book, we recommend reading it alongside Mynett's *Metal Music Manual* (2017), which provides a comprehensive overview of fundamental and contemporary production techniques. While the *Metal Music Manual* focuses primarily on current best practices, this project is concerned with the development of production approaches as the genre has diversified and how bands and producers continue to create and redefine

heaviness. Rather than outlining ‘golden standards’, our focus is on the unique strategies that producers have developed and are actively exploring. Within this framework, the tension between the industry and fan expectations on one side and artistic freedom on the other is central. Thomas (2015) repeatedly refers to the dichotomy between art and science in metal music production—a contrast that has yet to be thoroughly examined. Common to both perspectives is the shared pursuit of pushing technological and acoustic boundaries in search of new expressions of heaviness, all while upholding the high production standards essential to the genre (see Herbst and Mynett 2021a, 2021b).

Our research approach is ethnographic in the broadest sense. Ethnographic, fly-on-the-wall studies in recording studios remain relatively uncommon. Two of the most relevant studies in popular music, although not focused on metal, are Louise Meintjes’ (2003) investigation of record production in South Africa and Eliot Bates’ (2016) study of the transition to digital production in Istanbul’s traditional music scene. The limited number of such studies can be attributed to two main factors: ethnographic research on production requires both time and access to studios. For instance, although Turner (2009, 2012) did not participate directly in the production process, he was able to study Cradle of Filth’s ‘Tragic Kingdom’ (2008) by analysing the original Pro Tools session provided by the record company. This access allowed him to overcome common time and access constraints, enabling a detailed examination of producer Andy Sneap’s mixing methodology, including plug-in settings and signal chains—an analysis that would have been difficult with aural techniques alone. Despite the value of this resource, Thomas rightly notes ‘the lack of comparison between other producer’s production methods’ (2015: 259).

‘Heaviness in Metal Music Production’ addresses this significant gap in knowledge by focusing on the bespoke strategies and methodologies that leading metal producers use to achieve the genre’s defining quality: heaviness. While Mynett (2017), in his *Metal Music Manual*, occasionally refers to the techniques of internationally recognized producers through retrospective interviews, our approach directly compares different producers mixing the same song using their individual methods. For this purpose, we composed and recorded the song ‘In Solitude’ (HIMMP 2023), which spans various metal subgenres, and subsequently presented it to eight professional metal producers for mixing:

- Jens Bogren (b. 1979, Sweden): Opeth, Arch Enemy, At the Gates, Soilwork, Dimmu Borgir, Amon Amarth
- Mike Exeter (b. 1967, the UK): Black Sabbath, Tony Iommi, Heaven and Hell, Judas Priest, Cradle of Filth
- Adam ‘Nolly’ Getgood (b. 1987, the UK): Periphery, Animals as Leaders, Architects, SikTh, Haken, Cynic, Bleed from Within

- Josh Middleton (b. 1985, the UK): Architects, Sylosis, Heriot, Nakkeknaekker
- Fredrik Nordström (b. 1967, Sweden): At the Gates, Arch Enemy, Dark Tranquillity, Dimmu Borgir, In Flames, Opeth
- Buster Odeholm (b. 1992, Sweden): Humanity's Last Breath, Vildhjarta, Born of Osiris, Sworn In, Oceano, Hacktivist
- Dave Otero (b. 1981, the United States): Archspire, Khemmis, Allegaeon, Aborted, Primitive Man, Visigoth
- Andrew Scheps (b. 1969, the United States): Metallica, Black Sabbath, Apocalyptica, Green Day, Red Hot Chili Peppers, Bon Jovi

We meticulously documented each producer's mixing strategies by screen-capturing their DAW sessions, supplemented by video interviews that explore their mixing intentions and decision-making processes shaped by tacit knowledge (Schmidt-Horning 2004). Additionally, we collected the final audio exports and stems for each instrumental and vocal group, enabling a detailed comparison of each producer's individual approach and how the structural and performative features of the various subgenres within 'In Solitude' influenced their decisions.

The videos, mixes, and stems are freely available in a dataset,¹ which contains the primary resources:

- Producer mixes of 'In Solitude': both original loudness and loudness-matched versions for an accurate comparison, along with individual drum, bass, guitar, and vocal stems from each mix.
- Researchers' reference mix: including the Pro Tools project.
- Complete multi-track recording of 'In Solitude': encompassing drum samples, guitar DIs, and musical instruments digital interface (MIDI) tracks for orchestration (strings, brass, synthesizers, piano) as provided to the producers.

In addition to the video interviews, full transcripts of our conversations are published in the companion volume, *Heaviness in Metal Music Production, Volume II: Learn from the Masters* (Herbst and Mynett 2025), along with screenshots illustrating key mixing decisions and a listening guide to facilitate comparison of the audio mixes.

Although our initial aim was to include pre-production and recording phases in collaboration with the producers, logistical constraints and the high cost of coordinating studio visits across Europe and the United States with musicians and a video production team led us to focus on the mixing phase.

To provide a comprehensive perspective and ensure diversity in subgenre-specific production practices, as well as in the backgrounds and ages of the

producers, we draw on a variety of journalistic, educational, and professional sources. This material includes documentaries and mix deconstructions from publications like *Sound on Sound*; instructional videos from educational providers such as Unstoppable Recording Machine (URM), whose *Nail the Mix* series features live professional mixing sessions of popular metal tracks; interviews and feature articles from music and recording magazines like *Rolling Stone* and *Tape Op: The Creative Music Recording Magazine*; and band biographies such as *Iron Maiden in the Studio* (Brown 2011). We also utilized interviews previously conducted by both authors with various metal music producers. While these sources are not part of the experimental study, this extensive data covers all stages of pre-production and recording, allowing us to assess the producers' varied roles and techniques in achieving a 'heavy' metal record.

It is also important to note that, in contemporary metal production, efforts have increasingly shifted to the mixing phase, where arrangements are typically finalized and where mastering often takes place. The emphasis on mixing is reflected in the popularity of mix-focused products such as *Nail the Mix*, *Mix with the Masters*, and *Pro Mix Academy*. Although listening tests or other reception-based studies are beyond this book's scope, we document the most relevant aspects—from the initial idea to its final realization—of composition, performance, arrangement, recording, editing, mixing, and mastering behind 'In Solitude'. Detailed documentation of the aesthetic, technical, and practical complexities involved in capturing and translating a metal composition and its performances remains limited. In addition to studying professional producers' mixing approaches, we mixed and mastered the song ourselves, which enabled us to complement the ethnographic observations of the producers with autoethnographic reflections.

We anticipate that the findings will not only advance the academic conceptualization of heaviness but also enhance the practical understanding of how this essential quality is created and manipulated in metal music production. In other words, we hope this book will serve as a valuable resource for practising metal musicians, engineers, and producers. As evidenced by specialized online forums like *Ultimate Metal* and educational platforms such as *Nail the Mix*, a great number of amateurs, semi-professionals, and professionals have a vested interest in metal music production. Even the average metal fan is increasingly conversant in production concepts, a trend that likely explains why the metal press now frequently features 'in the studio' reports and includes producer credits and studio details (Williams 2015: 40). Since 2007, the magazine *Sound on Sound* has offered its 'Inside Track' column, in which a song's original mixing engineer or producer deconstructs a released track. This column was introduced in response to the decline of traditional apprenticeships in the audio industry, which

previously allowed aspiring professionals to learn the craft directly from experienced mentors:

The idea was that Inside Track would offer detailed insights into the techniques and working methods employed by the world's top mixers of high-charting recordings. As expected, this was an instant hit with the semi-professional home-studio owners who make up a large part of SOS's readership; what was more surprising was learning that some well-known mix engineers too have used these details to rebuild mixes done by their colleagues and try to pick up new tricks.

(Tingen 2015)

We trust that our detailed exploration of the various productions, especially our comparison of the producers' mixes of 'In Solitude', will provide a similar educational benefit and be equally valuable to the metal music community, including academics, professionals, laypersons, and fans alike.

1.5 Conventions and Expectations in Metal Music Production

Before analysing heaviness and its production, it is essential to address some contextual considerations, particularly regarding expectations within the metal genre. Mark Marrington (2019: 66–67) notes that, with the exception of newer 'cyber genres' like djent (Strachan 2017: 148–151), most metal sub-genres and their fanbases are deeply traditional and bound by genre-specific conventions. This adherence extends to music production, which appears to follow a relatively strict methodology. As Thomas and King explain:

This resultant effect of striving for specific production aesthetics has led to the existence of a recorded heavy metal production methodology, informed by intelligible recorded heavy metal music that conveys appropriate levels of heaviness. This methodology can only be put into practice if those using it adhere to accepted ideals of heavy metal production.

(Thomas and King 2019: 515)

Thomas describes 'genre specific production attributes' (2015: 197) grounded in the established ideals of engineers, producers, and musicians. Experts interviewed in his study observe that metal productions have grown increasingly formulaic in the pursuit of perfection, lamenting that technology has contributed to a uniform sound across much of metal music. The study concludes that 'the whole production process has been reduced to a series of choices based on expectations' (Thomas 2015: 204). Turner similarly posits that there is now a tangible 'possibility of a general formula for mixing this genre of music' (2012: 175). Marrington echoes this sentiment,

noting that mixing manuals often reduce the process to one of ‘problem-solving’ (2017: 200).

In the field of intelligent music production, there have been attempts to automate genre-specific mixing without human involvement (Man, Stables, and Reiss 2019). Recent advancements in artificial intelligence bolster this potential, as seen in the metal track ‘Guardians of Time’ (2023b) by Frostbite Orckings, which was reportedly composed, mixed, and produced entirely by an algorithm (Frostbite Orckings 2023a). This example reflects a new trend in the ‘Metalverse’ (Metalverse 2022). Taken together, these developments indicate a noticeable homogenization in contemporary production styles, which ‘are beginning to converge into a production methodology’ (Thomas and King 2019: 503). Turner (2009, 2012) identifies a systematic production approach in his analysis of Andy Sneap’s mixing techniques and, through interviews, suspects similar methodologies among other producers, including Colin Richardson, Martyn Ford, and James Murphy. Subgenre conventions are further evident in the names of DAW plug-in presets, which frequently denote specific drum or guitar sounds characteristic of various metal subgenres (Strachan 2017: 26–27).

Navigating expectations and determining the extent to which they should be met remains a considerable challenge for metal producers (Thomas 2015: 281). Producer Oz Craggs laments that his ‘hands are tied’ by the need for guitars and drums to sound a particular way (Thomas 2015: 263). Influential producer Colin Richardson echoes this sentiment, noting, ‘All of us, including bands and labels, have a sound based on [metal music] since Pantera; based on how metal “should” sound. I’ve been as guilty as anyone of playing the game’ (Taylor 2011). As Russ Russell points out, the paradox here is that metal production aspires towards perfection; yet, audiences and bands have become so accustomed to the sound of home recordings—with guitar amplifier simulations, programmed drums, and drum sample libraries—that ‘they are kind of disappointed when things don’t sound like that’ (Thomas 2015: 226).

The issue of ‘overproduction’ is especially relevant to discussions about the homogenization of metal’s sound. Previously, we suggested that contemporary metal music does not adhere strictly to a performance-based aesthetic, that high production quality does not inherently compromise authenticity, and that polished production often drives commercial success. However, metal music can indeed be ‘overproduced’. Such criticism typically focuses on the clinical sound resulting from rigidly quantized drum performances, the conspicuous use of samples to reinforce or replace drums, and the excessive layering of instruments and vocals without clear musical intent (Massy 2016: 213; Thomas 2015: 227; Williams 2015). Producer and bassist Joey Vera (Armored Saint, Fates Warning) argues that overproduction may actually dull a record’s heaviness, making it sound ‘a bit tame’ (Saxon 2007: 34).

Producer Ross Robinson similarly critiques overproduction for masking the artist's personality and reducing the emotional impact of the production (Mynett 2017: 21). This common sentiment has led producer Oz Craggs to view overproduction as an 'ethical question' for those involved in metal production (Thomas 2015: 227).

On the other hand, a sound that is too raw or 'underproduced' may not satisfy audiences either, as illustrated by Metallica's *St. Anger* (2003) album. Reportedly recorded live with no overdubs and intentionally rough edits, the album was meant to evoke a 'raw, unpolished sound' that challenged traditional metal production standards (Rock in McIver 2009: 325). However, this approach was met with sharp criticism from both the music press and fans, who found the unconventional production unconvincing (McIver 2009: 325–332). By contrast, Metallica's self-titled album, widely known as the *Black Album* (1991) and also produced by Bob Rock, set new benchmarks for metal production quality and became the band's most commercially successful album to date (McIver 2009: xv).

In the context of overproduction and audience expectations, producer Andy Sneap suggests that the main issue plaguing metal production may not be excess polish per se but rather a lack of vision, which prevents producers from fully realizing the genre's potential (Mynett 2017: 26). As *St. Anger* (2003) demonstrates, there is indeed a threshold beyond which the metal press and audiences may find deviations from production conventions unacceptable.

Thomas (2015: 205) observes that the professionals in his study rarely mention creativity when discussing their production practices. However, this impression may be overly narrow, as the reflections of other producers suggest a more nuanced perspective. In *Recording Unhinged: Creative & Unconventional Music Recording Techniques*, rock and metal producer Sylvia Massy advocates for allowing time for unexpected developments and embracing mistakes, noting that the history of record production is filled with errors later recognized as strokes of genius (2016: 5; see also Zak 2001: 127). For Andy Sneap, '[o]ne of the joys of recording is making mistakes and finding little tricks out' (Sneap 2014), while Rick Rubin describes production as 'a big experiment' where trying different approaches is essential: 'If it doesn't work, we all know it doesn't work' (Brown 2009: 6). According to an interview with Bullet For My Valentine, the primary factors limiting experimentation seem to be budget constraints and the band's desire to stay within genre conventions (Sharma 2018).

1.6 The Role of the Producer

In academic discourse, the producer's role remains ambiguously defined. Virgil Moorefield acknowledges that 'it's more difficult than ever to pin down what the role of the producer is' (2005: 109), while Albin Zak III (2001: 172)

notes that this role has developed over time and varies considerably across projects. Furthermore, Richard James Burgess (2013: 7) highlights that the producer's responsibilities often shift according to genre. Although a comprehensive exploration of the producer's role lies beyond the scope of this book, it is useful to outline its core functions. Sylvia Massy categorizes producers into three primary subtypes—musician/producer, engineer/producer, and fan/producer:

The musician/producer usually creates all the music and often writes the songs, bringing in vocal talent to front the project. The engineer/producer will craft the sound of an existing project, often using equipment and technique to create the magic in the studio. The fan/producer may never actually touch the console, but will help choose the songs and guide the project by bringing the right people together.

(Massy 2016: 188)

In metal music, few producers identify as fan/producers, with Rick Rubin standing out as a rare example. Rubin describes himself as having 'no technical ability whatsoever' (Ferris 2008: 55), focusing instead on assembling a production team and steering the project's artistic vision. Most metal producers, however, fall into the musician/producer or engineer/producer categories, with various shades between these roles. Producers in these groups often have a musical background that enables them to contribute to songwriting, arrangement, and performance assessment. Conversely, musician/producers frequently acquire engineering skills over time, motivated by both creative aspirations and financial considerations. Some, like Andy Sneap, embody a hybrid of all three types, handling both engineering and production tasks. This comprehensive role grants Sneap extensive artistic control, ensures high-quality output, and eliminates communication barriers, all qualities that appeal to artists and record labels alike, which make him a sought-after 'one-stop shop' (Turner 2012: 25).

The role of the audio engineer has historically been distinct from that of the producer; yet, these roles have increasingly converged over time (Zak 2009), particularly in metal music, often due to budget constraints. Traditionally, music production has involved specialized recording, mixing, and mastering engineers working under the producer's guidance. In metal, however, the 'producer' frequently assumes all these roles, creating an all-encompassing position that can leave a distinctive sonic imprint on a record (see Herbst and Mynett 2021b). In contrast, in multi-role teams, an individual producer's influence may be less pronounced. Furthermore, phases such as pre-production, recording, mixing, and mastering now tend to overlap, impacting the production process as a whole and shaping creative choices throughout.

Peter Wicke posits that the ‘producer, together with the sound engineers and technicians he [*sic!*] has available, is not less creatively involved in this process of musical formulation than the musicians’ (1990: 14). Simon Frith (1981: 10) similarly views the producer as pivotal to a record’s commercial success. These perspectives, alongside prior discussions, raise the question of whether producers should have a distinct sonic signature. Within the metal community, opinions differ: some producers emphasize serving the artist’s vision above all, while others consciously cultivate a recognizable sound. Bob Rock, for example, explicitly refrains from imposing ‘a sound’:

I hope there isn’t a signature Bob Rock sound, because I’ve worked many years so that it *doesn’t* happen. I like making records, and I like making records that interest me, and there’s not supposed to be any formula in that. To be quite honest, I’m not into being a career record producer. It’s not about *my* career. There was a time in my life where it was, but since *The Black Album* I’ve tried to be a better producer, as well as work with bands I find interesting and challenging at any given moment, and help them realize what they want to do. It’s not a Bob Rock record; it’s never been about me.

(*Rock in Brown* 2017: 63, *italics in the original*)

Two seasoned producers, Terry Date and Chris Tsangarides, share Bob Rock’s perspective that leaving a personal imprint on an album may detract from the artist’s vision (Brown 2018: 42; Krannila, Asell, and Tattari 2009). Generally, the old guard of producers has tended towards a less intrusive role, as seen in Martin Birch and Kevin Shirley’s work with Iron Maiden (Brown 2011: 46–47, 176) and Rick Rubin’s production of Slayer’s *Reign in Blood* (1986). In contrast, a newer generation of producers often embraces a distinct sonic signature. Notable examples include Colin Richardson and Andy Sneap, who have been influential in metal production since the 1990s. While Sneap’s style favours bigger-sounding guitars, Richardson’s is marked by a ‘fatter’ rhythm section (Turner 2012: 21). These original approaches have shaped the production techniques of later generations of metal producers (Thomas 2015; Turner 2012). Younger producers like Joey Sturgis have further developed unique production styles while also supporting artists’ creative goals:

There’s definitely a Joey Sturgis sound to everything I do. . . . I think it’s important to realize that ‘sound’ doesn’t mean every band/album/song is going to sound the same, just that what I think sounds good is subjective and is likely to sound good in other situations too.

(*Sturgis in Linzi A* 2017)

This trend towards stronger producer signatures is a notable dimension in the following analysis, as is the often-cited criticism of standardized production methods and the resulting homogenized sound, which is a fundamental contradiction worth examining.

1.7 Overview of the Book

Our investigation begins with a theoretical exploration of heaviness in metal music (Chapter 2). We start by reviewing current research in music perception and cognition, particularly examining ecological perception, embodied cognition, cognitive metaphor theory, and cross-domain mapping. Following an analysis of the challenges of objectivity in using semantic descriptors, we explore spectrographic translations to understand how audio engineers can manipulate sound and influence listener perception. This discussion also includes a literature review on the sonic metaphor of ‘heavy’. The musical parameters of heaviness are then analysed. To develop a systematic framework for heaviness, we examine musical parameters through both sonic/production-related and structural/performative features, integrating insights from the limited and scattered literature on this subject. To cross-reference the theoretical framework with practitioners’ perspectives, we investigate the discursive use of the term ‘heavy’ on online forums frequented by producers and musicians. The chapter concludes with a review of the theoretical and empirical findings, situating technological advancements and innovative production methods within the broader discourse on metal’s enduring pursuit of greater heaviness.

To identify the factors and complexities involved in producing heaviness, the following three chapters examine key stages in metal music production: pre-production, songwriting, and arrangement (Chapter 3); recording (Chapter 4); and mixing and mastering (Chapter 5). Each chapter begins with an overview of workflows, creative decisions, and technical or aesthetic constraints, illustrated with case studies and examples from both historical and recent records. The documentation of these stages in producing the project song, ‘In Solitude’, provides an applied context, showing how these processes influence the final sound. These introductory discussions offer general observations on pre-production, mixing, and mastering, all of which become central in analysing ‘In Solitude’ and the professional mixes examined in Chapter 6. Throughout these chapters, examples illuminate the intricate decision-making involved in metal production. A step-by-step account guides the reader through creating ‘In Solitude’, detailing each phase from songwriting and arrangement to recording, editing, mixing, and mastering. The complete multi-track recording, containing over 40 individual tracks of guitars, bass, drums, vocals, and orchestration (audio and MIDI), is available in the research project’s dataset. The dataset also includes clean sample hits

from the recorded drum kit, alternative bass and guitar signal chains, and the fully processed Pro Tools project of the researchers' production, allowing interested readers to analyse and reconstruct a professional metal production in detail.

Chapter 6 examines the multifaceted concept of heaviness in metal music production, presenting insights from eight leading producers who mixed 'In Solitude'. It explores how heaviness is conceptualized and realized through diverse approaches that range from hyperreal aesthetics—marked by meticulous editing and technological precision—to naturalistic methods that prioritize authenticity and human expression. The findings reveal heaviness as a composite quality, shaped by factors such as distortion, low-end management, rhythmic precision, and dynamic contrasts. Although heaviness is universally regarded as being central to metal's identity, its manifestations vary widely, encompassing sonic density, emotional intensity, and performative aggression. Producers emphasized the importance of compositional and performative foundations, with production seen as both an enhancer of heaviness and a reflection of aesthetic priorities. Distinct challenges in metal production, including managing the dense 'wall of sound' and balancing weight with clarity, highlight the producers' role as creative collaborators. This chapter highlights how metal's aesthetic continues to develop, shaped by a dialogue between technological advances and the enduring primacy of musical expression. It provides fresh perspectives on the genre's sonic and cultural identity by illuminating the art and craft of metal production.

Chapter 7 synthesizes the results of the original production study with the researchers' autoethnographic reflections on producing the song, alongside knowledge from the literature and case studies. Drawing on the framework developed in Chapter 2, the chapter articulates an empirically grounded theory of heaviness in metal music production. It contextualizes the findings within the academic discourse on heaviness and addresses technical and aesthetic issues that resonate beyond music technology to inform broader metal music studies. Aimed at scholars, producers, artists, and listeners of metal music, this concluding chapter encapsulates the study's key findings and highlights the central role of heaviness in defining the genre.

Note

1 <https://huddersfield.box.com/s/8gren2ma4kesvf5vwip2axzz1v8sawur>

Bibliography

Akrich, Madeleine and Latour, Bruno (1992). 'A Summary of a Convenient Vocabulary for the Semiotics of Human and Nonhuman Assemblies', in *Shaping Technology: Studies in Sociotechnical Change*, edited by Wiebe E. Bijker and John Law (pp. 259–264). Cambridge, MA: MIT Press.

- Bacon, Tony (2019). 'Devin Townsend'. *Souciant*. www.soundonsound.com/people/devin-townsend. Accessed 8 October 2024.
- Bates, Eliot (2016). *Digital Tradition: Arrangement and Labor in Istanbul's Recording Studio Culture*. Oxford: Oxford University Press.
- Bennett, Samantha (2019). *Modern Records, Maverick Methods: Technology and Process in Popular Music Record Production 1978–2000*. New York, NY: Bloomsbury.
- Berger, Harris M. (1999). *Metal, Rock, and Jazz: Perception and the Phenomenology of Musical Experience*. Hanover, NH: University Press of New England.
- Berger, Harris M. and Fales, Cornelia (2005). 'Heaviness in the Perception of Heavy Metal Guitar Timbres: The Match of Perceptual and Acoustic Features over Time', in *Wired for Sound: Engineering and Technologies in Sonic Cultures*, edited by Paul D. Greene and Thomas Porcello (pp. 181–197). Middletown, CT: Wesleyan University Press.
- Brown, Jake (2009). *Rick Rubin: In the Studio*. Montreal: ECW Press.
- Brown, Jake (2011). *Iron Maiden in the Studio: The Stories Behind Every Album*. New York, NY: John Blake Publishing.
- Brown, Jake (2017). 'Bob Rock: Metallica, Mötley Crüe, & More'. *Tape Op: The Creative Recording Magazine*, 121: 60–64.
- Brown, Jake (2018). 'Terry Date: Avoiding a Signature Sound?'. *Tape Op: The Creative Recording Magazine*, 123: 38–42.
- Burgess, Richard J. (2013). *The Art of Music Production: The Theory and Practice*. Oxford: Oxford University Press.
- Christe, Ian (2003). *Sound of the Beast: The Complete Headbanging History of Heavy Metal*. New York, NY: Harper Entertainment.
- Cope, Andrew L. (2010). *Black Sabbath and the Rise of Heavy Metal Music*. Farnham: Ashgate.
- Cunningham, Mark (1996). *Good Vibrations: A History of Record Production*. Chessington: Castle Communications.
- Dick, Chris (2017). 'Bob Rock on Metallica: "I Didn't Cater to What They Were. I Catered to What They Wanted to Do"'. *Decibel Magazine*. www.decibelmagazine.com/2017/09/18/outlaw-torn-qa-bob-rock. Accessed 8 October 2024.
- Dome, Malcolm (2016). 'The Story behind Black Sabbath's Master of Reality'. *Louder Sound*. www.loudersound.com/features/the-story-behind-black-sabbaths-master-of-reality. Accessed 8 October 2024.
- Ferris, D. X. (2008). *Slayer's Reign in Blood*. 33 1/3. New York, NY: Bloomsbury.
- Frith, Simon (1981). *Sound Effects: Youth, Leisure, and the Politics of Rock 'n' Roll*. New York, NY: Pantheon Books.
- Frith, Simon (1996). *Performing Rites: On the Value of Popular Music*. Oxford: Oxford University Press.
- Frostbite Orckings (2023a). 'First Single "Guardians of Time" Out Now'. *Frostbite Orckings*. www.orckings.org/?view=article&id=37&catid=8. Accessed 8 October 2024.
- Gibson, James J. (1979). *The Ecological Approach to Visual Perception*. Boston, MA: Houghton Mifflin.
- Gracyk, Theodore (1996). *Rhythm and Noise: An Aesthetics of Rock*. London: Tauris.
- Grow, Kory (2020). 'Heavy Metal, Year One: The Inside Story of Black Sabbath's Groundbreaking Debut'. *Rolling Stone*. www.rollingstone.com/music/music-features/black-sabbath-debut-album-heavy-metal-origin-interview-949070. Accessed 8 October 2024.
- Hannan, Calder (2018). 'Difficulty as Heaviness: Links between Rhythmic Difficulty and Perceived Heaviness in the Music of Meshuggah and the Dillinger Escape Plan'. *Metal Music Studies*, 4(3): 433–458.

- Herbst, Jan-Peter (2017). 'Historical Development, Sound Aesthetics and Production Techniques of the Distorted Electric Guitar in Metal Music'. *Metal Music Studies*, 3(1): 24–46.
- Herbst, Jan-Peter (2018). 'Heaviness and the Electric Guitar: Considering the Interaction between Distortion and Harmonic Structures'. *Metal Music Studies*, 4(1): 95–113.
- Herbst, Jan-Peter (2019a). 'Distortion and Rock Guitar Harmony: The Influence of Distortion Level and Structural Complexity on Acoustic Features and Perceived Pleasantness of Guitar Chords'. *Music Perception*, 36(4): 335–352.
- Herbst, Jan-Peter (2019b). '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): 53–69.
- Herbst, Jan-Peter (2019c). 'The Formation of the West German Power Metal Scene and the Question of a "Teutonic" Sound'. *Metal Music Studies*, 5(2): 201–223.
- Herbst, Jan-Peter (2020a). 'From Bach to Helloween: "Teutonic" Stereotypes in the History of Popular Music'. *Metal Music Studies*, 6(1): 87–108.
- Herbst, Jan-Peter (2020b). 'Sonic Signatures in Metal Music Production: Teutonic vs British vs American Sound'. *Samples*, 18: 1–26. <http://gfpn-samples.de/Samples18/Herbst.pdf>.
- Herbst, Jan-Peter (2020c). 'Views of German Producers on "Teutonic" Metal: Production Approaches and Generational Effects', in *One Nation Under a Groove: Nation als Kategorie populärer Musik?*, edited by Ralf von Appen and Thorsten Hindrichs (pp. 183–206). Bielefeld: Transcript.
- Herbst, Jan-Peter (2021). 'The Politics of Rammstein's Sound: Decoding a Production Aesthetic'. *Journal of Popular Music Studies*, 33(2): 51–76.
- Herbst, Jan-Peter and Mynett, Mark (2021a). 'Nail the Mix: Standardization in Mixing Metal Music'. *Popular Music and Society*, 44(5): 628–649.
- Herbst, Jan-Peter and Mynett, Mark (2021b). '(No?) Adventures in Recording Land: Engineering Conventions in Metal Music'. *Rock Music Studies*, 9(2): 137–156.
- Herbst, Jan-Peter and Mynett, Mark (2025). *Heaviness in Metal Music Production: Learn from the Masters*. Volume 2. Abingdon: Routledge.
- Iommi, Tony (2012). *Iron Man: My Journey through Heaven and Hell with Black Sabbath*. London: Simon and Schuster.
- Izhaki, Roey (2013). *Mixing Audio: Concepts, Practices and Tools*. Oxford: Focal Press.
- Krannila, Ville; Asell, Jari and Tattari, Kimmo (2009). 'Chris Tsangarides'. *Steel Mill*. <http://kkdowning.net/steelmill/Interviews/1979>. Accessed 8 October 2024.
- Latour, Bruno (2005). *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
- Linzi, A. (2017). 'The Big Über Rock Interview: Joey Sturgis'. *Über Rock*. www.uberrock.co.uk/interviews/56-may-interviews/19285-2017-05-27-10-17-06.html. Accessed 24 September 2020 [no longer accessible].
- Man, Brecht de; Stables, Ryan and Reiss, Joshua D. (2019). *Intelligent Music Production*. New York, NY: Routledge.
- Marrington, Mark (2017). 'Mixing Metaphors: Aesthetics, Mediation and the Rhetoric of Sound Mixing', in *Mixing Music*, edited by Russ Hepworth-Sawyer (pp. 199–215). London: Routledge.
- Marrington, Mark (2019). 'The DAW, Electronic Music Aesthetics, and Genre Transgression in Music Production: The Case of Heavy Metal Music', in *Producing Music*, edited by Russ Hepworth-Sawyer (pp. 52–74). New York, NY: Routledge.
- Massy, Sylvia (2016). *Recording Unhinged: Creative & Unconventional Music Recording Techniques*. Milwaukee, WI: Hal Leonard.
- Matera, Joe (2011). 'Tom Allom: "The Sounds on First Sabbath Albums Could Have Been Heavier"'. *Ultimate Guitar*. www.ultimate-guitar.com/news/interviews/

- tom_allom_the_sounds_on_first_sabbath_albums_could_have_been_heavier.html. Accessed 8 October 2024.
- McIver, Joel (2009). *Justice for All: The Truth about Metallica*. London: Omnibus.
- Meintjes, Louise (2003). *Sound of Africa! Making Music Zulu in a South African Studio*. Durham, NC: Duke University Press.
- Metalverse (2022). 'The Metalverse: Home of the World's First A.I. Rock and Metal Bands'. *Metalverse*. <http://metalverse.world>. Accessed 20 April 2023.
- Mittur, Avinash (2017). 'Interview: Tom Allom & Jack Ruston (Judas Priest, Producer)'. *Invisible Oranges*. www.invisibleoranges.com/interview-tom-allom-jack-ruston-judas-priest-producer. Accessed 8 October 2020.
- Moore, Allan F. (2002). 'Authenticity as Authentication'. *Popular Music*, 21(1): 214–218.
- Moorefield, Virgil (2005). *The Producer as Composer: Shaping the Sounds of Popular Music*. Cambridge, MA: MIT Press.
- Mynett, Mark (2011). 'Sound at Source: The Creative Practice of Re-Heading, Dampening and Drum Tuning for the Contemporary Metal Genre'. *Journal on the Art of Record Production*, 5. www.arjournal.com/asarpwp/sound-at-source-the-creative-practice-of-re-heading-dampening-and-drum-tuning-for-the-contemporary-metal-genre. Accessed 8 October 2020.
- Mynett, Mark (2012). 'Achieving Intelligibility Whilst Maintaining Heaviness When Producing Contemporary Heavy Metal Music'. *Journal on the Art of Record Production*, 6. www.arjournal.com/asarpwp/achieving-intelligibility-whilst-maintaining-heaviness-when-producing-contemporary-metal-music. Accessed 8 October 2024.
- Mynett, Mark (2016). 'The Distortion Paradox: Analyzing Contemporary Metal Production', in *Global Metal Music and Culture*, edited by Andy R. Brown, Karl Spracklen, Keith Kahn-Harris, and Niall Scott (pp. 68–88). London: Routledge.
- Mynett, Mark (2017). *Metal Music Manual: Producing, Engineering, Mixing, and Mastering Contemporary Heavy Music*. Abingdon: Routledge.
- Mynett, Mark (2018a). 'Session Notes Pt. 1: Making Modern Metal, Pre-Production'. *Sound on Sound* 1/2018: 58–64.
- Mynett, Mark (2018b). 'Session Notes Pt. 2: Making Modern Metal, Engineering'. *Sound on Sound* 2/2018: 88–97.
- Mynett, Mark (2018c). 'Session Notes Pt. 3: Making Modern Metal, Mixing and Mastering'. *Sound on Sound* 3/2018: 72–84.
- Mynett, Mark (2019a). 'Defining Contemporary Metal Music: Performance, Sounds and Practices'. *Metal Music Studies*, 5(3): 297–313.
- Mynett, Mark (2019b). 'Heaviness in Three Dimensions: The Use of Sonic Space in Contemporary Metal Music Production', in *Art of Record Production: Creative Practice in the Studio*, edited by Simon Zagorski-Thomas, Katia Isakoff, Sophie Stévanec, and Serge Lacasse (pp. 66–79). Abingdon: Routledge.
- Mynett, Mark (2020). 'Maximum Sonic Impact: (Authenticity/Commerciality) Fidelity-Dualism in Contemporary Metal Music Production', in *The Bloomsbury Handbook of Music Production*, edited by Simon Zagorski-Thomas and Andrew Bourbon (pp. 293–302). London: Bloomsbury.
- Mynett, Mark (2022). 'Three-Dimensional Doom: My Dying Bride's "Your Broken Shore" (2020)', in *Analyzing Recorded Music: Collected Perspectives on Popular Music Tracks*, edited by William Moylan, Lori Burns, and Mike Alleyne (pp. 294–304). New York, NY: Focal Press.
- Phillipov, Michelle (2012). *Death Metal and Music Criticism: Analysis at the Limits*. Lanham, MD: Lexington Books.
- Popoff, Martin (2006). *Black Sabbath: Doom Let Loose*. Toronto: ECW Press.
- Reyes, Ian (2008). 'Sound, Technology, and the Interpretation in Subcultures of Heavy Music Production'. PhD thesis, Pittsburgh University.

- Reyes, Ian (2013). 'Blacker Than Death: Recollecting the "Black Turn" in Metal Aesthetics'. *Journal of Popular Music Studies*, 25(2): 240–257.
- Rizzi, Emilio M. (2016). 'Music Production in Heavy Metal Music'. MA thesis, University of York.
- Rose, Steven (2014). 'Iconic Producer Bob Rock Interview'. *Ultimate Guitar*. www.ultimate-guitar.com/news/interviews/bob_rock_i_still_try_to_make_great_records.html. Accessed 8 October 2024.
- Saxon, Jonathan (2007). 'Joey Vera: Recording Armored Saint, Anthrax and More'. *Tape Op: The Creative Recording Magazine*, 62: 30–36.
- Schmidt-Horning, Susan (2004). 'Engineering Performance: Recording Engineers, Tacit Knowledge, and the Art of Controlling Sound'. *Social Studies of Science*, 34(5): 703–731.
- Sharma, Amit (2018). Bullet For My Valentine. In *Music Radar*. Available online at <https://www.musicradar.com/news/bullet-for-my-valentine-right-now-i-believe-more-than-ever-that-our-strengths-are-in-songwriting-not-just-guitar-playing>, accessed 17 June 2025.
- Silverstone, Roger and Hirsch, Eric (eds.) (1994). *Consuming Technologies: Media and Information in Domestic Spaces*. New York, NY: Routledge.
- St-Laurent, Méi-Ra (2019). "It's Kind of in the Middle": The "Mid-Fi" Aesthetic: Toward a New Designation of Black Metal Aesthetic of Recording: The Case of the Québec Black Metal Scene', in *Proceedings of the 12th Art of Record Production Conference: Mono: Stereo: Multi*, edited by Jan-Olof Gullö (pp. 267–286). Stockholm: Royal College of Music.
- Stolz, Nolan (2017). *Experiencing Black Sabbath*. Lanham, MD: Rowman and Littlefield.
- Strachan, Robert (2017). *Sonic Technologies: Popular Music, Digital Culture and the Creative Process*. New York, NY: Bloomsbury Publishing.
- Taylor, Mick (2011). 'Interview: Metal Production Guru Colin Richardson'. *Music Radar*. www.musicradar.com/news/guitars/interview-metal-production-guru-colin-richardson-400260. Accessed 8 October 2024.
- Thomas, Niall (2015). 'The Development of Technology and Its Influence on Recorded Heavy Metal Music 1969–2015'. PhD thesis, University of Hull.
- Thomas, Niall and King, Andrew (2019). 'Production Perspectives of Heavy Metal Record Producers'. *Popular Music*, 38(3): 498–517.
- Tingen, Paul (2014). 'Inside Track: Linkin Park's the Hunting Party'. *Sound on Sound*. www.soundonsound.com/techniques/inside-track-linkin-parks-hunting-party. Accessed 8 October 2024.
- Tingen, Paul (2015). 'Inside Track: Bring Me the Horizon'. *Sound on Sound*. www.soundonsound.com/techniques/inside-track-bring-me-horizon. Accessed 8 October 2024.
- Tingen, Paul (2016). 'Inside Track: Deftones Prayers/Triangles'. *Sound on Sound*. www.soundonsound.com/techniques/inside-track-deftones-prayerstriangles. Accessed 8 October 2024.
- Turner, Dan (2009). 'Outlining the Fundamental Production Aesthetics of Commercial Heavy Metal Music Utilising Systematic Empirical Analysis'. *Art of Record Production Conference*. www.artofrecordproduction.com/aorpjoom/symposiums/21-ar-p-2009/117-turner-2009. Accessed 7 October 2024.
- Turner, Dan (2012). 'Profiling a Metal Mastermind: The Mixing Techniques of Andy Sneap'. MRes thesis, University of Glamorgan.
- Volák, Vojtěch (2022). 'Heaviness: A Key Concept of Metal Music through the Lens of Deleuzian Philosophy'. *Studia de Cultura*, 14(3): 53–62.
- Walser, Robert (1993). *Running with the Devil: Power, Gender, and Madness in Heavy Metal Music*. Hanover, NH: University Press of New England.
- Wicke, Peter (1990). *Rock Music: Culture, Aesthetics, and Sociology*. Cambridge: Cambridge University Press.

- Wicke, Peter (2009). 'The Art of Phonography: Sound, Technology and Music', in *The Ashgate Research Companion to Popular Musicology*, edited by Derek B. Scott (pp. 147–168). Farnham: Ashgate.
- Williams, Duncan (2015). 'Tracking Timbral Changes in Metal Production from 1990 to 2013'. *Metal Music Studies*, 1(1): 39–68.
- Wright, Jeb (2013). 'Producer Tom Allom: From Sabbath to Priest'. *Classic Rock Revisited*. www.classicrockrevisited.com/show_interview.php?id=978. Accessed 8 October 2024.
- Zagorski-Thomas, Simon (2014). *The Musicology of Record Production*. Cambridge: Cambridge University Press.
- Zak, Albin (2001). *The Poetics of Rock: Cutting Tracks, Making Records*. Berkeley, CA: University of California Press.
- Zak, Albin (2009). 'Getting Sounds: The Art of Sound Engineering', in *The Cambridge Companion to Recorded Music*, edited by Nicholas Cook, Eric F. Clarke, Daniel Leech-Wilkinson, and John Rink (pp. 63–76). Cambridge: Cambridge University Press.

Discography

- Behemoth (2018). *I Loved You at Your Darkest*. Nuclear Blast.
- Black Sabbath (1970a). *Black Sabbath*. Vertigo.
- Black Sabbath (1970b). *Paranoid*. Vertigo.
- Black Sabbath (1971). *Master of Reality*. Vertigo.
- Cradle of Filth (2008). 'Tragic Kingdom', on *Godspeed on the Devil's Thunder*. Roadrunner Records.
- Damnation's Hammer (2019). *Unseen Planets, Deadly Spheres*. Massacre Records.
- Deftones (2016). *Gore*. Warner Bros. Records.
- Frostbite Orckings (2023b). *Guardians of Time*. Kontor New Media Music.
- HIMMP (2023). *In Solitude*. Self-released. <https://open.spotify.com/album/23dI8tJo5bSz69dQITEvez?si=QH0yvmxvSauj6X2kl4i4Nw&nd=1>.
- Martin, Ricky (1999). *Living' La Vida Loca*. Columbia.
- Metallica (1991). *Metallica (Black Album)*. Elektra.
- Metallica (2003). *St. Anger*. Elektra.
- Slayer (1986). *Reign in Blood*. Def Jam Recordings.
- Townsend, Devin (2019). *Empath*. Inside Out Music.

Videography

- Has, Sebastian (2018). 'Behemoth ILYAYD Recording & Production Studio Sessions'. *YouTube*. <https://youtu.be/B1s9zgmI0g4>. Accessed 8 October 2024.
- RecordProduction.com (2015). 'Legendary Metal Producer Tom Allom Interview at British Grove Studios'. www.youtube.com/watch?v=7_wKlcb2vyo. Accessed 8 October 2024.

Unpublished Interview Data

- Sneap, Andy (2014). Interview by Mark Mynett. Ripley. 50:06 minutes.

2

THEORETICAL FOUNDATION OF PERCEPTUAL HEAVINESS IN METAL MUSIC

Heaviness is both the namesake and a defining trait of ‘heavy metal’ music, distinguishing it as the only major popular music genre to explicitly include ‘heavy’ in its name. Despite its frequent usage, there is no comprehensive definition of musical heaviness. As Vojtěch Volák aptly notes, most metal music scholars ‘never explain what precisely heaviness means. Rather, they rely only on popular connotations of the word’ (2022: 53). Among the limited academic sources, definitions of what constitutes heaviness in metal vary, but a general consensus suggests that it is a multifaceted metaphor encompassing more than just tonal qualities. Harris M. Berger asserts that ‘any element of the musical sound can be heavy if it evokes power or any of the grimmer emotions’ (1999b: 59), while Mark Mynett describes heaviness as a ‘discursive category that implies a collection of sonic characteristics and performance/compositional approaches’ (2019b: 66). Simon Zagorski-Thomas (2014: 215) highlights that, although multiple musical qualities contribute to a heavy sound in metal, perceptions of heaviness are also shaped by experiences of live performances, band interviews, and album reviews. In extreme death and black metal, visual aspects, such as gory album art and corpse paint (Halnon 2006; Podoshen et al. 2018), further influence a band’s image and potentially affect listeners’ perceptions of the music. Therefore, it seems reasonable to regard both musical and extra-musical extremity and transgression as being integral to the concept of heaviness (Hannan 2018; Kahn-Harris 2007; Smialek 2015).

In a recent article, Jason Miller (2021) addresses the question of what makes heavy metal heavy. He concludes that ‘it is surprisingly difficult, if not impossible, to articulate the concept of musical heaviness’, attributing this difficulty to the stylistic diversity of metal and the ‘radically different, sometimes incompatible, musical properties’ within the genre (2021: 2). According to

Miller, the primary challenge in defining heaviness musically lies in the various, often overlapping or contradictory, conceptions of the phenomenon. He further contends that no fixed set of musical characteristics defines or guarantees a heavy aesthetic (2021: 2–3). However, it could certainly be argued that numerous musical features do contribute to a heavy aesthetic, and Miller's assertions fall short of explaining how and why metal music has become heavier over time. Nor do they provide practical advice for musicians and producers aiming to compose, perform, or produce heavy music.

Michel-Antoine Xhignesse (2024) recently offered a philosophical response to Miller's (2021) discussion of heaviness, suggesting that heaviness in metal is fundamentally linked to 'inaccessibility', a concept rooted in cognitive auditory processing fluency. Rather than isolating specific musical features that contribute to heaviness, which differ across metal subgenres, Xhignesse proposes that the principles behind these features can be identified to explain their effect on heaviness. His perspective is illuminating in multiple ways. First, it supports cross-genre comparisons within metal. For example, he argues that Sleep's *Dopesmoker* (2003), a 63-minute doom metal track, is likely to be perceived as heavier than Slayer's *Reign in Blood* (1986b), as its length and slower tempo present greater cognitive inaccessibility. Here, heaviness is amplified not by adhering to familiar metal conventions but by 'actively undermining some or all of the properties which the target audience takes to be standard for the genre' (Xhignesse 2024: 688), thus promoting a sense of challenge and complexity.

Xhignesse's second argument addresses why older records can lose their perceived heaviness over time. He suggests that while the recorded sounds remain static, listeners' perceptions evolve as they become accustomed to particular sonic textures and compositional techniques, diminishing the initial impact of the music: 'once listeners have become accustomed to the "heaviness" of an era's sound, it will become less attentionally salient, and listeners' responsiveness to it will decrease' (2024: 690). Third, Xhignesse offers a framework for comparing metal's heaviness to that of other genres. Experimental music, atonal music, and improvisational jazz, for example, may evoke heaviness through cognitive disfluency, achieved via techniques such as dissonance, irregular form, and tempo, similar to metal's complexity but diverging in genre-specific ways (Xhignesse 2024: 692–694). However, Xhignesse notes that to be recognized as metal, music must maintain core elements of what Deena Weinstein describes as the genre's 'code' (2000: 6).

Finally, Xhignesse compares metal with literature, suggesting that metal musicians, like authors, rarely aim to create 'unlistenable' work. Instead, they produce music that demands deeper engagement, which, in turn, fosters replayability and long-term appreciation: 'replay value' is intrinsic to metal's appeal, where complexity and unfamiliarity enhance the listener's experience (Xhignesse 2024: 694–695). This reasoning clarifies the positive connotations

of heaviness within the metal community, where musical traits contributing to heaviness also enhance the listening experience and longevity of the record.

This chapter aims to deepen the theoretical understanding of musical heaviness within the metal genre. We begin by examining how sound functions as a sonic metaphor, considering the cognitive mechanisms that shape the experience of heaviness. Next, we identify key sonic and production parameters essential for creating a sense of heaviness. As the engineering of heaviness relies on a material foundation, we then examine the structural and performative elements of metal music that must be recorded to be effectively produced for the listener. This analysis also serves to illuminate distinctions between metal subgenres and to explore related semantic descriptors like ‘brutality’, ‘punch’, and ‘aggression’. Finally, we investigate how music producers and musicians understand and employ the concept of ‘heaviness’ within their discourse.

2.1 Sound Perception through Sonic Metaphors

Most dictionaries define ‘heavy’ as denoting significant weight, degree, or intensity, typically implying substantial physical mass or powerful force. The term also conveys slowness or sluggishness and suggests something that commands seriousness or presents challenges in handling or comprehension. Each of these interpretations aligns well with the larger-than-life aesthetic of metal music, which frequently combines machine-like precision with tightly synchronized rhythms and the impactful resonance of low-pitched instruments.

We will revisit these aspects of heaviness in metal music, but, first, we must consider the relationship between sound and language in human cognition. It is widely accepted that listeners process their musical experiences metaphorically to create meaning (see Walther-Hansen 2020). Several mechanisms underpin this metaphorical construction of meaning (see Zagorski-Thomas 2014: 7–14). From the viewpoint of ecological perception, humans interpret music based on the properties of their physical and cultural surroundings, which provide rich perceptual cues that do not necessarily demand active cognitive processing, as perception relies on ‘invariant properties’ (Gibson 1979: 310–312). These properties shape basic human experiences beyond specific contexts. In instances requiring interpretation, this is achieved through metaphorical transfer. Known as ‘embodied cognition’ (Lakoff and Johnson 1980; Johnson 1987), humans experience their environment through bodily interactions, which play a role in interpreting music, a relatively abstract experience, by connecting it to other sensory domains. Descriptions of sound as hot or cold, soft or hard, sweet, creamy, transparent, or heavy are drawn from visual, olfactory, or tactile experiences. Such ‘cross-domain mapping’ structures ‘our understanding of one domain (which is typically unfamiliar or abstract) in terms of another (which is most often familiar and concrete)’ (Zbikowski 2002: 34). This cognitive mapping allows listeners to connect their musical perceptions to concepts from other areas of experience, making

them accessible through language (Zbikowski 2002: 64). For instance, the flowing quality of legato might evoke the visual experience of a river, while pitches are described as falling or rising, rooted in the physical experience of gravity. Language, then, serves as a direct reference to the physical experiences underlying human perception.

This conception does not imply that semantic descriptors perfectly match the music, as no straightforward relationship exists between sound, language, and mental representation. However, the universally shared foundation of physical experience as the basis of perception narrows the range of possible interpretations. In this way, a semantic description is not entirely subjective, as it is grounded in a common experiential reality. Although sonic metaphors remain open to individual interpretation, many scholars suggest that the perception of sound qualities retains a high level of objectivity, with considerable interpersonal agreement (Théberge 1997: 207–209; Zak 2001: 65; Adlington 2003; Porcello 2004; Walther-Hansen 2020). Regardless of the degree of objectivity, any analytical approach that omits metaphor risks undermining the essence of auditory experience, as the ‘cognitive basis of the words and their learned meanings are largely erased’ (Walther-Hansen 2020: 6–7). Metaphorical language, reflective of cognitive processes, thus holds substantial value for sound analysis by offering valid and personally meaningful interpretations that also reveal the cognitive mechanisms underlying sound perception (Walther-Hansen 2020). It is important to note that metaphorical language is shaped by cultural learning and is propagated through conversations, specialist publications, and discussions in online forums and social media groups among musicians and producers (Walther-Hansen 2020: 2).

Despite acknowledged perceptual differences arising from each listener’s unique experiences, metaphorical perceptions of sound, such as heaviness, generally align with sound’s acoustic properties (Pedersen 2008; Moylan 2007; Corey 2017; Man and Reiss 2015; Porcello 2004). Albin Zak describes ‘spectrographic translations’ (2001: 65), suggesting that perceptions of sounds as ‘dark’, ‘bright’, ‘muffled’, or ‘edgy’ correspond to distinct frequency spectra and temporal qualities. For instance, Brecht de Man and Joshua Reiss (2015) explain that a ‘dark’ sound often lacks high-frequency content, while an ‘edgy’ timbre has pronounced energy in the upper midrange and high frequencies. Similarly, a ‘transparent’ audio mix, where each instrument is easily distinguishable, is a visual analogy applied to auditory clarity. Tactile metaphors such as ‘hard’ are often used for abrupt sounds or textures, while terms like ‘fat’ and ‘powerful’ convey the physical impact of a well-engineered snare drum—a sound shaped by drum size, head type, playing style, microphone selection, placement, and processing. This semantic crossover from sensory experiences to audio engineering extends further, as Paul Théberge (1997: 207) notes: audio ‘gates’ metaphorically represent the opening and closing of a signal path. Similarly, although high-end frequencies are linked with perceived brightness and heaviness (Berger and Fales 2005), sounds

emphasizing low frequencies are often deemed ‘heavy’ (Théberge 1997: 207). Finally, a ‘present’ mix often results from sound-processing choices, including balanced levels, close-miking, dynamic control, and precise equalization (Burgess 2013: 73).

The literature on the conceptual metaphor of ‘heaviness’ in audio and music contexts is notably sparse. In their review of audio engineering manuals, Man and Reiss (2015) identify only a single source that explicitly addresses heaviness, reducing it to a specific technical parameter: the frequency range between 40 and 200 Hz (Gibson 2005: 119). In linguistics, Daria Ryzhova and colleagues analyse the concept of ‘heavy’ across 11 languages, concluding that defining ‘heavy’ is challenging due to its lack of direct reference to the five perceptual senses, although the tactile sense is the most relevant (Ryzhova, Rakhilina, and Kholkina 2019). The term’s associations vary across languages, introducing layers of individual and cultural nuance. In English, ‘heavy’ conveys tactile weight and serves as a metaphorical ‘object’, a notion that aligns with Mads Walther-Hansen’s (2020) interpretation of ‘heavy’ as an ontological metaphor rooted in physicality. Heavy objects imply ‘force’ due to their mass; they are challenging to move and deliver great impact (Walther-Hansen 2020: 106).

Acoustically, ‘heavy sounds’ are often characterized by their sonic spectrum, particularly an emphasis on low frequencies, which reinforces their ‘weight’ (see also Adlington 2003). Additional sonic features that contribute to heaviness include reduced reverberation, a flattened dynamic envelope, high (perceived) loudness, and distortion. Together, these elements create a powerful, energetic quality (Walther-Hansen 2020: 106–107), hallmarks of metal music. Moreover, the perception of heaviness is influenced by the sound source itself; for instance, a distorted guitar is generally perceived as heavier than an oboe, regardless of spectral emphasis (Walther-Hansen 2020: 107). Finally, while ‘heavy’ serves as a relatively distinct semantic descriptor, it shares conceptual space with other sonic metaphors, such as ‘big’, ‘fat’, ‘thick’, and ‘full’, each contributing to the nuanced perception of heaviness (Walther-Hansen 2020).

The overlap of sonic metaphors is logical from a linguistic perspective. Ronald Langacker’s (2002) theory of schematicity and the interconnectedness of lexical items posits that cognitive metaphors for timbres should be conceptualized as an ‘array of interrelated senses’ (2002: 2). Langacker suggests that sound qualities exist within a network of metaphors that associate them with other sensory or experiential dimensions (2002: 106). Applying Langacker’s framework, Stephen Hudson points out that ‘heavy’ intersects with other sonic metaphors, including ‘dark’, ‘hard’, and ‘rough’ (2022: 105–106). Although distinct, Hudson argues that interpretations of heaviness are frequently influenced by one or more of these overlapping metaphors. Drawing inspiration from Walther-Hansen (2020), Hudson relates

these four sonic metaphors to other experiential qualities, such as weight, lowness, force/effort, loudness, and connotations of bad/evil, to create a networked model (Figure 2.1).

According to this model, heaviness most closely aligns with weight, lowness, force/effort, and loudness, each of which evokes the imagined sound of a large or imposing instrument or ensemble. However, these qualities are not unique to heaviness; they overlap with associated metaphors such as hardness, roughness, and darkness, creating a multifaceted and interconnected framework for understanding the perceptual dimensions of sonic weight.

The ambivalent characteristics of heaviness as a metaphor reflect the blurred boundaries among cognitive metaphors. Hudson identifies two primary forms that heaviness can embody: slow, with pronounced sonic weight, and fast, with intense energy. His visual model (Figure 2.2) illustrates that

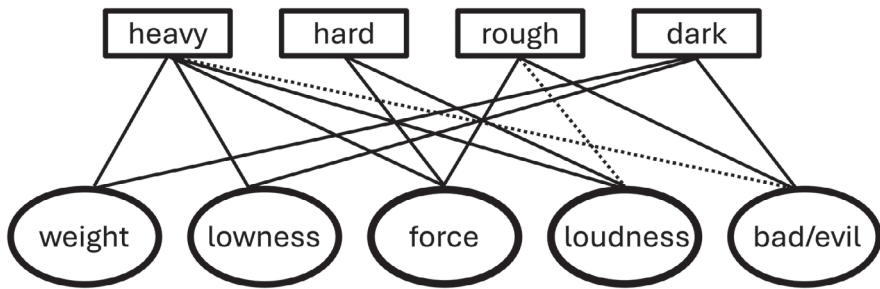


FIGURE 2.1 Cognitive metaphors related to heaviness with their overlapping entailments, modelled after Hudson (2022: 106).

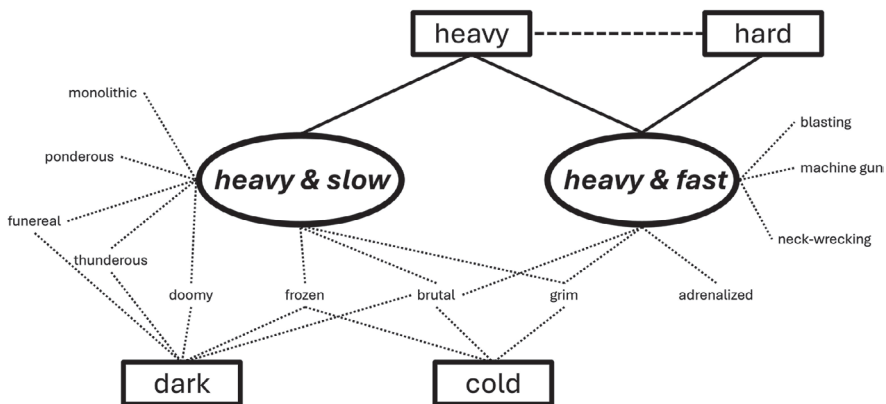


FIGURE 2.2 Network of senses of the cognitive metaphor 'heavy', modelled after Hudson (2022: 107).

heaviness defies a single definition. By using the terms ‘funereal’ and ‘adrenalized’ as contrasting examples, Hudson highlights their opposing meanings. Although both may convey a sense of heaviness, their musical expressions differ considerably. For instance, the dense, dragging tempi of sludgy doom metal evoke a ‘funereal’ heaviness, whereas the fast, forceful attack of thrash metal represents an ‘adrenalized’ form of heaviness.

In general, there is a consensus that ‘heavy’ sounds are cognitively processed as objects of considerable weight. This perception draws on conceptual mappings from the tactile domain and is characterized by a strong emphasis on low frequencies. Additional acoustic traits associated with heaviness include spatial qualities such as proximity, directness, and immediacy, which are achieved through high loudness and a reduced dynamic range. These features give heaviness a sense of ‘force’, evoking metaphors of action or motion (Adlington 2003) and linking it with notions of power and energy.

It is widely recognized that audio engineers develop the skill to mediate between metaphorical language and acoustic reality (Zak 2001; Porcello 2004; Théberge 1997). When a guitarist requests a ‘fatter’ sound, the engineer understands how to interpret this spatial metaphor in terms of timbre, responding by adjusting the frequency spectrum through choices in microphone placement, amplifier settings, guitar selection, or equalization (Porcello 2004: 739). Similarly, if the drum sound is deemed too ‘dry’ or ‘tight’, the experienced engineer might alter the room microphone setup, raise the levels in the mix, or add artificial reverb to address the issue (Porcello 2004: 748). A knowledgeable engineer would likewise interpret ‘punchy’ as relating to dynamic properties, ‘wetness’ as the level of reverb, and ‘spots’ as close-miking techniques (Man and Reiss 2015). Over time, engineers learn how seemingly metaphorical language aligns with specific acoustic characteristics and how to manipulate these to achieve the desired aesthetic.

This alignment between linguistic metaphor and tonal attributes extends to both individual instruments and their spatial arrangement in production. The ‘sound box’ (Figure 2.3) functions as a heuristic model, aiding in the

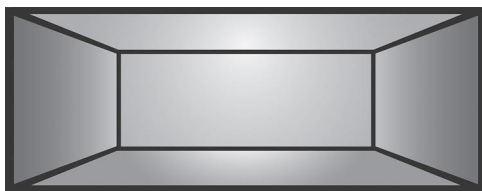


FIGURE 2.3 Empty sound box giving a visual representation of the three-dimensional sonic space in a mix, modelled after Dockwray and Moore (2010: 184).

conceptualization of the positioning of perceived sound sources within the virtual space of a recording:

The sound-box acts as a virtual spatial enclosure within which the location of sound sources can be specified with some precision. Location within the sound-box is metaphorically described at any single moment in three-dimensional space: laterality of the stereo image; perceived proximity to a listener; and the perceived pitch height of sound sources. The changes in that positioning over time create a fourth dimension, that of temporality.

(Moore, Schmidt, and Dockwray 2011: 83–84)

The mixing engineer has the ability to adjust the spatial positioning and perceived size of sound sources and thus plays a central role in defining the production's aesthetic. In this context, the concept of 'functional staging' is noteworthy. As Zagorski-Thomas explains, 'certain forms of technological mediation are applied because they allow some types of recorded music to better fulfil their particular social function' (2010: 252). This concept applies when producers create the impression of a live concert atmosphere in rock records or manipulate the perception of heaviness in metal music. However, Mynett suggests that 'organic staging' (2013: 50) may better capture the spatial qualities in contemporary metal production. The Oxford Dictionary of English (OED n.d.) defines 'organic' as 'having a harmonious relationship between the elements of a whole', and in metal, reducing the depth perspective creates this cohesive relationship. Such an approach aligns metal's dense textures and intense performances with the desired heaviness and clarity, enhancing both its sonic weight and intelligibility in recorded and mixed form.

In discussing spatialization and staging, the concept of hyperreality is especially relevant. Mynett (2019b: 71) and Thomas (2015: 203–207) observe that sonic ideals in metal music have shifted from prioritizing authentic, live-like representations to embracing a hyperreal aesthetic. This shift emphasizes exaggerated, meticulously crafted sound that surpasses natural performance characteristics, aiming for an intensified sonic experience that feels larger and more impactful than traditional live or studio settings could convey. This hyperreal approach aligns with metal's pursuit of an immersive, powerful sound that transcends conventional boundaries of audio fidelity and realism:

During the 1970s and 1980s, productions were often driven by a notion of performance authenticity that focused on staging the band in a large concert hall, and generally without the rhythm guitars at each side of the stereo panorama being doubled up. In contrast, contemporary heavy music production tends to be less concerned with true-to-life performance

environment aesthetics, and more concerned with providing maximum sonic impact, with the kind of exaggerated detail that creates something ‘larger than life’; often referred to as ‘hyper-realism’.

(Mynett 2019b: 71)

Key production techniques for creating a hyperreal aesthetic often involve close-miking instruments to capture the most direct and isolated sound possible, followed by meticulous processing to enhance audio qualities. These techniques incorporate spatial, functional, or organic staging methods, allowing recorded elements to achieve an unnatural clarity and presence that surpass the acoustics of any physical performance space (see Mynett, Wakefield, and Till 2010: 141; Reyes 2008: 226). This approach enables instruments and vocals to be presented with precision and intensity, often unattainable in live or unprocessed settings. Although hyperrealism appears to be a defining feature of contemporary metal production, the concept itself has hardly been explored in music studies. Maurice Windleburn (2021: 403) points out that hyperrealism has rarely been examined in the context of musical composition and sound, indicating a significant gap in the theoretical discourse surrounding this increasingly prominent aesthetic.

Sociologist Jean Baudrillard (1994) sees hyperreality as an increasingly pervasive aspect of modern societies, especially in a digital world. His theory of simulation describes the progressive detachment of representation from reality, organized into three orders of simulacra. Each order successively diminishes the connection to any original, with the third order ultimately yielding copies devoid of an authentic source. In the first order, a simulacrum aims to closely represent reality, retaining a direct reference to the original. The second order, however, brings the copy closer to hyperreality by blurring the distinction between original and reproduction by amplifying specific characteristics for effect. This trajectory is evident in the history of recorded music, which has moved from having a focus on authentic ‘high-fidelity’ reproductions towards idealized versions of performances. Virgil Moorefield describes this shift as a transition from an ‘illusion of reality’ to a ‘reality of illusion’ (2005: xiii). This progression is reflected in metal production techniques from the 1970s and 1980s, which, as Mynett (2019b: 71) describes, began with an effort to preserve the band’s core sound while increasingly enhancing it with electroacoustic devices, creating a polished version that accentuated desired sonic qualities.

In the ultimate third-order simulacrum, a new reality emerges, entirely detached from its original reference. The simulacrum is no longer a mere copy; it has become an independent entity. This new hyperreality amplifies certain aspects of the original and creates an experience that is more ‘intense and involving’ than the source could ever achieve (Kellner 2019). Examples

of this phenomenon include photography and music production, where hyperreal aesthetics evoke fascination and captivate audiences (Bloechl 2005: 136). This engagement is particularly evident in metal music, where hyperreal production techniques align with the genre's ethos of transgression and intensity, offering listeners heightened experiences that sustain their interest.

In metal, hyperreal techniques push the boundaries of not only heaviness but also speed, virtuosity, and sonic impact (Walch 2023). These techniques exemplify what Zagorski-Thomas (2014: 49–69) describes as 'sonic cartoons', which are production strategies that simultaneously introduce hyperreal elements while removing extraneous aspects. By simplifying and schematizing sound, unwanted features like noise or excessive frequency energy are eliminated, while desirable qualities are accentuated. These sonic cartoons highlight the selected elements of the music, enhancing the listener's perception of specific attributes such as heaviness and clarity. Although prevalent across many popular music genres, this practice is particularly pronounced in metal, where sonic cartoons serve to intensify musical expression and elevate core aesthetic values.

2.2 Sonic and Production Parameters of Heaviness

Heaviness in metal music is deeply intertwined with production techniques, yet discussions on how to produce 'heavy' sounds are notably sparse in mixing manuals (Man and Reiss 2015). An exception is James Gibson's (2005) *The Art of Mixing*, which highlights the lower frequency spectrum—specifically between 40 and 200 Hz—as contributing to a sense of heaviness. Academic sources, though limited, offer further insights. Emilio Rizzi (2016) identifies distorted guitar timbre, sonic weight, intelligibility, aggression, and balanced sound as essential components for heaviness in metal production. Similarly, Niall Thomas (2015: 187) points to impact, energy, precision, and extremity as key production elements, while Mark Mynett (2017: 21) expands this list to include sonic weight, size, density, loudness, power, aggression, energy, emotion, and intensity. Many of these attributes are enhanced through harmonic distortion and are conveyed through composition, arrangement, and the recording of both individual and collective performances. Thus, heaviness can be understood as arising from a combination of technology, musical structure, and performance.

Before examining the influence of structural and performative elements, this chapter will analyse heaviness from a sonic and production perspective. This investigation includes the core parameters of heaviness—distortion, sonic weight, clarity, punch, and loudness—as well as the role of production quality and aesthetic considerations in achieving a heavy sound.¹

2.2.1 *Distortion*

The distorted electric guitar is widely regarded by scholars as the defining sound of the metal genre, primarily because of its central role in creating heaviness (Mynett 2016; Herbst 2017b; Walser 1993; Berger and Fales 2005; Kahn-Harris 2007). Berger notes, ‘First and foremost, “heavy” describes distorted guitar timbres’ (Berger 1999b: 58), further asserting that ‘all of the other uses of the term are metaphoric extensions of this primary use’ (Berger and Fales 2005: 182). The pursuit of heaviness has led to substantial developments in guitar sounds within the genre. Studies indicate that advancements in guitar amplification technologies and recording techniques have contributed to the progressively heavier nature of metal music over time (Berger and Fales 2005; Herbst 2017b).

Distortion transforms the guitar from being an impulsive to a sustained instrument, a shift widely recognized as central to the perceptual experience of heaviness (Berger and Fales 2005: 194; Herbst 2018). Harmonic distortion enhances high-frequency energy, expands both the low and high ends of the frequency spectrum, shifts formants, compresses the dynamic range to create an impression of increased loudness, and introduces noise, which all are factors linked to perceptions of heaviness (Herbst 2017b, 2018; Berger and Fales 2005). The expanded frequency spectrum provides a ‘weighty’ low-end and a perceived ‘in-your-face’ aggressiveness through heightened treble frequencies. However, heaviness in metal is also a product of arrangement. The kick drum and bass bolster the low-end, while cymbals contribute high-end presence, power, and rhythmic subdivisions that amplify the music’s ‘energy’ quotient. Fast, precise drumming, prominent bass, and extreme vocal techniques further intensify the heavy aesthetic, illustrating that heaviness results from the collective contributions of all instruments. Additionally, distortion is not limited to guitars; bass guitars are frequently distorted, as are vocals, either through various rough vocal techniques characteristic of metal (Wallach, Berger, and Greene 2011: 11; Wallmark 2018: 68–69) or through audio processing.

In metal music production, harmonic distortion plays a foundational role in achieving the genre’s characteristic heaviness. Many key attributes of heaviness, such as perceived weight, size, density, loudness, power, and aggression, are closely tied to the application of harmonic distortion. Distortion enriches the low-frequency range, compresses the signal to boost perceived loudness, and amplifies high-frequency details, thereby supporting an impression of sonic weight and size while delivering an ‘in your face’ sense of proximity. However, a central challenge with harmonic distortion is that its broadened frequency spectrum heightens the risk of masking, where one instrument or vocal part can obscure another. According to Xhignesse (2024: 685), such masking might create a ‘wall of noise’ effect for listeners unfamiliar with

metal, which intensifies the perceived heaviness through cognitive disfluency. Yet, from an audio engineering standpoint, excessive masking can undermine the clarity of individual instruments and vocals, obscuring performative nuances and detracting from the sonic precision expected in high-quality, commercially viable metal productions.

From an engineering perspective, distortion has complex implications for heaviness in metal music. Interestingly, human hearing itself begins to distort at extreme sound levels, while vocal distortion naturally occurs when the vocal cords are pushed beyond their normal range, often during moments of heightened aggression or intense emotion (Wallmark 2018: 75; Mynett 2019a: 309–310; Walser 1993: 42). As a result, from an early age, distortion becomes associated with loudness, power, aggression, energy, emotion, and intensity, shaping our perception of heaviness regardless of the actual listening level (Mynett 2017: 9).

This association with distortion, however, presents a paradox for heaviness in metal music. As Mynett (2016) argues, distortion is essential for the sonic character of core metal instruments, particularly the guitar and bass and their production. Yet, while it amplifies the intensity and perceived heaviness of the sound, distortion also obscures certain sound aspects, undermining the clarity of tone and rhythmic structures, especially during fast subdivisions. This balance between enhancing heaviness and maintaining clarity poses a challenge in metal production.

2.2.2 Sonic Weight, Size, and Density

Sonic weight plays a central role in the perception of heaviness, though it can be distinguished from heaviness as a broader concept (Walther-Hansen 2020: 105–107). While heaviness in metal music is influenced by both low- and high-frequency energies, sonic weight specifically refers to the low-frequency content and the perceived ‘mass’ of this spectral region. This emphasis on the low-end contributes to a sensation of physical density, making sonic weight an essential subcomponent of heaviness (Walther-Hansen 2020: 105–107; Wallmark 2018: 67; Gibson 2005: 119).

Deena Weinstein (2000: 24) highlights the bass guitar’s essential role in establishing heaviness through its contributions to weight, density, and depth. When the bass joins guitars and drums, especially with the added impact of double-kick drums, the low-frequency spectrum is perceived as large, dense, and powerful (Wallach, Berger, and Greene 2011: 11). However, the tonal characteristics of these instruments, shaped by their construction, amplification, and engineering, are just as important as their mere presence. An effective approach to managing the sonic weight of heaviness is through pitch adjustment (Williams 2015: 52; Wallmark 2018: 70–71). Meshuggah’s ‘I Am Colossus’ (2012), particularly from 0:02 to 0:34, exemplifies this effect,

where palm-muted, down-tuned riffs on an eight-string guitar are reinforced by low-tuned kick drums and toms, along with a down-tuned bass. As Calder Hannan (2018: 443) observes, synchronized low-frequency sounds evoke heaviness by mimicking physical mass. Such frequencies are not only heard but also physically felt, enhancing the weighty impression (Wallmark 2018: 67). This bodily perception can create a sense that sounds are even lower than their actual frequencies, further emphasizing their weighty impression (Mynett 2019b: 74). Miller (2021: 11) adds another dimension to pitch's role in heaviness, suggesting that pitch contrasts, high and low, can enhance heaviness, as demonstrated in Slayer's 'Raining Blood' (1986a).

In metal music, sonic weight is achieved through distinctive performance characteristics that likely set the genre apart from others. As most metal instrumentation is performed live, achieving effective sonic weight relies on specific qualities of the performance itself. Drums, bass, and guitar must be played with a forceful attack; softer approaches cannot create the intense low and high frequencies that convey sonic mass (Mynett 2019b: 68). Amplifying low frequencies alone cannot replicate the density and power derived from 'hard' playing. For instance, during the recordings of Metallica's *Death Magnetic* (2008) and Slipknot's *The Gray Chapter* (2014), drumheads reportedly had to be replaced every three takes due to the intensity of the hits (Massy 2016: 112; McIver 2009a: 375). Tool's *Undertow* (1993) sessions were similar, with heads replaced after nearly every take due to wear and breakage. Consequently, sonic weight reflects both the quantity and quality of low-frequency content, as well as the energy required to produce such substantial frequencies (Mynett 2019b: 75).

A second characteristic of metal music's approach to sonic weight lies in the song's tempo and the resulting speed of rhythmic subdivisions. In contemporary metal productions, low frequencies are most impactful when tightly controlled (Mynett 2019b: 75–76), although there is no universal formula for achieving this. The low-frequency weight of a production is influenced by the band's sound and performance characteristics, as variations in the speed of subdivisions in drums, bass, and guitar affect the available space for low-frequency content and ambience. When low frequencies do not have enough time to decay fully before the next transient, it can lead to a resonance build-up, resulting in a boomy or muddy low-end that obscures high-frequency transient details. Therefore, faster subdivisions necessitate more aggressive control over low frequencies. Achieving balance involves sustaining the energy of the performance through high-frequency clarity while allowing low-frequency weight to contribute to perceived size (Mynett 2017: 14–21).

For example, Godthrymm's 'We Are the Dead (and Dreaming)' (2020) allows for pronounced sonic weight due to the slower intervals between the kick drum, bass, and guitar, which create space for an emphasized low-end. The kick drum here has a prominent low-frequency focus with minimal

high-frequency ‘click’, typically necessary for articulation in faster contexts. Similarly, the bass guitar is emphasized below 100 Hz, with both instruments producing a consistent low-end. In contrast, Thy Art Is Murder’s ‘Welcome to Oblivion’ (2019b) features faster, tightly synchronized performance subdivisions, leaving less space for deep bass frequencies to resonate. Consequently, this production places a greater emphasis on the upper bass region (125–250 Hz) rather than sub-bass and lower bass frequencies (Mynett 2019b: 75–76).

Perceived size is another important element of heaviness that closely aligns with sonic weight. The term ‘heavy’ inherently suggests mass, and heavier objects are often perceived as larger in size or volume (Walther-Hansen 2020). Berger observes that ‘[b]ass guitar timbres are heavy when they give the aural impression of great size’ (1999b: 58). He further suggests that boosting both low and high frequencies with an equalizer enhances the power and tactile punch of a recording, making it feel heavier. By accentuating the spectral extremes, the sound’s perceived size or height expands, rendering it, in effect, ‘larger than life’.

In our physical environment, sound reliably conveys information about the size of its source. Ecological perception suggests that low frequencies typically indicate a large and weighty source, as these frequencies require substantial physical space to resonate. Thus, sounds with a voluminous low-end are instinctively associated with larger dimensions, given that low frequencies are produced by physically large instruments. Metal journalist Joel McIver captures this idea in his review of ‘The Thing That Should Not Be’ from Metallica’s *Master of Puppets* (1986), which he regards as the heaviest track on the album due to its slow, lumbering riff, likened to ‘some huge, wounded beast dragging itself along the sea bed’ (2009a: 144). In his comparison of *Master of Puppets* and Slayer’s *Reign in Blood* (1986b), McIver deems Metallica’s album heavier because of its ‘crushing, intimidating or downright frightening atmosphere’, achieved through sonic weight and an overwhelming sense of size (2009a: 149).

Beyond height, the width of the perceived performance environment also contributes to the sense of size in metal music (Moylan 2007: 176–180). In typical metal mixes, guitars and cymbals are panned widely, and psychoacoustic techniques are sometimes employed to make the stereo image appear even wider than natural stereo imaging permits. This widening not only enhances the sense of size but also increases the perceived proximity to the listener. For example, a drum kit heard from a distance has a narrow spatial impression, which expands in both vertical and horizontal dimensions as one approaches the instrument (Herbst 2014: 86–87) (see Figure 2.4).

Enhanced width and proximity can create a sense of aggression, aligning with Ian Reyes’s (2008: 68–69) argument that closeness in sound heightens its threat potential. Producer Oz Craggs emphasizes that such aggression is achieved when instruments and vocals feel as if they are ‘jumping out of the

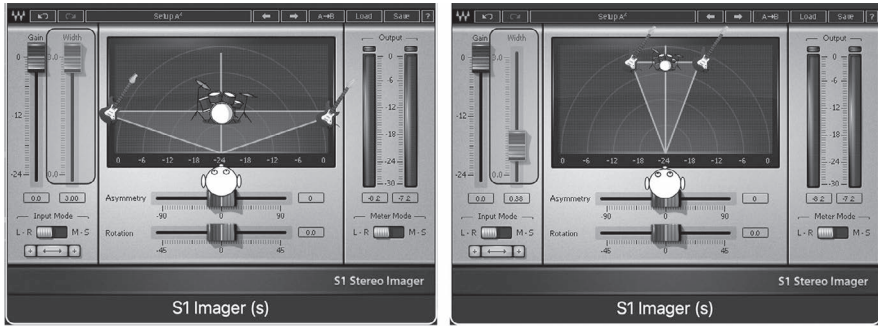


FIGURE 2.4 Visualization of the relationship between proximity and width using Waves' S1 Imager plug-in.

speakers' (Thomas 2015: 190). Coupled with intense high-frequency content, a widened sound source can even 'seem closer than the loudspeaker it emanates from' (Zagorski-Thomas 2012: 141), effectively invading the listener's personal space (Moore 2012: 184–188). This intense proximity, a key feature of hyperreal metal production, results in an aggressive, 'in-your-face' auditory experience.

The perception of size in metal music is influenced not only by the spatial dimensions within the sound box but also by extra-musical elements, such as song titles and lyrics that evoke images of grandeur or enormity (Hannan 2018: 444). Meshuggah's 'massive' sound aligns with titles like 'MonstroCity' (2016) and 'I Am Colossus' (2012), which amplify the impression of scale and weight. Size is also metaphorically conveyed through musical complexity. In his analysis of Meshuggah's 'I Am Colossus' (2012), Hannan argues that the difficulty of understanding the song's structure enlarges the production metaphorically, making it 'bigger than the listener's ability to keep track of it, bigger than what one can wrap one's head around' (2018: 445). This conceptual enlargement, Hannan contends, adds metaphorical heaviness to the music, paralleling the way slow, deep sounds acoustically mimic the characteristics of large, heavy objects.

Density is another key element in the perception of heaviness in metal music. Closely linked to sonic weight and size, density is often achieved by filling out the frequency spectrum, where larger instruments with higher loudness levels and extensive frequency excitation tend to produce denser sounds than smaller instruments. In metal production, density is primarily created in the arrangement and realized in the mix by filling out the frequency spectrum (Walther-Hansen 2020: 100–107). Instruments in the virtual space must be positioned differently on the vertical and horizontal axes, with essential components, such as the kick drum, bass, lead guitar, and vocals, generally occupying the foreground (Mynett 2019b). To fill the available sonic space,

this strategy involves multiplying and layering sounds, especially multiple instances of the rhythm guitar (Herbst 2017b). Arranging instruments and their position in space is made more effective through microphone selection and placement, often using a variety of amplifiers and cabinets, all of which help to provide greater frequency coverage. A ‘fuller range of frequencies creates a sensation of fuller musical space’ (Zagorski-Thomas 2016: 128), contributing to greater density.

2.2.3 *Clarity and Punch*

Metal music production requires careful balancing, as maximizing all sonic parameters does not necessarily lead to a heavy sound; rather, sonic weight and clarity must be skilfully balanced. In a tutorial on death and black metal production, Ron Vento emphasizes that ‘heaviness comes from smart tracking, lowtuned instruments and clarity—not tons of low-end frequencies everywhere’ (2009: 26). In metal, sonic clarity can amplify the energy, intensity, and impact of each element, collectively reinforcing the rhythmic power and drive essential to the genre. Clarity becomes highly relevant for effective heaviness as it highlights the energy embedded in each performative gesture. For a deeper understanding of sonic clarity, it is helpful to consider two components: ‘definition’ and ‘intelligibility’ (Mynett 2017: 19–20). Definition pertains to an individual instrument’s clarity when isolated, while intelligibility refers to the ease with which a particular sound or performance component can be perceived within an ensemble context.

Definition is essential for conveying the distinct characteristics of a single instrument within a performance. For instance, the brief solo drum fill from 3:43 to 3:45 in Lamb of God’s ‘Blacken the Cursed Sun’ (2006) allows each drum sound to be discerned despite the fast subdivisions. If the drums lacked definition due to weak attack transients or excessive resonant sustain, the fill would be difficult for listeners to follow, thereby diminishing both its impact and the drummer’s intended musical intentions.

Intelligibility, distinct from definition, refers to the ease with which a single performance can be perceived within the context of a mix. In Darkthrone’s black metal album *Transilvanian Hunger* (1994), for instance, the fast double-kick drumming across most songs lacks intelligibility, making it difficult to follow (Mynett 2020: 295). By contrast, in the harmonized, tremolo-picked guitar riff from 0:09 to 0:24 in Insomnium’s ‘Valediction’ (2019), fast double-kick subdivisions and tom fills are rhythmically synchronized with the bass. Despite the high sonic density and structural complexity, the individual notes and rhythms of the tremolo-picked riff remain intelligible. This difference in clarity suggests how musical structure and performance qualities determine the level of intelligibility needed. While slower, groove-based performances are more easily understood even with reduced intelligibility,

faster or more intricate subdivisions demand heightened clarity for accurate comprehension. Consequently, artists focused more on sonic weight than on technical complexity may require less emphasis on clarity, whereas those showcasing intricate performances benefit from enhanced intelligibility (Mynett 2020: 299).

Clarity is paramount for effective metal production. Without sufficient definition and intelligibility, complex performances lose their impact, obscuring the music's energy and intensity. Consider the analogy of a photograph: poorly produced metal music is akin to an image that is so blurry and faint that its intended content is difficult to decipher. In contrast, well-defined and intelligible production resembles a crisp, clear image. In an effective metal mix, any sound element that needs to stand out does so (Mynett 2016: 80); however, achieving this clarity often requires hyperreal processing and meticulous spatial staging of instruments and vocals.

Although one might assume that power in metal music derives primarily from sonic weight, the presence and impact of sounds actually depend significantly on upper-midrange and high-frequency transient information. These frequencies contribute much of the energy and excitement in metal productions (Thomas 2015: 193), giving sounds the forceful qualities essential to heaviness (Walther-Hansen 2020: 105–107). Transients, in particular, are particularly important for creating 'punch', a descriptor as ambiguous as heaviness itself. Research on punch is still in its infancy, but it appears that transient energy is a defining factor (Fenton and Lee 2019; Fenton, Lee, and Wakefield 2014). Punchy sounds exhibit a concentrated burst of energy, perceived as a dense, momentary increase in loudness, marked by a sharp rise in power across mid- to high-frequency bands, which accentuates the sound's initial attack phase over its sustain and decay. Even though any instrument in a metal production can have punch, this quality is most often associated with drums, which are processed to achieve a hyperreal impact that enables them to cut through the dense wall of guitars and bass (Herbst and Mynett 2021: 638–640).

Effectively shaping punch in metal requires consideration of the speed of rhythmic subdivisions (Mynett 2019b: 75–76). Large, weighty sound sources occupy substantial sonic space, and if this space is constrained by fast subdivisions, the sonic weight can overwhelm, obscuring the performance's energy and diminishing the clarity of other elements. Consequently, in fast subdivisions, punch often takes precedence over sheer size and weight. An example is the symphonic black metal band Dimmu Borgir's 'The Unveiling' (2018), which demonstrates drums with sharp attacks, fast decays, and a relatively 'thin' sound, particularly for the kick drums, with minimal sonic weight. By contrast, Mastodon's *Once More 'Round the Sun* (2014), a sludge metal album, exemplifies a larger, weightier drum sound, emphasizing size and presence, made feasible by the slower pace that allows more sonic space for these characteristics (Mynett 2016: 79).

The relationship between heaviness and punch is intricate. Although heaviness may generally be more of a timbral quality and punch a temporal characteristic, timbral attributes cannot be fully isolated from the temporal envelope, nor can temporal features exist independently of timbre. The examples of Dimmu Borgir and Mastodon illustrate how punch is intertwined with timbre and the spectral space it occupies within the mix. Similarly, heaviness often relies on punch to achieve its full impact (Walther-Hansen 2020: 105–107). Only in select, predominantly slower subgenres, such as doom or drone, does heaviness operate through sonic weight without depending on punch. An example is Sunn O)))’s album *Pyroclasts* (2019), which features only heavily distorted guitars, bass, and synthesizers with no percussive elements. In this case, the absence of clear attack transients results in minimal punch, yet the dense wall of distortion, exclusively a timbral characteristic, conveys a palpable sense of heaviness.

2.2.4 Loudness and Extremity

High loudness is one of the defining characteristics of metal music and remains among the most immediately recognizable features for listeners outside the genre (Walser 1993; McKinnon 2009; Weinstein 2000). Loudness amplifies other attributes, such as sonic density, particularly when dynamic range compression is applied to compact the frequency spectrum determined by the arrangement (Mynett 2016; Williams 2015; Zagorski-Thomas 2014: 214). Additionally, high loudness contributes to the perception of power and excitement, similar to the experience of live music (Wallach, Berger, and Greene 2011; Williams 2015). To maintain this sense of power and intensity at lower playback levels, the low and high frequencies of individual instruments and the overall mix are often enhanced, making the sound seem louder and more powerful (Wallmark 2018: 70). This approach leverages the non-linear nature of human auditory perception, where low and high frequencies appear disproportionately louder as volume increases (Senior 2011: 62). At lower levels, boosting these frequencies simulates the effect of a loud performance. Gesturally, heightened excitation of a snare drum or guitar string results in increased high-frequency content, while low-frequency energy correlates with sounds produced by high-energy impact (Mynett 2019b: 75). This psychoacoustic phenomenon explains why accentuating high and low frequencies in a mix can enhance the perception of energy, contributing to the impression of an intense performance.

Extremity is a concept frequently invoked in discussions of metal production; however, it does not define specific musical qualities. Instead, it represents an approach to composition, performance, and production that can yield what are perceived as extreme musical characteristics (Turner 2009; Wallmark 2018). Keith Kahn-Harris (2007: 29) notes that while extremity

is pervasive and somewhat ambiguous, it suggests a deliberate transgression of boundaries. In metal production, extremity is embraced as an ideal and is often pursued through unconventional and exaggerated sound-processing techniques (Thomas and King 2019; Turner 2009). Standard practices in audio engineering, characterized by a moderate approach to processing and corrective frequency cuts rather than creative boosts, are largely ignored. Roey Izhaki highlights this departure from convention, noting that in genres like death metal, equalizers are used to introduce substantial boosts rather than subtle cuts, producing a harshness that suits the genre's aggressive aesthetic (2013: 231).

Additionally, extremity in metal is frequently manifested through instrument modification, with drastic down-tuning and the use of seven-, eight-, or nine-string guitars becoming common (Kennedy 2017: 80–83). For instance Rings of Saturn's track 'The Husk' (2019) utilizes a nine-string guitar, while Animals as Leaders' (2009) self-titled debut album features low-tuned guitars or pitch-shifted effects that sometimes take on the role of the bass guitar (Matami 2018). Such extreme approaches to audio processing, instrumental customization, and arrangement are uncommon in most other band-based popular music genres. Although extremity may serve as an end goal in metal production (Turner 2009; Wallmark 2018), it often functions to enhance other core attributes of heaviness such as sonic weight (Williams 2015).

2.2.5 Quantifying the Sonics of Heaviness

Quantifying heaviness is as challenging as defining it, particularly when attempting to distinguish it from related semantic descriptors (see also Miller 2021). Joel McIver (2009a: 149) assesses the relative heaviness of Metallica's *Master of Puppets* (1986) and Slayer's *Reign in Blood* (1986b) based on factors such as tempo, tuning, and atmosphere. Empirical studies exploring this concept are limited, with few employing listening tests or acoustic analysis to attempt a systematic quantification of heaviness. One notable study by Isabella Czedik-Eysenberg and colleagues examines 'hardness', the German semantic equivalent of heaviness (Czedik-Eysenberg, Knauf, and Reuter 2017). In their study, 40 participants listened to 62 ten-second musical excerpts, noting what they deemed essential features of musical hardness. Among these features, high tempo was found to be the most significant, followed by vocal style, absence of melody, loudness, percussive emphasis, and prominent bass frequencies. Additional factors included distortion, noise, and the presence of electric guitar riffs. The researchers then correlated these auditory impressions with computationally extracted acoustic features, revealing core characteristics of musical hardness. Specifically, these included a prominent presence of percussive instruments, a dynamically compressed and spectrally dense signal, emphasized low- and high-frequency content,

and screamed or growled vocals, all of which are attributes closely aligned with the sonic profile of much contemporary metal music. When comparing across genres, the study confirmed expectations: participants rated black and death metal as the ‘hardest’ genres, with other metal subgenres following. Rock music, by contrast, exhibited a statistically significantly lower rating of hardness than any metal subgenre. The only non-metal genre rated relatively high for ‘hardness’ was techno/hardcore, primarily due to its flat dynamic envelope. Although the study’s sample size and scope limit its representativeness, its findings reinforce central sonic criteria for heaviness, aligning closely with common characteristics found in metal music.

Jan-Peter Herbst (2018, 2019) explored how listeners respond to guitar chords with varying distortion levels, finding that increased harmonic complexity and distortion generally lowered perceptual pleasantness. This outcome helps explain the prevalence of tonally neutral power chords (fifth intervals) across most metal genres, as they are perceived as less dissonant under distortion. In contrast, distorted minor chords produce a pronounced sense of dissonance, likely accounting for their limited use, except in subgenres like black metal, where such dissonance aligns with stylistic goals. Additionally, the study revealed that metal fans are less sensitive to the acoustic discomfort caused by high distortion levels, harmonic complexity, and the resultant drop in perceptual pleasantness compared to listeners with little affinity for metal (see also Boddington-Jordan and Herbst 2023; Swallow and Herbst 2022). These findings emphasize how musical preferences shape listeners’ tolerance and perception of sonic qualities like heaviness.

2.2.6 *Lo-Fi Production*

So far, we have outlined the overarching production parameters and sonic principles underlying heaviness in metal music, emphasizing that the band’s unique characteristics, particularly the density and speed of rhythmic subdivisions, should guide the shaping and manipulation of heaviness. Heaviness itself can take on multiple forms (see Miller 2021), with some productions favouring sonic weight and size while others emphasize clarity and proximity. Certain productions achieve clinical precision, whereas others highlight rawness and aggression through live-recording elements. Each metal subgenre tends to prioritize one or two aspects of heaviness, often at the expense of others. For instance, symphonic metal may sacrifice clarity and proximity for enhanced size, while power metal’s hyper-controlled sound can lack aggression. Thrash metal leans into rawness and aggression, emphasizing live, unpolished elements over sonic weight and density. Given metal’s diversity, rigid production rules are impractical (see also Miller 2021).

However, one subgenre notably deviates from mainstream production aesthetics: black metal (see Reyes 2013). As Ross Hagen observes, ‘black metal

is perhaps anomalous in that its sound runs counter to what is considered “heavy” in metal’ (2011: 187). Unlike other subgenres, black metal’s distorted guitars often sound thin and compete with layers of synthesizers and atmospheric sounds, reducing the emphasis on punch. The bass and drums typically lack definition and intelligibility, which limits their contribution to heaviness in the previously defined sense. Additionally, high-pitched, raspy vocals are blurred to enhance atmosphere over impact, as heard in Cold-World’s ‘Hymn to Eternal Frost’ (2008). According to Hagen, ‘the idea of “heaviness” in black metal has become somewhat divorced from its associations with low frequencies and has instead become associated with harshness and timbral density’ (2011: 187).

Reyes (2008, 2013) and Walch (2023: 248–280) interpret black metal’s distinctive production aesthetic as a fundamentalist reaction to a perceived crisis of heaviness that emerged in the 1990s. At that time, death metal had solidified its status as the heaviest metal subgenre, largely due to its extensive use of technological mediation. Digital tools such as drum sample reinforcement, programming, and editing/quantization practices were widely employed to achieve a precise, hyperrealistic sound (Walch 2023: 248–280). However, this increasingly hyperreal production style was often criticized by black metal purists as being overly polished and ‘overproduced’, which they felt detracted from the raw intensity of the music. For some in the metal community, death metal had come to rely on a rigid formula, epitomized by the productions of Scott Burns at Morrisound Studio in Tampa (Purcell 2003: 18; Matera 2020; Hillier 2020b). His work with Florida death metal bands like Cannibal Corpse, Death, Deicide, Morbid Angel, and Obituary became synonymous with a high-tech, hyper-precise sound featuring pronounced low-end presence and intensely close, ‘in-your-face’ vocals (Reyes 2013: 251).

First-generation black metal artists perceived American death metal as having ‘exhausted the possibilities for heaviness’ (Reyes 2013: 242), reaching an extreme that, paradoxically, limited further exploration. For these artists, the American style of death metal had hit a maximum threshold of heaviness, leaving little room for further intensification within the genre’s prevailing aesthetic framework. Consequently, they opted to ‘retreat to less heavy terrain’ in order to redefine heaviness on their own terms (Reyes 2013: 242). Inspired by Venom’s early releases, *Welcome to Hell* (1981a) and *Black Metal* (1982), black metal pioneers adopted an amateur, analogue-based lo-fi aesthetic that embraced rawness, sonic imperfection, and intentional decay (Russo 2014: 95–96). Rather than expanding the established qualities of heaviness, these artists pursued a distinctly anti-standard approach. In doing so, they knowingly decreased processing fluency and accessibility, even for established metal audiences, creating an aesthetic that was raw and intentionally abrasive (Xhignesse 2024: 690–691, 694).

Reyes (2013: 250) highlights Bathory's early productions, such as *Bathory* (1984), *The Return . . .* (1985), and *Under the Sign of the Black Mark* (1987), as emblematic of black metal's transgressive lo-fi aesthetic. Bathory reportedly avoided the hyperrealistic drum sound typical of death metal by using a single-room microphone and applying a limiter, which resulted in a percussive quality likened to 'beating on cardboard boxes' (Reyes 2008: 227). In fact, legend suggests that in lieu of a second bass drum or double-kick pedal, Bathory occasionally used actual cardboard boxes to simulate the kick drum sound (Reyes 2008: 227). The guitars and bass were recorded with low-cost practice amplifiers and entry-level instruments that lacked low-end response. These budgetary limitations were not disguised but rather embraced, as Bathory deliberately avoided extensive takes, overdubs, and editing—practices that might have refined the performances to a more polished standard. Similar to Venom, a proto-black metal influence, Bathory's raw sound reflected minimal production time, typically just two or three days per album (Reyes 2008: 225), in stark contrast to the weeks-long production schedules at Morrisound for death metal releases, where high performance and production standards were prioritized.

This lo-fi aesthetic did not resonate broadly with all extreme metal fans, marking black metal's divergence from death metal and establishing a deliberate distinction that many black metal artists sought. Nevertheless, not all black metal bands adhered strictly to lo-fi production. Later generations introduced varying degrees of fidelity, with bands like Dimmu Borgir, Behemoth, and Cradle of Filth adopting symphonic elements and hi-fi production conventions. Many contemporary black metal bands have shifted to a 'mid-fi' sound, an aesthetic described by Méi-Ra St-Laurent (2019: 284) as combining the 'harsh and boomy' elements of lo-fi with selected hi-fi features, such as defined attack transients and clearer instrument separation. As St-Laurent (2019: 285) notes, the straightforward association of lo-fi with authenticity and of hi-fi with inauthenticity is no longer universally applicable within black metal as bands develop and expand their definitions of authenticity. However, the subgenre largely continues to view excessively polished production as inauthentic, ensuring that most black metal productions remain distinct from the mainstream standards of other metal genres.

Setting aside black metal bands with commercial production values, it remains challenging to ascertain whether black metal inherently lacks heaviness or if heaviness simply manifests in an alternative form. For those unacquainted with metal music, black metal's raw and abrasive sound might actually appear more shocking than that of death metal (Czedik-Eysenberg, Knauf, and Reuter 2017). Even some extreme metal fans find black metal's heightened disfluency (Xhignesse 2024) challenging to appreciate, as it pushes sonic boundaries further than death metal (Reyes 2013: 248). In his

analysis of the language used in metal album reviews, Eric Smialek (2015: 120–121) finds that death metal is frequently described with terms like ‘brutal’, ‘technical’, and ‘heavy’, descriptors that are less common in reviews of black metal albums. Instead, black metal is often perceived as ‘dark’ and ‘atmospheric’. This notable distinction suggests that lo-fi black metal productions seldom aim to achieve heaviness as conventionally defined, nor are they perceived as such. Rather, the lo-fi black metal aesthetic is often characterized as harsh, abrasive, aggressive, and grim, qualities that, while being associated with an intense or raw sound, generally lack the combined elements of sonic weight, size, and clarity typically required to produce a traditional sense of heaviness.

Ultimately, the perception of heaviness is subjective and varies widely among listeners. Consequently, as this book progresses, lo-fi metal production will be considered an exception to the conventions of heaviness discussed thus far.

2.3 Structural and Performative Features of Heaviness

In its 50-year history, metal has diversified into a complex array of subgenres, making the early binary classification of ‘lite metal’ versus ‘speed/thrash metal’ (Weinstein 2000) inadequate to capture its current variety. Today, metal encompasses styles such as heavy metal, power metal, thrash metal, death metal, nu metal, industrial metal, progressive metal, black metal, symphonic metal, metalcore, grindcore, and post-metal (see, e.g. Wiederhorn and Turman 2013). Hybrid genres have also developed, such as progressive death metal and symphonic black metal (Hillier 2020a), further complicating the classification. Some albums, and even individual songs, often blend multiple styles, reflecting the genre’s stylistic fluidity.

Although it may be assumed that extreme metal is inherently heavier than mainstream metal, mainstream metal can also achieve heaviness by emphasizing particular structural and sonic characteristics. For instance, the power metal band DragonForce’s ‘The Game’ (2014) maintains the high-speed execution typically associated with extreme metal, but it prioritizes sonic clarity over weight. This contrasts with the weight-centred production of the death-doom metal band Asphyx’s ‘Molten Black Earth’ (2020), which foregrounds low-end density and sonic weight rather than clarity.

Instead of conducting a comprehensive stylistic analysis, the following deliberations will focus on the structural and performative features that influence the perception of heaviness. These elements, grouped into the categories of speed, rhythm, harmony, and vocals, enable us to explore the core characteristics of some major subgenres without examining each in exhaustive detail.

2.3.1 *Tempo*

The pursuit of heaviness in metal has led various subgenres to experiment with extremes of tempo, ranging from very slow to very fast, as well as with contrasting combinations of different tempi and rhythmic feels. Many metal songs incorporate slower sections to provide contrast with the generally fast tempo. These slower parts can appear as brief transitions or as extended, designated breakdowns, a feature that gained popularity with the rise of death metal, where breakdowns were crafted as mosh parts (Pillsbury 2006: 10; Berger 1999b: 64). Lewis Kennedy (2017: 88–89) categorizes three types of ‘slow and heavy riffs’: the slowdown, slam, and breakdown, with the latter serving as an umbrella term.

The slowdown, characteristic of early American death metal, involves a sudden reduction in tempo and a shift from palm-muted to open-picking patterns on the guitar, as heard in Cannibal Corpse’s ‘Hammer Smashed Face’ (1993) during the section from 0:46 to 1:17. Breakdowns, while similar to slowdowns, often feature a half-time drumbeat (see Garza 2021), where cymbals emphasize a new, slower pulse, and the kick drum aligns with the bass and guitar rhythm. The guitar riffs in breakdowns tend to be more complex than those in slowdowns, as exemplified in Oceano’s ‘The Taken’ (2015) from 0:50 to 1:20. Slams, by contrast, may retain the song’s original tempo and are defined by chromatic, palm-muted chord progressions, as in Katalepsy’s ‘Lurking in the Depth’ (2013) from 0:52 to 1:08.

Breakdown sections amplify the perception of heaviness by emphasizing low frequencies and creating a sluggish rhythmic feel produced by drums and palm-muted guitars (Smialek 2015: 230). The slower, weighty gestures are often metaphorically perceived as added heaviness (Walther-Hansen 2020: 105–107). Although it is difficult to determine objectively whether a breakdown is heavier than other sections, some studies suggest that breakdowns function as the song’s emotional peak (Gamble 2019: 344; Smialek 2023: 290–292). The shift from ultra-fast to very slow, and back again, seems to reinforce the sense of heaviness (Herbst and Mynett 2023a). This contrast moves from complex, high-tempo performances to a more timbrally focused sound, transitioning from clarity to sonic weight (Pieslak 2008: 46), which is why breakdowns have such a powerful effect.

The breakdown in metal music can be seen as analogous to the drop in electronic dance music (EDM), as both manipulate listeners’ emotional experiences through contrast. Ragnhild Torvanger Solberg (2014) describes how, in EDM, the build-up phase removes bass and kick elements, narrowing the frequency spectrum and creating an ‘uplifter’ effect—an upward movement that builds tension. This anticipation then resolves with the drop, where bass and kick return, expanding the frequency spectrum to emphasize groove and sonic weight and producing a sensation of downward motion. In metal, breakdowns

typically occur without the preparatory build-up phase seen in EDM; instead, they contrast with the preceding fast sections. However, the effect is similar: a sudden focus on rhythm and lower-register instrumentation releases the tension built by fast subdivisions, which facilitates larger physical responses, particularly in the form of mosh pit activity. To sustain a sense of heaviness throughout a song, tempo and rhythmic shifts, along with production techniques that toggle between clarity and sonic weight, may enhance various forms of heaviness. This approach aligns with Miller's (2021: 7) argument that heaviness can manifest through both high speed and intensity, as well as through slowness, stasis, and resistance, each providing a distinct form of heaviness.

Certain subgenres, like doom metal, tend to stay within a limited range of slow tempi and rarely change the feel abruptly. Instead, they rely on gradual, grinding intensity to convey heaviness. This genre emphasizes slow subdivisions; low-tuned instruments; and pronounced, often fuzzy or grainy distortion, which contributes to its sonic weight and density. In contrast to the rhythmic complexity found in many other metal genres, doom metal simplifies its structures, with guitars frequently sustaining power chords rather than executing fast, palm-muted single-note riffs. Electric Wizard's 'Funeralopolis' (2000) exemplifies this heavy, unyielding approach, embodying a slow, grinding form of heaviness. Perhaps more than any other major subgenre, doom metal focuses on a dense wall of guitar distortion.

Historically, the pursuit of heaviness in metal music has concentrated predominantly on increasing tempo rather than exploring slowness, although the latter has gained attention in recent years. Early hard rock and heavy metal bands experimented with fast tempi, as seen in Deep Purple's 'Speed King' (1970), Motörhead's 'Overkill' (1979), Venom's 'Witching Hour' (1981b), and Accept's 'Fast as a Shark' (1982). Abaddon (Tony Bray) of Venom is sometimes credited with popularizing the double-speed snare drum pattern in 'Witching Hour', which became foundational to thrash and extreme metal, setting a precedent for equating faster with better—or heavier—in metal (McIver 2009a: 51–52). Thrash and speed metal bands in both the United States and Europe adopted this approach, pushing the boundaries of speed as a primary means to intensify heaviness (see Herbst and Mynett 2023b). Slayer vocalist Tom Araya noted:

The heaviness wasn't there until we came around—the same with Metallica, Anthrax, Exodus, and us. I think we've had a big impact on the sound. We took music and made it really heavy and I think it's affected a lot of music from then on.

(Brown 2009: 68)

What Araya refers to is the competitive pursuit of speed as the primary mechanism for achieving heaviness as highlighted in the biographies of Metallica (McIver 2009a) and Slayer (McIver 2009b). Concert promoter Ron Quintana described the US thrash metal scene of the mid-1980s as follows:

Fans wanted them [Metallica] to do *Kill 'Em All* (1983) 20 per cent faster on the second album [*Ride the Lightning* (1984)]. These fans were into the newer, faster bands. In the Bay Area, many bands were still going for speed, speed, speed.

(Wiederhorn 2020)

A benchmark was Slayer's 'Necrophobic' (1986b) from *Reign in Blood*, clocking in at 248 bpm, a tempo that has since been exceeded in various extreme metal subgenres. Keith Kahn-Harris (2007: 32) states that contemporary metal often ranges between 150 and 250 bpm, with some extreme metal surpassing even 350 bpm (Berry and Gianni 2004: 85). High tempi appear essential for many extreme metal bands seeking to make their music heavier by rendering it less accessible (Xhignesse 2024). However, the perception of speed relies not just on tempo but also on rhythmic subdivisions. For example Accept's 'Fast as a Shark' (1982) at 280 bpm with eighth-note double kicks is likely perceived as slower than Kreator's 'Pleasure to Kill' (1986) at 200 bpm with sixteenth-note subdivisions, demonstrating that perceived speed is as much about rhythmic subdivisions as it is about tempo.

In relation to heaviness, Berger argues that 'experimentations with extremes of tempo was [*sic!*] part of the quest for heaviness, and both slow dirges and frantic grindcore numbers can be heavy if performed well' (1999b: 59). This sentiment aligns with Czedik-Eysenberg and colleagues' empirical study on musical 'hardness', which shows the impact of subdivision speed, noting that one of the most significant factors in their listening test was a higher number of rhythmic onsets, indicative of rhythmic density (Czedik-Eysenberg, Knauf, and Reuter 2017). Whether through fast or slow tempi, pushing the limits of speed has been central to the changing concept of heaviness in metal music. This exploration of extremes began with pioneering bands like Black Sabbath, who explored slow, dirge-like compositions, and Motörhead, who emphasized speed. These early experiments laid the groundwork for later extreme metal, where musicians discovered that manipulating tempo, by either accelerating or decelerating their favourite records, could amplify the perceived heaviness of their music. Such experimentation provided a foundation for more extreme and intense expressions of heaviness, as discussed by Walch (2023: 54–83).

2.3.2 Rhythm

The drumbeat is highly important for the perception of speed, with the snare drum and cymbal subdivisions setting the rhythmic feel. In a 4/4 time signature, the snare's placement on beats two and four establishes a standard feel while emphasizing beat three creates a half-time feel, and accenting each offbeat produces a double-time feel (see also Garza 2021). The kick drum, meanwhile, is given a degree of autonomy from the snare, allowing it to create fast bursts—even at slower tempi—through double-kick pedals or separate

kick drums. This technique, as illustrated in the breakdowns of Lorna Shore’s ‘To the Hellfire’ (2021), integrates the kick drum as a pivotal groove element and makes it an expressive instrument that enhances the ensemble sound (Herbst and Mynett 2023a). Drum performances across subgenres generally encompass complex rhythmic patterns formed by varied interlocking subdivisions rather than continuous, pulse-straight subdivisions.

The double-kick technique originated in 1930s’ jazz and later made its way into rock, with bands like Cream, The Who, and Rush incorporating it by the 1960s (Nyman 2013). In the late 1970s, Motörhead’s Phil Taylor advanced the technique, which became foundational for speed and thrash metal in the 1980s, ultimately cementing its role in metal (Cope 2010: 99). This era also led to the development of the blast beat, a hallmark of death metal and extreme metal genres from the late 1980s onward (Walch 2023: 86), establishing double-kick playing as a stylistic norm in metal. Today, double-kick playing is not only common but expected as well, as Hannes Grossmann of Necrophagist and Hate Eternal notes in his extreme metal drumming guide:

Double-bass drumming is, without a doubt, one of the most frequently used concepts in extreme metal music. Therefore, being able to play double-bass patterns diversely and to fully control both feet are the most crucial things an extreme metal drummer has to master.

(Grossmann 2013: 8)

Grossmann focuses on extreme metal; yet double-kick playing is now essential across nearly all metal subgenres. Its usage varies by subgenre and individual drumming style; in some cases, the double kick provides short bursts for emphasis, while in others, it establishes a continuous low-end layer for other instruments to play over.

There are three primary double-kick patterns, distinguished by snare placement: on the backbeats, on all downbeats, or on all upbeats (Figure 2.5).

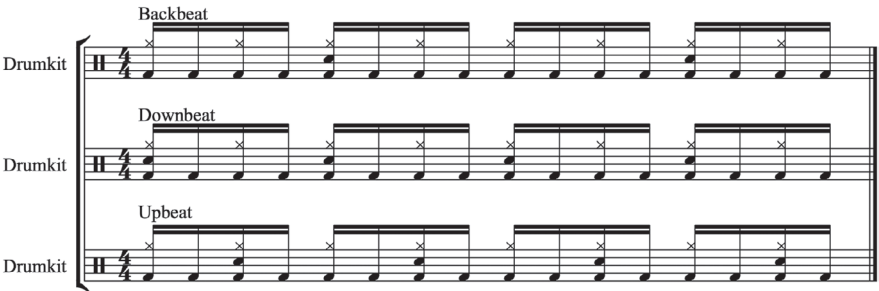


FIGURE 2.5 Standard double-kick drum patterns.

The backbeat pattern, which Grossmann describes as having a ‘heavier’ feel, generally creates a slower, more grounded impression (Grossmann 2013: 8). Each of these patterns imparts a distinct rhythmic feel that can influence the overall heaviness and energy of the performance.

In extreme metal, several rhythmic conventions convey acceleration, speed, aggression, and heaviness, with the blast beat being particularly significant (Grossmann 2013: 2; Phillipov 2012: 86). The blast beat is characterized by exceptionally fast snare hits that, due to their quick pace, generally do not serve their usual function of accentuating the backbeat, downbeat, or upbeat (Pillsbury 2006: 202). Hagen describes the blast beat as one of the most distinctive rhythmic elements in black metal, likening its sound to a ‘prolonged burst of machine-gun fire’ and a ‘sort of sonic blast’ (2011: 186).

The use of blast beats varies by subgenre within extreme metal. In death metal, they often align with the rhythmic subdivisions of other instruments, enhancing the overall sense of speed without directly mirroring each instrument’s phrasing. In black metal, however, blast beats typically play at faster subdivisions than other instruments, which tend to favour chordal progressions over riffs (Boddington-Jordan and Herbst 2023). Consequently, the rhythmic subdivisions in death metal foster a unified perception of speed, whereas the disparity between drum and instrumental subdivisions in black metal creates a more atmospheric, rather than strictly rhythmic, effect. This difference illustrates the blast beat’s versatility across extreme metal genres, which serves as both a rhythmic anchor and a tool for creating immersive sonic textures.

The blast beat’s origins can be traced back to the ‘skank beat’, a foundational rhythm in thrash metal played at double time for an intensified effect. Early thrash bands, such as Slayer, Metallica, Exodus, Testament, and Kreator, along with certain extreme metal bands like At the Gates, were among the first to incorporate the blast beat as a double-time variation of the skank beat (Figure 2.6). At the Gates’ ‘Slaughter of the Soul’ (1995) exemplifies this style and provided a rhythmic template that has since been expanded upon within extreme metal genres.

There is ongoing debate regarding the earliest recorded blast beat. Michelle Phillipov (2012: 86) suggests D.R.I.’s *Dirty Rotten EP* (1983), S.O.D.’s *Speak English or Die* (1985), and Sepultura’s *Morbid Visions* (1986) as early



FIGURE 2.6 From skank to blast beat.

examples, while Grossmann (2013: 18) points to Morbid Angel's debut album *Altars of Madness* (1989) and Terrorizer's *World Downfall* (1989) as key recordings. Metal drummer Derek Roddy (2007: 10) emphasizes Pete Sandoval's role on these 1989 Morbid Angel and Terrorizer albums, noting that while Sandoval may not have been the first to record a blast beat, he was the first to execute it consistently in time with a metrical grid. Sandoval's precision established a new level of rhythmic structure in blast beat drumming, influencing subsequent generations of extreme metal drummers and solidifying the blast beat as a core rhythmic element within the genre (Walch 2023: 116–120).

In the early days of extreme metal, blast beats primarily served to inject noise and a sense of frantic energy into the music rather than providing a groove-based rhythm (Grossmann 2013: 17; Roddy 2007: 10). However, over time, different conceptual approaches to blast beats emerged, reflecting various ways in which drums interact with the broader arrangement. According to Eyal Levi (2014), these approaches vary in their relationship with the guitar and bass rather than in the drumming techniques themselves.

The first approach is the 'groove approach', as heard in bands like Thy Art Is Murder. In 'Make America Hate Again' (2019a), the blast beat between 0:28 and 0:46 serves as a rhythmic counterpoint to the guitar riff, building tension before resolving into a more standard double-kick rhythm while the guitar riff remains constant. The second approach, 'technical riff outlining', is employed by bands like Black Dahlia Murder and Necrophagist. In Black Dahlia Murder's 'Everything Went Black' (2007), from 0:22 to 0:30, the blast beat mirrors and accentuates the technical single-note guitar lines, enhancing their complexity. The third approach is the 'wall of sound', commonly used in symphonic black metal by bands such as Dimmu Borgir. In 'Kings of the Carnival Creation' (2001), between 1:02 and 1:18, the blast beat's high speed creates a dense sonic texture that complements the otherwise sparse guitar lines, which rely on tremolo picking on the higher strings. Each approach contributes to a perception of heaviness by adding rhythmic and sonic density, supporting or complementing the guitar riff, creating contrast through alternating blast beats and regular double-kick patterns, and establishing tension and release within the song's structure, all of which contribute to heaviness.

In addition to the groove concepts related to the arrangement, several specific blast beat styles exist, one of which is the 'hammer blast' or 'Suffo blast' (Figure 2.7), named after the New York death metal pioneers Suffocation.



FIGURE 2.7 Hammer blast beat.

This style produces a raw and ‘brutal death metal sound’ (Grossmann 2013: 18), as exemplified in Suffocation’s ‘Liege of Inveracity’ (1991).

When the hammer blast is executed with a double-time kick pattern (Figure 2.8), it becomes what is commonly referred to as a ‘bomb blast’ (Grossmann 2013: 19) or ‘Cryptopsy blast’ (Levi 2014). This variation is emblematic of Cannibal Corpse’s style, often incorporating a triplet subdivision, as demonstrated in ‘The Strangulation Chair’ (2012). In contrast, the binary (non-triplet) version of this blast beat can be observed in Cryptopsy’s ‘Graves of the Fathers’ (1996). Both blast beat variations serve to intensify rhythmic density and aggression and enhance the sense of extremity and heaviness in the music through fast, tightly aligned double-kick bursts.

The bomb blast played with the snare accentuating every sixteenth note along with the kick drum is referred to as a ‘gravity blast’. This technique is a hallmark of bands like Origin, Beneath the Massacre, and Defeated Sanity (Grossmann 2013: 20). More recently, however, the blast beat has developed to incorporate more subtle dynamics (Figure 2.9). Instead of maintaining a constant, maximum volume, it now often includes ghost notes on the less accentuated subdivisions, adding a nuanced rhythmic texture (Grossmann 2013: 20–21). A notable example of this refined blast beat approach can be heard in ‘Osiris’ (2010) by the black metal band Dark Fortress. This shift adds dynamic variation, allowing for a more complex and textured percussive sound that enhances both aggression and rhythmic interest within the genre.

The regular blast beat (Figure 2.6), often referred to as the ‘Euro blast’ (Philipov 2012: 86; Levi 2014), has historically been more prevalent in European metal. In contrast, the hammer and bomb blast patterns are more commonly associated with American death metal, also known as ‘brutal’ death metal (Smialek 2015: 120). Like heaviness, brutality lacks a precise musical definition and typically characterizes bands considered heavy. In the context of death metal, brutality appears to be conveyed through raw, aggressive drum articulation, where each drum instrument frequently emphasizes consistent



FIGURE 2.8 Bomb blast beat.



FIGURE 2.9 Blast beat with ghost notes.

subdivisions, often aligning downbeats and upbeats across an eighth-note grid.

As shown in previous examples, these drum patterns are contextually related to guitar riffs and often mirror their structure (Mynett 2019a: 299). To maximize rhythmic and sonic impact, the kick drum generally aligns with the subdivisions of both the guitar and bass. This tight ensemble synchronization amplifies attack transients and low-frequency energy, reinforcing the weight and punch of the harmonic instruments. Such synchronization is essential for achieving perceived heaviness, as precise alignment between the drum, guitar, and bass parts adds texture, density, and punch to the music (Fenton and Lee 2019). A clear example can be found in Machine Head's 'Imperium' (2003). In the section from 1:12 to 1:25, the precise synchronization of all instruments produces maximum impact, marked by high spectral density and meticulously aligned rhythmic accents (Figure 2.10).

On the other hand, ensemble synchronization that falls short of the necessary precision can result in a chaotic and less intelligible sound, impacting the overall production. In addition to complicating the listener's ability to grasp the intricacies of the music's structure, an imprecise ensemble performance tends to be perceived as subjectively lighter or less heavy compared to a production marked by tight synchronization (Mynett 2019a, 2020).

While precise rhythmic subdivisions can enhance the perception of heaviness, rhythmic complexity and difficulty can also contribute to it. In his analysis of 'I Am Colossus' (2012) by Meshuggah and of 'Prancer' (2013) by The

♩ = 120

The musical score for Machine Head's 'Imperium' (2003) is presented in five staves. The top staff is for Electric Guitar, followed by Electric Guitar [Tab], Electric Bass, Electric Bass [Tab], and Drumkit at the bottom. The key signature is two sharps (F# and C#), and the time signature is 4/4. The tempo is marked as 120 beats per minute. The Electric Guitar and Electric Bass parts feature a complex, syncopated eighth-note pattern. The Electric Guitar [Tab] and Electric Bass [Tab] parts show the corresponding fret numbers (0-0-0-0) for each note. The Drumkit part features a complex, syncopated pattern with many eighth notes and rests, mirroring the complexity of the guitar and bass parts.

FIGURE 2.10 Section of Machine Head's 'Imperium' (2003).

Dillinger Escape Plan, Hannan notes that the rhythmic complexity in these pieces adds to their heaviness:

While rhythmic difficulty is neither necessary nor sufficient for heaviness, it can effectively contribute to it in a variety of ways: by allowing an opportunity for a band to showcase their precise playing and inspire awe; and by being perceptually unwieldy, awkward and uncomfortable, rhythmically difficulty structures mimic common attributes of heavy physical objects. By innovating in their use of rhythm, bands claim transgressive subcultural capital and their music becomes serious and therefore heavy.

(Hannan 2018: 455)

Hannan's observations imply that the perception of heaviness is partially associative and can be shaped by musical structures, performance attributes, and the listener's ability to appreciate them.

Even though ensemble rhythmic synchronization plays a critical role, it is especially central to extreme metal compared to traditional heavy metal. This distinction arises because rhythm takes precedence over melody and harmony in extreme metal (Mynett 2019a: 300–301). Even bands that do not prioritize high-speed performance often focus intensively on rhythm. Historically, faster tempi and subdivisions in metal have driven guitarists to shift from power chords to fast single-note lines (Moore 2001: 148–149), emphasizing the 'rhythmic potential of repeated pitches' (Pillsbury 2006: 129). Playing a single pitch allows for faster subdivisions, typically performed in the lower registers of the guitar with palm-muting.

In palm-muting, the guitarist places the side of the picking hand over the bridge end of the strings, reducing sustain and enhancing rhythmic definition (Herbst 2017c). This technique produces a weightier and heavier sound (Smialek 2015: 94; Herbst 2017a) and alters both the sonic texture and rhythmic feel. Furthermore, alternating between open and palm-muted picking introduces contrast, which contributes to the perceived heaviness (see also Herbst and Mynett 2023a). This approach is particularly impactful when accentuation varies across riff sections, such as when switching between palm-muted and open-picking styles, as demonstrated from 6:20 to 7:06 in Gojira's 'Flying Whales' (2005).

2.3.3 Harmony

In the history of metal music, dissonance is a well-established compositional technique (Swallow and Herbst 2022; Boddington-Jordan and Herbst 2023). The tritone, sometimes referred to as the devil's interval (Brown et al. 2016: 31), has featured prominently since Black Sabbath's eponymous track from their debut album *Black Sabbath* (1970) was released. Darker, more

dissonant modes, such as Phrygian and Locrian (Walser 1993: 46; Kahn-Harris 2007: 31), are staples in extreme and progressive metal subgenres but appear less frequently in traditional heavy metal, power metal, and metalcore (Boddington-Jordan and Herbst 2023). These modes undoubtedly shape the music's atmosphere, but it is less certain whether they directly influence the perception of heaviness.

Nonetheless, some research suggests that harmony impacts the experience of heaviness. Berger (1999b: 63) posits that atonality can convey heaviness by challenging listeners' tonal expectations. Departing from minor tonality and opting for a more ambiguous tonal centre may thus be seen as intensifying heaviness (Berger 1999b: 58). Additionally, a lack of distinct, repetitive sections can make structures less predictable and catchy, potentially contributing to a heavier aesthetic. This idea aligns with Hannan's (2018) suggestion that rhythmic and structural complexity, along with reduced 'catchiness', may enhance heaviness. Carcass's 'Symposium of Sickness' (1991) exemplifies this phenomenon, with its numerous, less-repetitive sections that contribute to a heavy aesthetic. The perspectives of Berger and Hannan resonate with Xhignesse's (2024) theory that atonality and defied expectations decrease accessibility, thereby intensifying the listener's cognitive effort and reinforcing the perception of heaviness.

Black metal is one of the few metal subgenres that regularly integrate full chords alongside single-note lines and power chords. While distorted major chords retain some degree of consonance, distorted minor chords contribute to black metal's intended dissonant and abrasive aesthetic (Herbst 2018, 2019; Hagen 2011; Boddington-Jordan and Herbst 2023). Played with tremolo picking and often without palm-muting, these chords produce a droning effect, which diminishes rhythmic clarity and intensifies dissonance due to the detuning caused by the constant state of wide vibration (Hagen 2011: 187). Although distorted minor chords enhance dissonance and abrasiveness (Herbst 2018, 2019), the precise relationship between dissonance and heaviness in metal remains unclear (Swallow and Herbst 2022). The two elements are seemingly related yet distinct, given that metal often aims for enhanced heaviness without necessarily increasing dissonance (Boddington-Jordan and Herbst 2023).

Harmonic complexity has increased in more recent subgenres like djent, not as a means of maximizing dissonance, as in black metal, but to intensify tension and adjust perceived chord size (Boddington-Jordan and Herbst 2023). Although power chords (fifth intervals) remain the harmonic mainstay of most metal bands, djent bands like Periphery incorporate alternatives such as major sixth and minor second intervals, as heard in 'Prayer Position' (2016). The minor second adds tension and sounds 'smaller' than power chords, while the major sixth creates a sense of expansiveness that contributes to the perceived size of the chord.

2.3.4 *Vocals*

In traditional heavy and power metal, melody and melodic vocals have been central (Friesen and Epstein 1994: 4), often featuring tenor vocalists like Judas Priest's Rob Halford, Iron Maiden's Bruce Dickinson, and Helloween's Michael Kiske. However, with the advent of more contemporary and extreme metal styles, the focus has shifted from melodic elements to ensemble rhythmic complexity (Mynett 2019a). This shift has impacted the role of vocals, which are now frequently mixed on par with instruments rather than being foregrounded. Additionally, vocal styles have come to signify various metal subgenres (Kennedy 2017; Phillipov 2012; Hagen 2011; Purcell 2003), although these distinctions are less rigid than they were in the 1990s and 2000s, reflecting the increased genre-blending in contemporary metal (Hillier 2020a).

The high, clear vocal style, characteristic of traditional metal, often conveys a sense of 'power', but it may not significantly contribute to heaviness, as it tends to be processed fluently and is easily accessible (Xhignesse 2024). In contrast, extreme metal vocalizations, including screams, shouts, snarls, barks, roars, grunts, and growls, facilitate transgressive effects (Kahn-Harris 2007) and are more likely to be perceived as heavy. These vocal styles often lower the pitch range in growl-like techniques to maximize metaphorical weight. Regardless of the specific technique, extreme metal vocals are generally noisy, as they contain non-harmonic elements that sonically resemble distorted guitar timbres (Kennedy 2017: 75), which lend them a disfluent character (Xhignesse 2024). Berger asserts that such vocal styles 'can be referred to as heavy' (1999b: 58), especially when pitches are less discernible, intensifying the impression of heaviness.

The acoustic similarity between guitar distortion and extreme metal vocals, however, has been debated, as extreme metal vocals typically lack a clear fundamental pitch (Mesiä and Ribaldini 2015). While they may produce a fundamental, it usually occurs within an inharmonic overtone spectrum (Wallmark 2018: 73). Smialek (2015: 260) characterizes these vocal styles as 'complex-pitched', which allow for distinctions between brighter and darker timbres, similar to drum cymbals, without anchoring them to a single pitch.

Although the harmonicity around pitch differs between distorted guitars and extreme metal vocals, several scholars propose that the perceptual effects of extreme vocals are metaphorically akin to guitar distortion. Michelle Phillipov (2012: 74) suggests that the death metal growl emulates a down-tuned distorted guitar, while Mark Mynett (2016: 77) views the distorted quality of extreme vocals as stemming from intense physical exertion that pushes the voice beyond typical speaking or singing limits. This exertion resembles the distortion effect in guitars, which results from amplification overload. Although the evidence is inconclusive, the resemblance between growl-like vocal styles and guitar distortion suggests a perceptual similarity.

Further supporting this, Tsai and colleagues (2010) found that growled vocals contain a mix of harmonic and inharmonic components that cover a wider frequency range than clean singing. This expanded frequency spectrum in extreme vocals parallels the way distortion broadens a guitar's sonic profile, making both instruments sound 'larger'. This spectral enlargement can be metaphorically interpreted as adding 'heaviness' to the sound, which reinforces its auditory impact and enhances the music's intensity.

In extreme metal, vocal distortion is typically achieved in either the low or high registers, employing specialized vocal techniques to create an aggressive and heavy timbre. This effect is often enhanced through audio processing, such as compression, equalization, and added harmonic distortion, which further intensifies the vocals. Pronunciation also influences perceived heaviness. Smialek (2015: 269–281) suggests that lowering the first two formants during vowel articulation can contribute to a heavier expression. Lowered formants deepen the vocal sound, enhancing its perceived weight and contributing to an overall impression of heaviness and power:

If a vowel such as /u/ (as in 'who') has the lowest recognizable first and second formant frequencies of vowels in American English, a death metal vocalist could sacrifice the intelligibility of a vowel such as the /ʌ/ in 'blood' so that it can instead sound lower and thus heavier: /blad/ becomes /blud/.
(*Smialek 2015: 269*)

Smialek's spectrographic analysis of Morbid Angel's 'He Who Sleeps' (2000) reveals that death metal vocalists often achieve a heavier sound by lowering formants on short words and modulating brighter vowels to darker ones in longer words (2015: 276). This approach is conceptually aligned with down-tuned guitars and low-tuned drums, where lower pitches metaphorically convey physical weight, a key attribute of heaviness in metal.

Furthermore, Hannan's (2018: 444–445) observation suggests that lyrics may amplify heaviness by evoking imagery of vastness or massiveness. Complementing this view, Xhignesse (2024: 685, 691) argues that transgressive themes, such as death, misanthropy, Satanism, suicide, and war, intensify perceived heaviness by challenging listeners' processing fluency, particularly within the stylistic framework of extreme metal. These themes are not only sonically impactful but also cognitively troublesome, which resonates with the genre's aesthetic of extremity and contributes to a powerful sense of sonic and lyrical heaviness.

2.4 Heaviness in the Discourse of Producers

Until now, we have examined how production, composition, and performance elements shape the perception of heaviness, alongside the role of metaphor in cognitive sound processing. Walther-Hansen (2020: 6–7) suggests

that cognitive concepts of sound are socially learnt, often facilitated through what Etienne Wenger (1998) describes as ‘communities of practice’. These communities, whether online or offline, form around shared interests in specific practices, such as music production or performance. They develop a ‘shared repertoire’ of resources created through collaborative activities, including routines, symbols, and practices that shape the ‘discourse by which members create meaningful statements about the world, as well as the styles by which they express their forms of membership and their identities as members’ within the community (Wenger 1998: 83). Familiarity with common techniques, concepts, and terminology within such a community fosters a shared understanding of key descriptors, including metaphorical terms like ‘heaviness’. Exploring communities of practice thus offers insights into how practitioners employ metaphorical sound descriptions in real-world settings and can provide practical grounding for theoretical perspectives and analytical models of heaviness. This approach could enrich the analytically derived framework, allowing for an evaluation rooted in the lived practices and shared understandings of those involved in the genre.

Beyond Mynett’s (2017) comprehensive manual, which examines heaviness in metal production through interviews and professional observations, as well as isolated studies on specific elements such as guitar sound (Herbst 2018, 2019) or perceived ‘hardness’ across popular music genres (Czedik-Eysenberg, Knauf, and Reuter 2017), and philosophical considerations (Miller 2021; Volák 2022; Xhignesse 2024), the existing metal scholarship has rarely addressed the concept of musical heaviness in depth. To better understand how producers use the term ‘heaviness’ in their discussions and what musical, performative, and production parameters they consider relevant, we examined the intersection of language use and musical practice through a netnographic analysis (Kozinets 2020) of 14 message boards for music producers and musicians.² Of these boards, six were explicitly aimed at musicians, five at music producers, two were focused on music equipment, and one on metal music.³ All were scanned for statements about ‘heavy’, regardless of genre. In particular, we explored how practitioners use the term ‘heavy’ in their discussions, in what contexts it is relevant, and what the discourse reveals about the significance of heaviness in the genre; what strategies practitioners apply to achieve heaviness; and what considerations influence their decisions. The overarching research interest was to gain a systematic understanding of ‘heaviness’ as a discursive term and musical concept used by practitioners in their community of practice. The analysis revealed four main categories. The first illuminates the discourse, conceptual understanding, and ideological value assigned to heaviness. The other three align with the tripartite framework established earlier in our overview of musical heaviness: composition, performance, and production.

2.4.1 *Discourse and Language Use*

Direct discussions on the term ‘heaviness’ are sparse across the analysed forums, where ‘heavy’ is typically used subjectively and intuitively, often without extensive reflection. This usage aligns with Walther-Hansen’s (2020) notion of ‘heavy’ as an ontological metaphor that operates more on instinct than on precise definition. Nevertheless, when participants encounter differing interpretations, it becomes evident that there is an implicit awareness and negotiation of meaning, suggesting that the term’s use, while being intuitive, is not entirely without scrutiny.

In music producer forums, ‘heavy’ often serves as an intensifier for audio processing descriptors, as seen in terms like ‘heavy EQ treatment’, ‘heavy limiting’, ‘heavy compression’, or ‘heavy distortion’. These terms convey a degree of processing intensity, typically associated with metal’s sonic identity (Thomas and King 2019; Turner 2009). One forum member’s post exemplifies this acceptance of sonic extremity within metal production, illustrating how metal aesthetics can embrace and even necessitate radical processing techniques, which is a notion echoed in Turner’s (2009) observations on metal’s affinity for sonic extremity:

Funny that people have asked me what triggers I used, and it’s really just not being afraid of EQ’ing the heck out of the kick drum, or anything for that matter. This is not jazz, nor is this a ‘purist’ situation we are talking about here. Why be afraid of EQ? It’s like saying, I want it to be SUPER heavy.

The term ‘heavy’ in audio production encompasses various forms of extreme processing, particularly techniques such as dynamic range compression, limiting, equalization, and distortion. These methods are commonly used for manipulating heaviness in recorded music, as they considerably alter both the dynamics and frequency spectrum—primary tools for creating the dense and punchy sound characteristic of metal music (Mynett 2017).

In much of the research literature, ‘heavy’ is synonymous with metal music (Mynett 2019b; Walther-Hansen 2020: 105). Discussions on music forums often reflect this association; even in threads not specifically focused on metal, phrases like ‘heavy music’ or ‘heavy bands’ typically denote metal. This assumption is seldom contested, except in some discussions explicitly examining the heaviness of particular metal bands, where differences in perceptions emerge. For example while traditional bands like Iron Maiden are universally acknowledged as ‘metal’, some fans argue they do not fully embody ‘heaviness’ in the modern sense. This distinction highlights the genre’s developing standards for heaviness, supporting Xhignesse’s (2024) argument that accessibility is a crucial factor in the perception of heaviness.

As the pursuit of more intense sonic qualities has accelerated, classic heavy metal bands have often been surpassed by newer, more extreme metal styles (Berger and Fales 2005).

Many forum discussions also suggest that perceptions of heaviness shift over time, with participants reflecting on changes in their listening experiences and how their tastes may diverge from those of younger metal fans. Some threads even argue that distinct subgenres of metal possess unique concepts and aesthetics of heaviness, each requiring tailored production techniques (see also Vento 2009). In these conversations, the term ‘heavy’ occasionally comes under scrutiny as being overly simplistic, failing to capture the nuanced approaches across metal’s stylistic spectrum:

‘[H]eavy’ is just a word, and as such it has many meanings. I hate it when people start arguing over words, it’s the meaning that’s important, so when somebody says ‘Sevendust is heavy’ then instead of thinking ‘Sevendust aren’t heavy’ it would be better to first try and see what their definition of ‘heavy’ is. It’s similar to saying ‘Apples are round’ and then getting a reply ‘No apples are NOT square’. In this case the word just happens to be the same (‘heavy’). ‘Heavy’ is like the words ‘metal’ or ‘punk’, people have such different meanings for these words that any disagreement over ‘Slipknot aren’t metal’, ‘Sevendust are heavy’ or similar shouldn’t be bothered with, because the arguments that follow usually result from different understandings of words.

Other discussants similarly highlight the subjective nature of ‘heavy’ and the diverse forms it can assume (Volák 2022). This complexity contrasts with discussions where the term is used more intuitively and without deeper reflection. Given the nuanced interpretations of ‘heavy’, some participants even refrain from debating the term, suggesting that certain sounds elude adequate description.

In discussions that focus explicitly or implicitly on heaviness, it becomes apparent that individual interpretations vary widely. Although ‘aggression’ is frequently associated with ‘heavy’, it remains ambiguous whether aggression is an inherent component of heaviness or merely a complementary quality that reinforces it. Both perspectives are supported by participant statements such as ‘To me heavy is about a mix between aggression and rage in music’, ‘The guitars to me don’t sound heavy enough (aggressive)’, and ‘In my mind it’s hard to top post-CFH [Cowboys from Hell] Pantera for sheer heaviness and aggression’. However, what specific contribution aggression makes to the perception of heaviness remains uncertain.

Musically, compositional and performance elements such as speed and playing style likely play a role, while production factors like frequency spectrum emphasis and a sense of proximity may also influence the perception

of heaviness (Herbst 2017b; Mynett 2016; Thomas 2015: 190). Additionally, aggression may be a subjective emotional response perceived in music through its intensity or sonic impact rather than as an inherent property.

The term ‘intensity’ also occurs in discussions of heaviness (see Mynett 2016; Walser 1993: 42; Volák 2022). Interestingly, intensity is rarely used to describe the music’s acoustic qualities; instead, it often refers to the challenge or endurance required to listen to such music. This interpretation aligns with research suggesting that the perceived difficulty of certain performative or structural aspects can enhance heaviness, as it implies artistic seriousness and demands a heightened level of listener engagement (Hannan 2018). Furthermore, extreme metal listeners frequently take pride in cultivating an appreciation for transgressive music, valuing it as an acquired taste that signifies dedication and resilience (Kahn-Harris 2007; Smialek 2015; Xhignesse 2024).

The notion of ‘emotion’ also appears in these discussions, though often in vague terms, such as ‘There’s an emotional component to heaviness too’ (see also Berger 1999b: 58; Zagorski-Thomas 2014: 215). Although some statements suggest that playing styles and expressive qualities, such as articulation, contribute to emotional depth—as in any genre of music—others note the influence of lyrical themes (see also Hannan 2018; Miller 2021; Xhignesse 2024). In this regard, ‘heavy’ lyrics extend beyond metal’s characteristic themes of gore and debauchery (Smialek 2015; Weinstein 2000; Xhignesse 2024) to encompass broader topics, including expressions of unrequited love or existential despair.

Another term with emotional implications is ‘chaos’. Zachary Wallmark (2018) posits that death metal, as a particularly extreme subgenre, creates a dynamic tension between chaos and control, eliciting a complex emotional response characterized by both cathexis (deep emotional investment) and catharsis. This dialectic fosters an intense listening experience that resonates emotionally, which positions chaos as both a thematic and sonic element within the perception of heaviness.

In many discussions, heaviness is closely associated with ‘brutality’. Although some discussants regard the terms as related or even synonymous, aligning with Wallmark’s (2018) observations, most view them as being distinct. This distinction is often blurred by their association with metal subgenres: ‘heavy metal’ and ‘brutal death metal’, the latter perceived by fans as an especially heavy variant of metal (see also Smialek 2015). However, debates often arise over whether death metal bands genuinely embody brutality, as the technical precision characteristic of brutal death metal does not inherently convey a brutal sound. According to some, achieving true brutality requires a ‘constant barrage of “noise” to form a wall of sound’. In this view, production techniques are essential to constructing this wall, often more so than the performative and compositional aspects.

As a result, many discussants advocate for a more in-depth understanding of ‘heaviness’, ‘brutality’ (Wallmark 2018), and ‘extremity’ (Thomas and King 2019; Turner 2009), highlighting that these qualities entail distinct auditory characteristics. However, their explanations tend to remain abstract, often comparing bands instead of offering clear definitions. For instance it is frequently noted that a mainstream metal band with ‘weighty and forceful’ riffs can sound heavier than an extreme metal band, suggesting that heaviness and force do not necessarily correlate with technical proficiency or extreme performance elements.

We have already pointed to the prevailing view in metal research that distorted guitar tones are widely considered essential to the ‘heavy’ aesthetic of metal music (Berger and Fales 2005), even as contributions from other instruments and vocals enhance this quality (Mynett 2019a; Williams 2015). Online discussions reflect this academic consensus, frequently emphasizing the guitar’s central role in producing heavy sounds. Participants debate specific aspects of guitar equipment, such as models, pickup configurations, and amplifiers, as key factors in achieving a heavy sound. Additionally, there is broad agreement that a genuinely heavy tone must be distorted, as ‘clean’ guitar sounds are typically not perceived as heavy (see Herbst 2018). However, many contributors also argue that guitars alone do not define heaviness. Instead, they highlight the importance of other elements: ‘Drums and bass have a huge impact on what sounds heavy. Mix that with an aggressive vocalist and it’s a recipe for an aggressive song’. This sentiment exemplifies how heaviness often intersects with other descriptors, such as ‘aggression’, to achieve its desired effect.

Although individual perceptions of heaviness vary, discussions consistently reflect a shared view that ‘heavy’ is a positive quality in metal music, imbued with ideological significance encompassing both musical and emotional dimensions (Berger 1999b: 58; Zagorski-Thomas 2014: 215). This perspective aligns with scholarly findings, affirming that heaviness serves as both an aesthetic and ideological marker within the metal genre (Berger and Fales 2005; Herbst 2018; Mynett 2017; Thomas 2015).

2.4.2 Composition

From a musicological perspective, heaviness results from an interconnection of structural, performative, and production elements, which aligns with statements that highlight the importance of composition. Discussants concede that high production quality and a suitably distorted sound are essential, but they caution that ‘production is somewhat overrated if the songwriting isn’t there’. In contrast to ‘brutality’, which can be achieved through fast tempi, technical skill, and extreme sounds, heaviness relies on ‘songwriting cleverness and some thought to really organically tap into that bestial headbang

mode in the listener'. Such statements suggest that heaviness engages listeners emotionally (Berger 1999b: 58; Zagorski-Thomas 2014: 215), which provokes physical responses such as headbanging.

Another point raised is that while production-based heaviness may remain relatively constant throughout a song or album, composition-based heaviness is often specific to particular sections or riffs, resonating with Miller's (2021: 7) analysis. Some discussants even argue that a riff can convey heaviness, regardless of production quality or distortion: 'For me, it depends on the riffs. A heavy riff will sound heavy even on an acoustic [guitar], and therefore even more so with some gain'.

Other observations highlight the importance of contrast between sections in creating heaviness: 'If you're heavy all the time, you're not heavy at all' (see also Miller 2021: 7). Breakdowns, frequently noted as the heaviest parts of a song due to their slower tempo and groove, exemplify how shifts in tempo, structure, and performance contribute to perceived heaviness (Kennedy 2017; Smialek 2015). These contrasts, achieved by varying loudness, arrangement density, tempo, and rhythmic subdivisions, seem to be central to maintaining and intensifying heaviness throughout a song. Such dynamic variation is also essential to the emotional experience of music (Gomez and Danuser 2007).

Linguistically, participants often describe structural contrasts in terms of 'intensity' (see Volák 2022), which reinforces the idea that heaviness is closely tied to emotional perception (Berger 1999b: 58; Zagorski-Thomas 2014: 215). This focus on intensity and contrast highlights the emotional and experiential dimensions of heaviness in metal music, situating it as a quality that transcends mere technical sound production.

2.4.3 *Performance and Gesture*

Performance is another factor associated with heaviness in online forums, where discussants frequently emphasize the role of playing gestures in conveying a sense of heaviness. As one participant remarks:

It's really all in the band's 'sound' to begin with. Sure, you can add some 'colouration' with different mics/pres/etc. . . ., but it is mostly the band's instruments and delivery that have the biggest determining factor in the end-result, no matter what style.

This perspective aligns with previous considerations, which suggest that a truly 'heavy' metal production relies on a strong performance characterized by precise ensemble synchronization and a 'hard' playing style. These elements consistently surface in conversations about what defines heaviness.

Performance precision, particularly rhythmic tightness, is seen as fundamental to achieving a heavy sound. Comments such as ‘Rhythmic tightness is actually more important for a heavy sound than a lot of low end’ or ‘I sometimes have to edit guitars and bass pretty heavily if the band is not rhythmically tight enough to sound properly “heavy” highlight the necessity of rhythmic synchronization. This locking together of instruments is necessary for creating the impact essential to a heavy aesthetic.

Discussants also emphasize the importance of ‘hard’ and ‘heavy’ playing gestures across instruments. Bassists, for instance, refer to a ‘heavy hand’, while guitarists talk about ‘heavy picking’, often combined with palm-muting to accentuate the low-end, producing what they describe as a ‘chuggy heavy’ impression or a ‘heavy chunk’ (see also Mynett 2019a: 306–307). Drummers likewise discuss various techniques associated with heaviness, including a ‘heavy hitter’ approach, where hard hits generate the energy needed for a punchy metal tone. Some argue that drummers who do not hit hard enough may require sample reinforcement to compensate, a measure they see as avoidable with:

You can get that drum sound out of real drums as long as the drummer is good. A lot of the drums that sound like samples are actually real drums, Shadows Fall for example. But the drummer has to hit the drums. It’s just EQ and compression after that.

General musicianship has improved over time (Thomas 2015: 204–207), yet the increasing complexity and tempo in metal may account for why some drummers do not strike hard enough to produce the desired sound. This shift may reflect changing expectations regarding both technical skill and physical intensity in contemporary metal performance.

A ‘heavy backbeat’ is sometimes noted as a defining element in discussions of heaviness, particularly regarding the distinctive sound of the snare drum. Other heavy playing gestures frequently involve double-kick drums, which are considered effective due to their extremity and the solid low-end foundation they provide, creating a physical sensation for listeners (Mynett 2019a). Blast beats are similarly described as both ‘heavy’ and ‘brutal’, which reinforce the importance of specific drum patterns in shaping the heavy aesthetic.

When discussing equipment, participants often refer to ‘heavy cymbals’ and ‘heavy sticks’. Although the term ‘heavy cymbals’ can sometimes denote physical weight, it may also imply a ‘heavy cymbal sound’. However, this term is seldom fully defined beyond the distinct attack or ‘ping’ of the ride cymbal, as opposed to a more sustained ‘wash’. In the case of drumsticks, ‘heavy’ typically refers to physical weight, allowing drummers to play with greater force.

These heavy playing gestures likely hold value for their acoustic impact. However, there is also evidence that the emotional qualities associated with heaviness extend to the act of playing itself. Performing ‘hard’ and ‘heavy’ is linked to expressive articulation (Gomez and Danuser 2007), channelling the musician’s emotional state into the sound. This emotional transfer is intensified by metal’s production aesthetics, which often empower listeners through sheer loudness and intensity (Wallach, Berger, and Greene 2011; Weinstein 2000: 23). Thus, it stands to reason that metal fans perceive and value the emotional depth embedded in the music through its performance. Robert Walser (1993: 42) considers distortion a ‘sign of extreme power and intense expression’, a characteristic stemming from both physical exertion and emotional intensity, whether in the sound production of instruments and voices (Wallmark et al. 2018) or in the overloading of an audio system with a loud signal. Heavy playing gestures may function similar to distortion, amplifying the emotional resonance of a heavy aesthetic and reinforcing metal’s powerful expressive qualities.

Tempo and groove are also highlighted in discussions of heaviness, with discussants offering insights that align with various metal research theories regarding how tempo influences heaviness. Both fast (Berger 1999b: 59; Czedik-Eysenberg, Knauf, and Reuter 2017) and slow (Kennedy 2017; Smialek 2015) tempi are associated with heaviness; however, there is a marked preference for slower tempi. Statements such as ‘Heavy is different from fast . . . heavy usually comes from a slower tempo’, “‘Heaviness’ is basically a function of pitch, distortion and tempo. Lowpitched, thickly distorted riffs played at slower tempi are going to produce the effect of heaviness”, and ‘Slow is heavier than fast. . . . The physical presence of a wall of bassy sound leaning on you. Fast and heavy is more like an earthquake shaking you, but it just doesn’t seem as “weighty”’ suggest that slowness enhances sonic weight, which is the primary factor in the metaphorical perception of heaviness as a physical object (Ryzhova, Rakhilina, and Kholkina 2019; Walther-Hansen 2020: 9).

These perspectives are influenced by historical, autobiographical, and genre-specific factors (see Berger and Fales 2005; Herbst 2018; Volák 2022; Xhignesse 2024). Several discussants note that music journalism traditionally associates ‘heavy’ with slow, doom-inspired metal in the style of Black Sabbath. This connection was established before the rise of faster, punk-influenced thrash bands like Metallica and Slayer. Phrases like ‘heavy doom’ reflect this association, and some participants argue that bands have sometimes lost heaviness as they increased in speed, further reinforcing the link between slowness and perceived weight and heaviness in metal.

Although not a frequent association, some statements link groove to heaviness, suggesting that ‘heaviness is groove-based. i.e.: the more you feel like banging your head, the more heavy something is’. In the context of metal,

however, determining what constitutes groove is complex. Unlike genres like soul, where groove often arises from subtle rhythmic deviations (Danielsen 2012), metal generally emphasizes ensemble rhythmic precision, valuing tight synchronization over expressive looseness (Mynett 2019a; Thomas 2015: 194–196). Discussions of ‘heavy groove’ imply that compositional choices, rather than performative variations, are key to creating rhythms that allow the individual instruments to interlock in a way that feels heavy. This emphasis on precision contrasts with Berger’s (1999b: 59) observation that (extreme) metal fans often associate rhythmic rigidity with heaviness. Some discussants suggest that heaviness arises from a combination of structural and performative elements, indicating that groove in metal may depend on the interdependence of precise rhythmic placement and complementary instrumentation:

I still think Pantera are up there with some of the most brutal, aggressive and heavy tones. That super tight high gain tone mixed with bouncy riffs and the right amount of space between the notes/drums. . . . It just works. It’s almost got a groove to it and that is what makes it so heavy.

The quoted explanation remains somewhat vague, but it suggests that the ‘tight’ force qualities (Walther-Hansen 2020: 117–119) associated with power, combined with slower rhythmic subdivisions that create ‘space between the notes’, can enhance sonic weight. As discussed previously, slower subdivisions allow for a greater emphasis on sonic weight in production, often at the expense of clarity. This balance between weight and clarity is pivotal in achieving the dense, impactful sound that defines heaviness in metal.

2.4.4 Production

Quantitatively, references to production vastly outnumber those related to composition and performance in the discussions, which highlights production’s role as a key parameter in generating heaviness. Statements about composition and performance often refer back to production aesthetics or requirements, reinforcing the notion that production is central to the heavy sound in metal music.

Achieving heaviness in metal production involves a careful balance, particularly between sonic weight and clarity, which is a challenge frequently stressed in discussions. Whether considering individual instrument sounds or the overall mix, practitioners seek help in achieving a sound that is heavy yet ‘tight’, ‘defined’, or ‘clear’. Advice typically centres around adjusting guitar distortion levels, boosting low frequencies, and balancing the kick drum’s low-end thump with a high-end ‘click’. In this context, ‘tightness’ is often contrasted with ‘looseness’. Rather than referring to performance quality,

‘tightness’ here seems to denote spectral size and density, achieved through layering similar sound sources, particularly guitars, to form a heavy ‘wall of sound’ or ‘wall of distortion’ (see also Zagorski-Thomas 2014: 214). Acoustically, distortion diminishes the clarity of note onsets (Herbst 2017c), which suggests that spectral size without dynamic nuance is the opposite of tightness, defined by clear rhythmic articulation and a narrower frequency spectrum. The consensus in the discussions is that while sonic weight benefits from distortion and spectral density, this must be balanced with clarity and tightness to achieve the desired heavy aesthetic (Mynett 2017: 14–20).

Loudness and proximity are additional central criteria for heaviness in metal and contribute to the intense ‘in-your-face’ sound that the genre demands (Mynett 2016: 74; Reyes 2008: 68–69; Wallmark 2018: 67). Discussions emphasize the importance of capturing signals close to the source to achieve a direct, powerful sound while minimizing excessive reverberation across instruments. For instance when recording drums, participants often recommend close-miking techniques: ‘I also usually go with a heavy reliance on close mics, low balance of overheads, and very little room mic level. . . . Sometimes a short reverb, sometimes not’. Another participant suggests: ‘It sounds like you are going for a modern death metal sound so you will need to close mic each individual drum. . . . A tight, dry, compressed and close [sound] is something they are going for’.

Positioning microphones close to the source also amplifies low frequencies due to the proximity effect, which enhances sonic weight and creates a more ‘scooped’ tone with heightened low and high frequencies. This approach provides a hyperreal impression of loudness that feels intense and present, even when the actual signal level remains moderate (Wallmark 2018: 67; Mynett 2016: 73–76). The resulting direct, loud sound meets Walther-Hansen’s (2020: 104–107) criteria for heaviness, emphasizing the impactful qualities that metal listeners expect.

Directness in metal production is further enhanced by compressing the dynamic range of audio signals, provided that the sound is not overly ambient, as compression can unintentionally amplify ambience. Compression is widely discussed for both individual instruments and the entire mix. When applied to the mix, compression ‘glues’ the sounds together, creating a homogeneous, spectrally dense sound with consistent loudness (Mynett 2017: 335–342; Herbst and Mynett 2021). However, as discussants caution, increased compression does not always equate to greater heaviness. Over-compression can diminish the metaphorical ‘force’ of heaviness by reducing it to mere ‘weight’ (Walther-Hansen 2020: 104–107) that lacks the necessary ‘punch’ quality, which conveys power and impact (Fenton and Lee 2019). For those who hold this view, true heaviness requires both metaphorical weight and force.

Compression practices vary greatly across instruments. Guitars, for instance, are rarely compressed due to their already reduced dynamic range

from distortion (Herbst 2017c). Some discussants state that they compress their guitars for colouration (see also Moore 2019) to achieve a more aggressive sound, while others use spectrum-specific multiband compression to control excessive low-end resonance on palm-muted notes, adapting audio processing to gestural features (Mynett 2017: 244). In contrast, bass signals are usually ‘heavily compressed’ to enhance their low-end, which is essential for creating sonic weight (Mynett 2017: 234–236). Similarly, vocal compression aims to heighten aggression and reduce dynamic range, keeping the voice prominently upfront (‘heavy compression and limiting is a large part of the “sound”’) (see also Mynett 2017: 245–249).

For drums, compression serves multiple purposes: it reduces dynamic range, increases loudness, shapes the envelope to enhance perceived force, and integrates the various microphone signals to create a cohesive drum sound (Mynett 2017: 233–234). However, balancing cohesion and separation is essential; while drums should sound unified, each element must remain intelligible (Mynett 2017: 191). This clarity is achieved through techniques such as waveform editing or noise-gating to isolate individual drum hits from bleed, allowing for precise, independent processing of each component (Mynett 2017: 192–200). Sample reinforcement often further enhances this separation and intelligibility. Many discussants view this balance between cohesion and separation as a contributing factor to heaviness, as highlighted in one comment: ‘The drums on . . . are f***ing HEAVY, and clear, and you can hear every piece of the kit. Just a great, heavy production’.

Consistent with the notion that heaviness incorporates (sonic) weight, numerous terms in the discussions refer to a pronounced low-end, experienced not only aurally but also as a visceral, bodily sensation (see also Wallmark 2018: 67). Walther-Hansen (2020) suggests that heaviness aligns with related conceptual metaphors, which are frequently reflected in the discussions. Commonly mentioned descriptors include ‘beefy, heavy sound’, ‘full, thick, heavy sound’, ‘rich, full, heavy sound’, and ‘bass’ or ‘deep sound’. In this context, ‘heavy’ appears to represent a desired foundational sound, customized by adding compatible tonal attributes and related associations, despite considerable acoustic overlap among the terms.

According to Walther-Hansen’s (2020) lexicon of sonic metaphors, ‘fat’ sounds are characterized by a strong low-end below 250 Hz, ‘full’ sounds are rich in overtones, and ‘thick’ sounds consist of several layers. Together, these features contribute to the overarching concept of heaviness, while additional descriptors serve to specify the type of heaviness, such as rich in low (‘fat’) or high (‘rich’) frequencies. Other modifiers are more associative; for instance a ‘nice heavy dark sound’ might acoustically correspond to a reduced high-frequency range, but in metal, ‘darkness’ carries genre-specific connotations linked to sadness, evil, or mystery (Walther-Hansen 2020: 98–100; Wallmark

2018). Thus, these tonal modifiers enrich the heavy base sound with specific aesthetic, associative, or emotional qualities.

Technically, discussions also frequently address the concept of ‘taming low end’ and the necessity of balancing sonic weight with tightness, which stresses the intricate relationship between tonal attributes and the desired impact of heaviness. High-end frequencies are addressed less frequently and usually in an implicit manner. The energy in these frequencies is essential for achieving definition, tightness, and punch (Fenton and Lee 2019; Mynett 2017: 13, 218–220; Williams 2015). However, introducing high-end frequencies without introducing harshness or abrasiveness poses a technical challenge (Mynett 2016: 77), as noted by some discussants.

In contrast, mid-range frequencies are a frequent topic of discussion. Metal research often highlights the ‘scooped’ guitar sound, characterized by reduced mid-frequencies, especially in genres like death metal (Berger 1999a; Herbst 2017b; Wallmark 2018: 69–70). Discussions typically focus on mid-frequency scooping at the level of individual instruments rather than the overall mix. Interestingly, despite the popularity of the scooped sound, most statements emphasize that retaining mid-range frequencies is necessary for achieving a ‘heavy’ metal sound. These views are more common in forums for music producers than for musicians, which indicates that scooping is often regarded as a technical rather than a purely aesthetic choice. Producers typically warn against ‘over-scooping’ guitars (Mynett 2017: 294–302), arguing that a ‘good heavy metal tone is always very mid-heavy’. They assert that ‘the bite of a tone would actually not be due to its high-frequency content, but would rather be achieved by boosting a certain frequency area in the high mids spectrum’, or ‘you would want enough mid-range frequency content in your tone to make it clearly distinguishable, defined, and articulated in a mix’. Middle frequencies not only are considered essential to the technical function of a mix but also contribute to desired qualities such as ‘bite’, ‘aggression’, and an ‘in-your-face’ presence, along with attributes closely linked to heaviness like ‘thickness’. Discussants also warn against a scooped sound in the bass guitar because it risks losing intelligibility, a concern raised less frequently for guitars. Interestingly, the frequency spectrum of drums receives relatively little attention in discussions, even though drums are the instrument in metal production where a scooped spectrum is generally the least detrimental and can even be advantageous (Mynett 2017: 253–305).

Layering is a widely discussed technique for achieving a ‘heavy’ sound in metal, applied to vocals and all instruments except drums. Even though closely linked to the metaphor of ‘thickness’ (Walther-Hansen 2020: 100–102), layering also serves essential acoustic and technical functions (Herbst 2017b). Guitar layering, in particular, receives substantial attention, as it is the most common layering technique in metal production. Historically, the number of guitar layers increased to four by the 2010s (Berger and Fales

2005; Herbst 2017b), although many producers have since returned to using two guitars (Mynett 2017: 134–137). The choice between two and four guitar performances usually depends on the desired aesthetic, with guitars typically panned hard left and right in the stereo field: two guitars prioritize clarity and tightness, while four guitars enhance sonic weight and size (Mynett 2017: 134–137; Herbst 2017b). The discussions do not reach a consensus on whether additional layers inherently produce a ‘heavier’ sound; instead, they focus on technical implementation. There is general agreement that, to maintain clarity and tightness, more guitar layers should use slightly less distortion, even if the goal is to achieve a ‘wall of sound’ aesthetic. It is recommended to blend slightly different tones from various guitars, amplifiers, or tone-shaping devices and settings to increase sonic density and thickness (see Herbst 2017b; Mynett 2017: 137–141). Structural considerations, such as arranging different octaves or chord inversions, are mentioned less frequently.

A broader aspect of layering involves the arrangement and interplay between guitar and bass. Producers often face a choice between presenting the guitar and bass as distinct elements and as a cohesive ‘meta-instrument’ (see also Mynett 2017: 145–146). Even though both approaches can create a heavy sound, most discussants express a preference for blending because this contributes to the desired ‘wall of sound’ effect:

The guitars and bass need to work together to create one big sound. Most of the time you are not trying to get separation between these instruments, you are trying to build a wall of sound.

The thing about heavy guitars in a mix, people forget that it’s the bass doing a lot of the work as well, and it’s the combined effort of both that creates the overall heaviness.

The guitars will sound thin by themselves but the heaviness will come when blended with the bass.

I like to have the bass do most of the heavy lifting too, the guitars really just add harmony and harmonic content to the foundation of the bass.

The last quote is particularly insightful, as it metaphorically highlights the bass’s role in the ‘heavy lifting’ necessary for achieving a heavy sound. In cognitive linguistics, ‘lifting’ is one of the most common lexical markers associated with ‘heavy’, alongside ‘shifting’ and ‘weighing’ (Ryzhova, Rakhilina, and Kholkina 2019: 191–192). Although the electric guitar often receives the most attention in discussions of metal’s heavy sound (Berger and Fales 2005), the essential contribution of the bass is sometimes underappreciated (Mynett 2016: 84). The quotation suggests that the bass provides the foundational ‘weight’ while guitars add harmonics and the iconic distorted tone (Kahn-Harris 2014).

Additionally, guitars enhance the perception of size by broadening the overtone spectrum, which expands the frequency range both laterally and vertically within the stereo field (Herbst 2017b). As bass frequencies are typically harder to localize spatially, guitars play a significant role in establishing the wall of sound. This principle is reflected in statements like, ‘I would never pan a heavy guitar part anywhere other than left, centre or right. . . . If you want size, go wide’ (see also Mynett 2017: 203–208), which emphasizes the importance of panning and stereo placement in creating a very wide sound.

Layering for bass works differently than for guitar. Few discussions address blending multiple bass performances, and experienced producers generally discourage this practice. Unlike guitars, where slight timing deviations can enhance perceived thickness (Herbst 2017b), such deviations in the bass can create a sense of sloppiness. Instead, producers recommend blending various tones derived from the same bass signal. Such blending can be achieved through physical re-amping or by using digital amplifier simulations to shape different tonal and expressive qualities from a single performance (see also Mynett 2017: 143–153). The motivations for this approach range from aesthetic goals, such as ‘fattening up’ the sound, to technical purposes like sculpting specific frequency ranges to ensure the bass complements other instruments in the mix (Mynett 2017: 253–305).

Layering vocals, however, is widely used to enhance heaviness. Unlike guitar layering, discussants recommend not just doubling the same vocal performance but instead blending different articulations or pitch ranges. For instance one technique involves doubling vocals with one high and one low pitch, applying ‘heavy’ reverb to the low vocal to amplify its size and depth. Even though simple doubling can thicken vocals, blending distinct vocal styles such as whispers, growls, and screams produces an ‘otherworldly’ sound that a single voice alone cannot achieve. This layering evokes associations with evil (Wallmark 2018) and metaphorically expands the perceived heaviness of the sound. Some participants suggest using different microphones for each vocal style to enhance tonal contrast and create more extreme sounds (see also Mynett 2017: 156–162). Additional audio effects, including compression, equalization, reverb, and delay, are also mentioned as tools to further intensify the heaviness and extremity of vocal tones (see also Turner 2009).

In line with the essential role of the distorted guitar acknowledged in metal literature (Berger and Fales 2005; Herbst 2017b; Mynett 2016; Wallmark 2018; Williams 2015), many observed discussions highlight how guitar distortion enhances heaviness. This effect incorporates several tonal and emotional modifiers previously discussed. The most common outcome of distortion is a ‘thickening’ of the low-end (Williams 2015), often paired with palm-muted phrasing to further emphasize heaviness (Mynett 2019a: 306–307). However, most discussions caution that excessive distortion can actually reduce

the perceived heaviness of the guitar sound, aligning with audio engineering best practices (Mynett 2016). As one participant explains:

[Y]ou should be careful about adding too much gain, which is a very common mistake when people want to dial in a heavy distortion tone, less gain will actually often work better for this, cause at a certain point more gain will in fact make your distortion sound less heavy, since you gradually loose the sense of impact and attack the higher you turn up the gain, beside contributing to generally loosing definition and articulation, really making the character of the distortion more mushy than heavy sounding.

This quotation reinforces the idea that heaviness cannot rely solely on the metaphor of sonic weight; it also requires the action metaphor of ‘force’, which in turn necessitates ‘clarity’ and ‘tightness’ (Mynett 2017: 14–21; Walther-Hansen 2020: 104–107).

In metal music, distortion is not limited to guitars. Bass players also use distortion to add ‘heavy dirt’ to their sound, but they must carefully preserve note definition to avoid muddiness (Mynett 2017: 145–146). It remains unclear from the discussions whether bass distortion serves primarily aesthetic or emotional purposes (see Herbst 2019: 337). Producers often describe blending layers of clean and distorted bass sounds to achieve a heavy yet defined tone that integrates well into the mix (Mynett 2017: 143–153), with much of the commentary focused on the technical aspects of managing distortion in audio processing.

Distortion is rarely discussed in relation to drums, despite its use by professional producers who often saturate room microphones to enhance perceived size and density or apply distortion to the snare to increase perceived loudness (Mynett 2016: 83). In contrast, vocal distortion is frequently emphasized as a technique to maintain the voice’s prominence against a dense wall of sound (see Mynett 2017: 325–329).

As sonic weight is closely linked to pitch, tuning is frequently debated in the discussions observed, especially regarding guitar and bass (Mynett 2017: 50–54; Wallmark 2018: 70–71). Historically, tunings have been progressively lowered (Berger and Fales 2005; Herbst 2017b), yet opinions on this trend vary widely. Advocates of down-tuning argue that low pitches are crucial to modern metal, as they contribute a fundamental weight essential to a heavy sound (Williams 2015). Critics, however, contend that down-tuning without sufficient tightness can result in a ‘sludgy mess’, and they question the widespread assumption that lower notes inherently create greater heaviness. Instead, they argue that heaviness depends on the quality of riffs, not the tuning, although these views are often presented without detailed justification. Despite this debate, the threads contain numerous examples of

bands, ranging from classic to modern and across subgenres, that achieve a heavy sound using standard tuning or minimal down-tuning. For drums, metal production guides generally recommend tuning them as low as possible to achieve a weighty aesthetic (Mynett 2017: 43–47). However, drum tuning is infrequently discussed in relation to heaviness, with only occasional references to low-tuned toms in the pursuit of ‘super heavy poundy toms’. Some mention ‘big kicks’, likely achieved through a combination of low tuning, wave-shaping, equalization, and sample reinforcement (Mynett 2017: 35–48, 177–186, 216–225, 262–269).

In production-oriented metal research, the genre’s aesthetic is often described as increasingly hyperreal, a quality largely achieved through drum enhancements like quantization, sample reinforcement, and sample replacement (Mynett 2017; Thomas 2015; Williams 2015). This hyperreal aesthetic suggests that drum samples are an important tool for increasing heaviness when other production parameters reach their limits. Surprisingly, however, drum samples are rarely discussed explicitly in terms of heaviness. One of the few comments on the topic states, ‘Most guys I know who do a lot of really heavy stuff are pretty into using samples with their drums to make everything feel really hyper defined’. This observation does not imply that samples are unused or undiscussed; rather, references to heaviness are seldom made directly. Instead, discussions often centre on processing techniques such as blending different samples and tones or effectively integrating the layered sound within the mix (see also Mynett 2017: 177–200). This focus reflects a broader approach to crafting a dense, cohesive sound, prioritizing precise layering and arrangement over any single element’s isolated contribution to heaviness.

2.5 The Multifaceted Nature of Heaviness

Over two decades ago, heaviness was declared the defining characteristic of the metal genre in metal scholarship. Despite the growth of metal music studies as a distinct field, research specifically focused on heaviness remains relatively sparse. This chapter offers a systematic framework for understanding musical heaviness, identifying several components and relationships that shape its perception. Drawing on diverse sources and supplemented by musical analysis and empirical research, the framework organizes various acoustic, perceptual, musical, and performative parameters that contribute to heaviness. Given the distinct aesthetics across metal’s subgenres, the framework is necessarily reductionist, focusing on core features that contribute to heaviness rather than the unique configurations of each subgenre. It theorizes the interdependence of production, composition, and performance, with each component relying on and reinforcing the others to create a heavy aesthetic.

The framework should not be interpreted as privileging production over structure and performance. Rather, production serves to enhance the musical composition as it is realized through performance. Mynett emphasizes that ‘metal is the least acceptable when delivered with poor production, as the music’s defining quality [of] “heaviness” will inevitably be vastly compromised’ (2016: 68). Similarly, Walch highlights the pivotal role of production, arguing that the highly standardized instrumentation of (extreme) metal ‘draws attention to the audible differences that specific devices and studio processes make’ (2023: 27). This perspective aligns with most research on heaviness, which has largely concentrated on music technology (Herbst 2017b; Thomas 2015; Wallmark 2018; Williams 2015) or at least acknowledged its important role (Kennedy 2017; Smialek 2015; Walser 1993).

Contemporary metal productions seldom aim to simulate a realistic acoustic performance environment; instead, they construct a distinct, hyperreal sound (Mynett 2019b: 73). Unlike productions from the 1970s to the 1990s, which prioritized performance authenticity, today’s metal productions emphasize exaggerated detail and size to create a ‘larger than life’ impression (Mynett 2019b: 71). This shift has led production practices ‘away from traditional, performance-focused, recording, towards a more fragmented, technologically architectural approach’ that leverages ‘innovative processing and architectural approaches to recording, and mixing, the instrumental elements of the genre’ (Thomas and King 2019: 499).

As a result, contemporary compositions have become increasingly varied, characterized by heightened speed, refined performance precision, and—partly owing to more powerful digital music production tools—sounds that are bigger, weightier, and clearer. Evidence suggests that the genre’s intensified heaviness is largely shaped by this trend towards extreme, radical, and—depending on one’s perspective—unrealistic and hyperreal production, which some might argue radically alters the music’s authenticity (Thomas and King 2019: 501). These developments have led to greater use of programmed drums, bass, and lead guitar, effectively making composition and performance elements integral to the production ‘product’ itself (Herbst and Mynett 2021; Herbst and Vallejo 2023).

Examining the sound of death metal, Wallmark (2018) concludes that extremity is fundamental to its aesthetic and appeal. He identifies various elements of performance, composition, and production that are driven by the pursuit of ever-greater extremity (Kahn-Harris 2007), mirroring metal’s broader pursuit of increased heaviness. Regarding technology’s role, Wallmark argues that this drive for transgression ‘has led us to the proverbial brink: human bodies are becoming inadequate to the task, and machines are used as a substitute’. He cites ‘inhumanly fast’ drumming (2018: 81) as an example of how technological advances enable levels of extremity beyond

human physical capabilities (see also Walch 2023: 84–127). He further elaborates:

It could be argued that bodily, material limits have been reached in the death metal scene, but this in itself does not augur the end to this teleological pattern, at least not yet. In the arms race of extreme in death metal, human bodies have been aided and abetted by various technologies to expand the limits of possibility: formerly unsurpassable boundaries are, with computer manipulation, suddenly available to us. . . . [W]ith the help of technology, what we *hear* in death metal is vastly different from the reality of its physical production.

(Wallmark 2018: 76–77, *italics in the original*)

As musicians approach physical limits in terms of tempo and lower tuning, technology is a promising means of furthering metal's pursuit of 'greater X' (Berger and Fales 2005: 193). This 'greater X' may be achieved through heaviness, extremity, aggression, brutality, evilness, or any other desired attribute across metal's diverse subgenres. Whether or when technology will eventually reach its own limits in this quest remains uncertain.

Defining musical heaviness with fixed weightings for production, performance, and composition is equally challenging. First, despite a commonly assumed universal understanding within the metal genre, heaviness varies considerably across subgenres and is shaped by subjective factors, including emotional, associative, and ideological influences external to the music itself. Second, heaviness is relative, changing over time and in comparison to other music releases within a given period; music once considered heavy may no longer qualify as such just a few years later (Berger and Fales 2005: 182–183; Xhignesse 2024). Third, empirical studies indicate that perceptions of heaviness differ between fans and non-fans and, likely, among listeners of different metal subgenres (Berger 1999b; Herbst 2018, 2019; Czedik-Eysenberg, Knauf, and Reuter 2017; Xhignesse 2024). For instance non-fans encountering distorted guitar tones, extreme vocals, or aggressive high-speed drumming tend to perceive the music as heavy (Herbst 2018), likely due to its relative inaccessibility (Xhignesse 2024).

Metal fans, however, might argue that the aggressiveness of metalcore, with its screamed vocals and rhythmically intricate ensemble performances, exceeds the heaviness of older death metal, which employs grunts and deep timbres. Perceptions of heaviness incorporate qualities such as aggression, punch, power, rawness, evilness, and brutality, all of which may be components of metal's heaviness. Specific musical attributes also contribute, including 'thickness' from layered sound; 'fatness' from an intensified low-end spectrum; and 'fullness' from pronounced overtones. Associative descriptors like 'darkness', achieved through attenuated high frequencies, convey

genre-specific meanings such as sadness, evilness, or mystery (Wallmark 2018; Walther-Hansen 2020: 98–100).

In the metal genre, musical heaviness appears to rely on a core set of widely accepted attributes: weight, size, density, loudness, power, aggression, energy, emotion, and intensity (Mynett 2017: 9–21), conveyed through harmonic distortion, composition, and performance. Even though academic discourse typically defines heaviness in terms of sonic weight and slowness (Thomas 2015; Smialek 2015), discussions among practitioners emphasize the importance of additional ‘force’ qualities (Walther-Hansen 2020). Many metal musicians and producers believe that focusing solely on weight does not achieve maximal heaviness unless it is combined with power and energy (Mynett 2017; Thomas 2015). In this view, a merely ‘sluggish’ sound lacks the impact necessary for true heaviness, which requires force for an impactful effect. ‘Heavy’ playing gestures with clear attack transients contribute to this force or ‘punch’ (Fenton and Lee 2019), ideally supported by audio-processing techniques such as wave-shaping and equalization, along with structural reinforcement from other instruments within the arrangement (Mynett 2017, 2019a). Conversely, a production aesthetic that overemphasizes force by amplifying transients and high-frequency energy risks diminishing the perception of heaviness, as sonic weight remains a foundational element. This balance between weight and force is a consensus point in both practitioner discussions and academic literature.

Heaviness in metal encompasses various forms (see Miller 2021; Xhignesse 2024), with each subgenre prioritizing specific qualities to establish distinct aesthetic, ideological, and emotional identities. Attempting to definitively determine the heaviest, most extreme, brutal, or evil musical parameters is therefore futile. A more fruitful approach is to examine how structural, performative, and technological components interact to achieve the intended effect of heaviness. Beyond the core musical characteristics, heaviness remains open to adaptation and experimentation. Various emphases and variations allow for personalization, enabling practitioners to align with their tastes and differentiate among subgenres. Although metal practitioners universally value heaviness, they often infuse it with qualities personally meaningful to them, shaped by their experiences and preferences as producers, musicians, and listeners. From a psychoanalytic perspective, concepts like heaviness serve as ‘signifiers’ that shape metal’s ‘ego ideal’, enabling artists and fans to transcend the mundane and surpass limitations (Walch 2023: 7–8).

The netnographic study reveals numerous examples of personalized approaches to heaviness, reflecting varying emphases on aggression, intensity, chaos, or brutality; differing values placed on composition, performance, and production; and preferences for cohesion over separation or sonic weight over clarity. This openness makes heaviness a versatile expressive and aesthetic tool, granting metal creators and listeners the freedom to explore new,

personally meaningful forms of expression. This adaptability likely contributes to metal's enduring pursuit of ever-greater heaviness.

One of the most interesting observations is the central role of emotion in relation to heaviness (see Berger 1999b: 58; Zagorski-Thomas 2014: 215). While prior metal research has highlighted music's emotional functions, particularly regarding listener empowerment (Wallach, Berger, and Greene 2011; Weinstein 2000), this empowerment is often framed as a personal function; however, it is mainly sociological. In contrast, discussions in online forums suggest a deep engagement with the sonic aesthetics of heaviness, driven not only by societal functions but also by personal identification, aesthetic contemplation, and communal interaction.

Heaviness is far more than metal's 'defining feature' (Berger and Fales 2005: 181); it carries ideological significance for its audience and is intimately connected to the individual. Musicians shape their own interpretations of heaviness through their instruments or voices, marking their artistic identity and amplifying their expressiveness. Similarly, producers view crafting heaviness during recording and engineering processes as their ultimate objective and a testament to the quality of their work (Mynett 2017). An audience that values this craftsmanship appreciates not only the artistry but also the emotional connection that arises from meticulously produced recordings. Heaviness thus transcends a mere sonic aesthetic. Particularly in recorded media, which lack direct interaction between artists and listeners, heaviness serves as an expressive vehicle and an intricate communicative device of the values that metal embodies: originality, authenticity, artistry and craftsmanship, rebellion, empowerment, agency, emotional support, community, and shared values.

Notes

- 1 The framework of components that constitute heaviness presented in Sections 2.2 and 2.3 has been published in a shorter and earlier form in Herbst and Mynett (2022a, 2022b).
- 2 A shorter version of the study is published in Herbst and Mynett (2022b).
- 3 The message boards analysed are listed in the Appendix (Table 2.1).

Bibliography

- Adlington, Robert (2003). 'Moving beyond Motion: Metaphors for Changing Sound'. *Journal of the Royal Musical Association*, 128(2): 297–318.
- Baudrillard, Jean (1994). *Simulacra and Simulation*. Ann Arbor, MI: University of Michigan Press.
- Berger, Harris M. (1999a). 'Death Metal Tonality and the Act of Listening'. *Popular Music*, 18(2): 161–178.
- Berger, Harris M. (1999b). *Metal, Rock, and Jazz: Perception and the Phenomenology of Musical Experience*. Hanover, NH: University Press of New England.
- Berger, Harris M. and Fales, Cornelia (2005). 'Heaviness in the Perception of Heavy Metal Guitar Timbres: The Match of Perceptual and Acoustic Features over Time',

- in *Wired for Sound: Engineering and Technologies in Sonic Cultures*, edited by Paul D. Greene and Thomas Porcello (pp. 181–197). Middletown, CT: Wesleyan University Press.
- Berger, Harris M.; Wallach, Jeremy and Greene, Paul D. (eds.) (2011). *Metal Rules the Globe: Heavy Metal Music Around the World*. Durham, NC: Duke University Press.
- Berry, Mick and Gianni, Jason (2004). *The Drummer's Bible: How to Play Every Drum Style from Afro-Cuban to Zydeco*. Arizona: See Sharp Press.
- Bloechl, Olivia (2005). 'Orientalism and Hyperreality in "Desert Rose"'. *Journal of Popular Music Studies*, 17(2): 133–161.
- Boddington-Jordan, James and Herbst, Jan-Peter (2023). 'Harmonic Structures in Twenty-First-Century Metal Music: A Harmonic Analysis of Five Major Metal Genre'. *Metal Music Studies*, 9(1): 27–58.
- Brown, Andy R.; Spracklen, Karl; Kahn-Harris, Keith and Scott, Niall (eds.) (2016). *Global Metal Music and Culture*. London: Routledge.
- Brown, Jake (2009). *Rick Rubin: In the Studio*. Montreal: ECW Press.
- Burgess, Richard J. (2013). *The Art of Music Production: The Theory and Practice*. Oxford: Oxford University Press.
- Cope, Andrew L. (2010). *Black Sabbath and the Rise of Heavy Metal Music*. Farnham: Ashgate.
- Corey, Jason (2017). *Audio Production and Critical Listening*. New York, NY: Routledge.
- Czedik-Eysenberg, Isabella; Knauf, Denis and Reuter, Christoph (2017). "Hardness" As a Semantic Audio Descriptor for Music Using Automatic Feature Extraction', in *Informatik 2017*, edited by Maximilian Eibl and Martin Gaedke (pp. 101–110). Bonn: Gesellschaft für Informatik.
- Danielsen, Anne (2012). 'The Sound of Crossover: Micro-Rhythm and Sonic Pleasure in Michael Jackson's "Don't Stop 'Til You Get Enough"'. *Popular Music and Society*, 35(2): 151–168.
- Dockwray, Ruth and Moore, Allan F. (2010). 'Configuring the Sound-Box 1965–1972'. *Popular Music*, 29(2): 181–197.
- Fenton, Steven and Lee, Hyunkook (2019). 'A Perceptual Model of "Punch" Based on Weighted Transient Loudness'. *Journal of the Audio Engineering Society*, 67(6): 429–439.
- Fenton, Steven; Lee, Hyunkook and Wakefield, Jonathan (2014). 'Elicitation and Objective Grading of "Punch" within Produced Music'. *136th International Audio Engineering Society Convention*, Berlin, pp. 189–196.
- Friesen, Bruce K. and Epstein, Jonathon S. (1994). 'Rock and Roll Ain't Noise Pollution: Artistic Conventions and Tensions in the Major Subgenres of Heavy Metal Music'. *Popular Music*, 18(3): 1–17.
- Gamble, Steven (2019). 'Breaking down the Breakdown in Twenty-First-Century Metal'. *Metal Music Studies*, 5(3): 337–354.
- Garza, Jose M. (2021). 'Transcending Time (Feels)'. *Music Theory Online*, 27(1). <https://mtosmt.org/issues/mto.21.27.1/mto.21.27.1.garza.html>.
- Gibson, David (2005). *The Art of Mixing: A Visual Guide to Recording, Engineering, and Production*. Boston, MA: Course Technology.
- Gibson, James J. (1979). *The Ecological Approach to Visual Perception*. Boston, MA: Houghton Mifflin.
- Gomez, Patrick and Danuser, Brigitta (2007). 'Relationships between Musical Structure and Psychophysiological Measures of Emotion'. *Emotion*, 7(2): 377–387.
- Grossmann, Hannes (2013). *Extreme Metal Drumming*. Milwaukee, WI: Hal Leonard.
- Hagen, Ross (2011). 'Musical Style, Ideology, and Mythology in Norwegian Black Metal', in *Metal Rules the Globe*, edited by Jeremy Wallach, Harris M. Berger, and Paul D. Greene (pp. 180–199). Durham, NC: Duke University Press.

- Halnon, Karen (2006). 'Heavy Metal Carnival and Dis-Alienation: The Politics of Grotesque Realism'. *Symbolic Interaction*, 29(1): 33–48.
- Hannan, Calder (2018). 'Difficulty as Heaviness: Links between Rhythmic Difficulty and Perceived Heaviness in the Music of Meshuggah and the Dillinger Escape Plan'. *Metal Music Studies*, 4(3): 433–458.
- Herbst, Jan-Peter (2014). *Netzwerk Sound: Eine didaktische Herausforderung der populären Musik*. Augsburg: Wißner.
- Herbst, Jan-Peter (2017a). 'Akkordstrukturen im verzerrten Rockgitarrenriff. Eine experimental-analytische Studie zur Auswirkung von physikalischen und psychoakustischen Faktoren'. *ASPM Samples*, 15: 1–27. <https://gfpmp-samples.de/Samples15/herbst.pdf>.
- Herbst, Jan-Peter (2017b). 'Historical Development, Sound Aesthetics and Production Techniques of the Distorted Electric Guitar in Metal Music'. *Metal Music Studies*, 3(1): 24–46.
- Herbst, Jan-Peter (2017c). 'Shredding, Tapping and Sweeping: Effects of Guitar Distortion on Playability and Expressiveness in Rock and Metal Solos'. *Metal Music Studies*, 3(2): 231–250.
- Herbst, Jan-Peter (2018). 'Heaviness and the Electric Guitar: Considering the Interaction Between Distortion and Harmonic Structures'. *Metal Music Studies*, 4(1): 95–113.
- Herbst, Jan-Peter (2019). 'Distortion and Rock Guitar Harmony: The Influence of Distortion Level and Structural Complexity on Acoustic Features and Perceived Pleasantness of Guitar Chords'. *Music Perception*, 36(4): 335–352.
- Herbst, Jan-Peter (ed.) (2023). *The Cambridge Companion to Metal Music*. Cambridge: Cambridge University Press.
- Herbst, Jan-Peter and Mynett, Mark (2021). 'Nail the Mix: Standardization in Mixing Metal Music'. *Popular Music and Society*, 44(5): 628–649.
- Herbst, Jan-Peter and Mynett, Mark (2022a). 'Toward a Systematic Understanding of "Heaviness" in Metal Music Production'. *Rock Music Studies*, 10(1): 16–37.
- Herbst, Jan-Peter and Mynett, Mark (2022b). 'What Is "Heavy" in Metal? A Netnographic Analysis of Online Forums for Metal Musicians and Producers'. *Popular Music and Society*, 45(5): 633–653.
- Herbst, Jan-Peter and Mynett, Mark (2023a). 'Lorna Shore's "to the Hellfire": A Study in Heaviness'. *Metal Music Studies*, 9(2): 189–213.
- Herbst, Jan-Peter and Mynett, Mark (2023b). 'Mapping the Origins of Heaviness between 1970 and 1995: A Historical Overview of Metal Music Production', in *The Cambridge Companion to Metal Music*, edited by Jan-Peter Herbst (pp. 29–42). Cambridge: Cambridge University Press.
- Herbst, Jan-Peter and Vallejo, Alexander (2023). *Rock Guitar Virtuosos: Advances in Electric Guitar Playing, Technology and Culture*. Cambridge: Cambridge University Press.
- Hillier, Benjamin (2020a). 'Considering Genre in Metal Music'. *Metal Music Studies*, 6(1): 5–26.
- Hillier, Benjamin (2020b). 'Musical Practices in Early Melodic Death Metal'. *Journal of Music Research Online*, 11: 1–28.
- Hudson, Stephen S. (2022). 'Review of *Making Sense of Recordings: How Cognitive Processing of Recorded Sound Works* by Mads Walther-Hansen, Oxford University Press, 2020'. *Integral*, 35: 103–108.
- Izhaki, Roey (2013). *Mixing Audio: Concepts, Practices and Tools*. Oxford: Focal Press.
- Johnson, Mark (1987). *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason*. Chicago, IL: University of Chicago Press.
- Kahn-Harris, Keith (2007). *Extreme Metal: Music and Culture on the Edge*. Oxford: Berg.

- Kahn-Harris, Keith (2014). 'Breaking Metal's Boundaries'. *Souciant*. <http://souciant.media/2014/01/breaking-metals-boundaries>. Accessed 8 October 2024.
- Kellner, Douglas (2019). 'Jean Baudrillard', in *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta. <https://plato.stanford.edu/archives/win2019/entries/ baudrillard>. Accessed 8 October 2024.
- Kennedy, Lewis (2017). 'Functions of Genre in Metal and Hardcore Music'. PhD thesis, University of Hull.
- Kozinets, Robert V. (2020). *Netnography: The Essential Guide to Qualitative Social Media Research*. Los Angeles, CA: Sage.
- Lakoff, George and Johnson, Mark (1980). *Metaphors We Live by*. Chicago, IL: University of Chicago Press.
- Langacker, Ronald W. (2002). *Concept, Image, and Symbol: The Cognitive Basis of Grammar*. New York, NY: Mouton de Gruyter.
- Levi, Eyal (2014). 'Metal Drum Programming'. *Creative Live*. www.creativelive.com/class/metal-drum-programming-eyal-levi. Accessed 8 October 2024.
- Man, Brecht de and Reiss, Joshua D. (2015). 'Analysis of Peer Reviews in Music Production'. *Journal on the Art of Record Production*, 10. www.arppjournal.com/asarpwp/analysis-of-peer-reviews-in-music-production. Accessed 8 October 2024.
- Massy, Sylvia (2016). *Recording Unhinged: Creative and Unconventional Music Recording Techniques*. Milwaukee, WI: Hal Leonard.
- Matami, Jo (2018). 'Tosin Abasi: Why Animals as Leaders Don't Have a Bassist'. *Ultimate Guitar*. www.ultimate-guitar.com/news/general_music_news/tosin_abasi_why_animals_as_leaders_dont_have_a_bassist.html. Accessed 8 October 2024.
- Matera, Joe (2020). 'How Entombed and Sunlight Studios Gave Birth to Death-Metal Guitar Tone'. *Guitar World*. www.guitarworld.com/features/how-entombed-and-sunlight-studios-gave-birth-to-death-metal-guitar-tone. Accessed 8 October 2024.
- McIver, Joel (2009a). *Justice for All: The Truth about Metallica*. London: Omnibus.
- McIver, Joel (2009b). *The Bloody Reign of Slayer*. Kindle. London: Omnibus.
- McKinnon, Colin A. (2009). 'Louder Than Hell: Power, Volume and the Brain', in *Heavy Fundamentalisms: Music, Metal, and Politics*, edited by Rosemary Hill and Karl Spracklen (pp. 113–126). Oxford: Inter-Disciplinary Press.
- Mesiä, Susanna and Ribaldini, Paolo (2015). 'Heavy Metal Vocals: A Terminology Compendium', in *Modern Heavy Metal: Markets, Practices and Cultures*, edited by Toni-Matti Karjalainen and Kimi Kärki (pp. 383–392). Helsinki: Aalto University.
- Miller, Jason (2021). 'What Makes Heavy Metal "Heavy"?'. *The Journal of Aesthetics and Art Criticism*, 80(1): 70–82.
- Moore, Allan F. (2001). *Rock, the Primary Text: Developing a Musicology of Rock*. Aldershot: Ashgate.
- Moore, Allan F. (2012). *Song Means: Analysing and Interpreting Recorded Popular Song*. Farnham: Ashgate.
- Moore, Allan F.; Schmidt, Patricia and Dockwray, Ruth (2011). 'A Hermeneutics of Spatialization for Recorded Song'. *Twentieth-Century Music*, 6(1): 83–114.
- Moore, Austin (2019). 'Tracking with Processing and Coloring as You Go', in *Producing Music*, edited by Russ Hepworth-Sawyer (pp. 209–226). New York, NY: Routledge.
- Moorefield, Virgil (2005). *The Producer as Composer: Shaping the Sounds of Popular Music*. Cambridge, MA: MIT Press.
- Moylan, William (2007). *The Art of Recording: Understanding and Crafting the Mix*. Amsterdam: Elsevier.
- Mynett, Mark (2013). 'Contemporary Metal Music Production'. PhD thesis, University of Huddersfield.
- Mynett, Mark (2016). 'The Distortion Paradox: Analyzing Contemporary Metal Production', in *Global Metal Music and Culture*, edited by Andy R. Brown, Karl Spracklen, Keith Kahn-Harris, and Niall Scott (pp. 68–88). London: Routledge.

- Mynett, Mark (2017). *Metal Music Manual: Producing, Engineering, Mixing, and Mastering Contemporary Heavy Music*. Abingdon: Routledge.
- Mynett, Mark (2019a). 'Defining Contemporary Metal Music: Performance, Sounds and Practices'. *Metal Music Studies*, 5(3): 297–313.
- Mynett, Mark (2019b). 'Heaviness in Three Dimensions: The Use of Sonic Space in Contemporary Metal Music Production', in *Art of Record Production: Creative Practice in the Studio*, edited by Simon Zagorski-Thomas, Katia Isakoff, Sophie Stévanec, and Serge Lacasse (pp. 66–79). Abingdon: Routledge.
- Mynett, Mark (2020). 'Maximum Sonic Impact: (Authenticity/Commerciality) Fidelity-Dualism in Contemporary Metal Music Production', in *The Bloomsbury Handbook of Music Production*, edited by Simon Zagorski-Thomas and Andrew Bourbon (pp. 293–302). London: Bloomsbury.
- Mynett, Mark; Wakefield, Jonathan and Till, Rupert (2010). 'Intelligent Equalisation Principles and Techniques for Minimising Masking When Mixing the Extreme Modern Metal Genre', in *The Metal Void: First Gatherings*, edited by Niall Scott and Imke von Helden (pp. 141–146). Oxford: Inter-Disciplinary Press.
- Nyman, John (2013). 'Double Bass Legends: A Short History'. *Drum Magazine*. <https://drummagazine.com/double-bass-legends-a-short-history>. Accessed 8 October 2024.
- OED (n.d.). 'Organic'. www.oed.com/view/Entry/132431?redirectedFrom=organic#eid. Accessed 18 April 2023.
- Pedersen, Torben (2008). 'The Semantic Space of Sounds: Lexicon of Sound-Describing Words'. https://assets.madebydelta.com/assets/docs/share/Akustik/The_Semantic_Space_of_Sounds.pdf. Accessed 16 March 2021 [no longer accessible].
- Phillipov, Michelle (2012). *Death Metal and Music Criticism: Analysis at the Limits*. Lanham, MD: Lexington Books.
- Pieslak, Jonathan (2008). 'Sound, Text and Identity in Korn's "Hey Daddy"'. *Popular Music*, 27(1): 35–52.
- Pillsbury, Glenn T. (2006). *Damage Incorporated: Metallica and the Production of Musical Identity*. New York, NY: Routledge.
- Podoshen, Jeffrey; Andrzejewski, Susan; Wallin, Jason and Venkatesh, Vivek (2018). 'Consuming Abjection: An Examination of Death and Disgust in the Black Metal Scene'. *Consumption Markets and Culture*, 21(2): 107–128.
- Porcello, Thomas (2004). 'Language and the Professionalization of Sound-Recording Engineers'. *Social Studies of Science*, 34(5): 733–758.
- Purcell, Natalie J. (2003). *Death Metal Music: The Passion and Politics of a Subculture*. Jefferson, NC: McFarland.
- Reyes, Ian (2008). 'Sound, Technology, and the Interpretation in Subcultures of Heavy Music Production'. PhD thesis, Pittsburgh University.
- Reyes, Ian (2013). 'Blacker Than Death: Recollecting the "Black Turn" in Metal Aesthetics'. *Journal of Popular Music Studies*, 25(2): 240–257.
- Rizzi, Emilio M. (2016). 'Music Production in Heavy Metal Music'. MA thesis, University of York.
- Roddy, Derek (2007). *The Evolution of Blast Beats*. Pembroke Pines, FL: World Music 4all.
- Russo, Joseph (2014). 'Perpetue Putesco: Perpetually I Putrefy', in *Hideous Gnosis: Black Metal Theory Symposium 1*, edited by Nicola Masciandaro (pp. 93–104). Lexington, KT: CreateSpace Independent Publishing.
- Ryzhova, Daria; Rakhilina, Ekaterina and Kholkina, Liliya (2019). 'Approaching Perceptual Qualities: The Case of Heavy', in *Perception Metaphors*, edited by Laura J. Speed, Carolyn O'Meara, Lila San Roque, and Asifa Majid (pp. 185–207). Amsterdam: John Benjamins Publishing.
- Senior, Mike (2011). *Mixing Secrets for the Small Studio*. Burlington: Focal Press.

- Smialek, Eric (2015). 'Genre and Expression in Extreme Metal Music, ca. 1990–2015'. PhD thesis, McGill University.
- Smialek, Eric (2023). 'Contempt-of-Core: A Reception History of Metalcore Subgenres as Abject Genres', in *The Cambridge Companion to Metal Music*, edited by Jan-Peter Herbst (pp. 281–298). Cambridge: Cambridge University Press.
- Solberg, Ragnhild T. (2014). "'Waiting for the Bass to Drop": Correlations between Intense Emotional Experiences and Production Techniques in Build-up and Drop Sections of Electronic Dance Music'. *Dancecult*, 6(1): 61–82.
- St-Laurent, Méi-Ra (2019). "'It's Kind of in the Middle": The "Mid-Fi" Aesthetic: Toward a New Designation of Black Metal Aesthetic of Recording: The Case of the Québec Black Metal Scene', in *Proceedings of the 12th Art of Record Production Conference: Mono: Stereo: Multi*, edited by Jan-Olof Gullö (pp. 267–286). Stockholm: Royal College of Music.
- Swallow, Reuben and Herbst, Jan-Peter (2022). 'Dissonance in Metal Music: Musical and Sociocultural Reasons for Metal's Appreciation of Dissonance'. *Metal Music Studies*, 8(3): 351–379.
- Théberge, Paul (1997). *Any Sound You Can Imagine: Making Music/Consuming Technology*. Hanover, NH: Wesleyan University Press.
- Thomas, Niall (2015). 'The Development of Technology and Its Influence on Recorded Heavy Metal Music 1969–2015'. PhD thesis, University of Hull.
- Thomas, Niall and King, Andrew (2019). 'Production Perspectives of Heavy Metal Record Producers'. *Popular Music*, 38(3): 498–517.
- Tsai, Chen-Gia; Wang, Li-Ching and Wang, Shwu-Fen et al. (2010). 'Aggressiveness of the Growl-Like Timbre: Acoustic Characteristics, Musical Implications, and Biomechanical Mechanisms'. *Music Perception*, 27(3): 209–222.
- Turner, Dan (2009). 'Outlining the Fundamental Production Aesthetics of Commercial Heavy Metal Music Utilising Systematic Empirical Analysis'. *Art of Record Production Conference*. www.artofrecordproduction.com/aorpjoom/symposiums/21-arj-2009/117-turner-2009. Accessed 8 October 2024.
- Vento, Ron (2009). 'Death and Black Metal: Recording Death and Black Metal'. *Tape Op: The Creative Recording Magazine*, 71: 24–26.
- Volák, Vojtěch (2022). 'Heaviness: A Key Concept of Metal Music through the Lens of Deleuzian Philosophy'. *Studia de Cultura*, 14(3): 53–62.
- Walch, Florian (2023). 'Extreme Metal across the Digital Divide: Music, Technology, Genre'. PhD thesis, University of Chicago.
- Wallach, Jeremy; Berger, Harris M. and Greene, Paul D. (2011). 'Affective Overdrive, Scene Dynamics, and Identity in the Global Metal Scene', in *Metal Rules the Globe*, edited by Harris M. Berger, Jeremy Wallach, and Paul D. Greene (pp. 3–33). Durham, NC: Duke University Press.
- Wallmark, Zachary (2018). 'The Sound of Evil: Timbre, Body, and Sacred Violence in Death Metal', in *The Relentless Pursuit of Tone*, edited by Robert Fink, Melinda Latour, and Zachary Wallmark (pp. 65–87). New York, NY: Oxford University Press.
- Wallmark, Zachary; Iacoboni, Marco; Deblieck, Choi and Kendall, Roger (2018). 'Embodied Listening and Timbre: Perceptual, Acoustical, and Neural Correlates'. *Music Perception*, 35(3): 332–363.
- Walser, Robert (1993). *Running with the Devil: Power, Gender, and Madness in Heavy Metal Music*. Hanover, NH: University Press of New England.
- Walther-Hansen, Mads (2020). *Making Sense of Recordings*. Oxford: Oxford University Press.
- Weinstein, Deena (2000). *Heavy Metal: The Music and Its Culture*. Cambridge, MA: Da Capo Press.
- Wenger, Etienne (1998). *Communities of Practice: Learning, Meaning, and Doing*. New York, NY: Cambridge University Press.

- Wiederhorn, Jon (2020). 'Metallica's Ride the Lightning: The Album That Broke the Boundaries of Thrash'. *Louder Sound*. www.louderound.com/features/the-top-10-best-metallica-songs-from-the-1980s. Accessed 8 October 2024.
- Wiederhorn, Jon and Turman, Katherine (2013). *Louder Than Hell: The Definitive Oral History of Metal*. New York, NY: It Books.
- Williams, Duncan (2015). 'Tracking Timbral Changes in Metal Production from 1990 to 2013'. *Metal Music Studies*, 1(1): 39–68.
- Windleburn, Maurice (2021). 'Musical Hyperrealism: Exploring Noah Creshevs-ky's Compositions through Jean Baudrillard's Ideas'. *Organised Sound*, 26(3): 403–412.
- Xhignesse, Michel-Antoine (2024). 'The Heaviest Metal'. *Philosophia*, 52: 681–697.
- Zagorski-Thomas, Simon (2010). 'The Stadium in Your Bedroom: Functional Stag-ing, Authenticity and the Audience-Led Aesthetic in Record Production'. *Popular Music*, 29(2): 251–266.
- Zagorski-Thomas, Simon (2012). 'Musical Meaning and the Musicology of Record Production', in *Black Box Pop: Analysen populärer Musik*, edited by Dietrich Helms and Thomas Phleps (pp. 135–147). Bielefeld: Transcript.
- Zagorski-Thomas, Simon (2014). *The Musicology of Record Production*. Cambridge: Cambridge University Press.
- Zagorski-Thomas, Simon (2016). 'An Analysis of Space, Gesture and Interaction in King of Leon's "Sex on Fire"', in *Song Interpretation in 21st-Century Pop Music*, edited by Ralf von Appen, André Doebring, and Allan F. Moore (pp. 116–132). London: Routledge.
- Zak, Albin III (2001). *The Poetics of Rock: Cutting Tracks, Making Records*. Berkeley, CA: University of California Press.
- Zbikowski, Lawrence M. (2002). *Conceptualizing Music: Cognitive Structure, The-ory, and Analysis*. New York, NY: New York University Press.

Discography

- Accept (1982). 'Fast as a Shark', on *Restless and Wild*. Brain.
- Animals as Leaders (2009). *Animals as Leaders*. Prosthetic Records.
- Thy Art Is Murder (2019a). 'Make America Hate again', on *Human Target*. Nuclear Blast.
- Thy Art Is Murder (2019b). 'Welcome to Oblivion', on *Human Target*. Nuclear Blast.
- Asphyx (2020). 'Molten Black Earth', on *Necroceros*. Century Media.
- At the Gates (1995). 'Slaughter of the Soul', on *Slaughter of the Soul*. Earache.
- Bathory (1984). *Bathory*. Black Mark Production.
- Bathory (1985). *The Return . . .* Black Mark Production.
- Bathory (1987). *Under the Sign of the Black Mark*. Under One Flag.
- Black Dahlia Murder (2007). 'Everything Went Black', on *Nocturnal*. Metal Blade Records.
- Black Sabbath (1970). *Black Sabbath*. Vertigo.
- Cannibal Corpse (1993). *Hammer Smashed Face*. Metal Blade Records.
- Cannibal Corpse (2012). 'The Strangulation Chair', on *Torture*. Metal Blade Records.
- Carcass (1991). 'Symposium of Sickness', on *Necroticism: Descanting the Insalubri-ous*. Ear Music.
- ColdWorld (2008). 'Hymn to Eternal Frost', on *Melancholie²*. Cold Dimensions.
- Cryptopsy (1996). 'Graves of the Fathers', on *None so Vile*. Wrong Again Records.
- D.R.I. (1983). *Dirty Rotten EP*. Dirty Rotten Records.
- Dark Fortress (2010). 'Osiris', on *Ylem*. Century Media.
- Darkthrone (1994). *Transilvanian Hunger*. Peaceville.
- Deep Purple (1970). 'Speed King', on *Deep Purple in Rock*. Harvest.

- The Dillinger Escape Plan (2013). 'Prancer', on *One of Us Is the Killer*. Sumerian Records.
- Dimmu Borgir (2001). 'Kings of the Carnival Creation', on *Puritanical Euphoric Misanthropic*. Nuclear Blast.
- Dimmu Borgir (2018). 'The Unveiling', on *Eonian*. Nuclear Blast.
- DragonForce (2014). 'The Game', on *Maximum Overload*. Ear Music.
- Electric Wizard (2000). 'Funeralopolis', on *Dopethrone*. Rise Above Records.
- Godthrymm (2020). 'We Are the Dead (and Dreaming)', on *Reflections*. Profound Lore.
- Gojira (2005). 'Flying Whales', on *From Mars to Sirius*. Mon Slip.
- Insomnium (2019). 'Valediction', on *Heart Like a Grave*. Century Media.
- Katalepsy (2013). *Autopsychosis*. Unique Leader Records.
- Kreator (1986). *Pleasure to Kill*. Noise.
- Lamb of God (2006). 'Blacken the Cursed Sun', on *Sacrament*. Epic.
- Lorna Shore (2021). 'To the Hellfire', on . . . *And I Return to Nothingness*. Century Media.
- Machine Head (2003). 'Imperium', on *Through the Ashes of Empires*. Roadrunner Records.
- Mastodon (2014). *Once More 'Round the Sun*. Reprise Records.
- Meshuggah (2012). 'I Am Colossus', on *Koloss*. Nuclear Blast.
- Meshuggah (2016). 'MonstroCity', on *The Violent Sleep of Reason*. Nuclear Blast.
- Metallica (1983). *Kill 'Em All*. Megaforce Records.
- Metallica (1984). *Ride the Lightning*. Megaforce Records.
- Metallica (1986). *Master of Puppets*. Elektra.
- Metallica (2008). *Death Magnetic*. Warner Bros. Records.
- Morbid Angel (1989). *Altars of Madness*. Ear Music.
- Morbid Angel (2000). 'He Who Sleeps', on *Gateways to Annihilation*. Ear Music.
- Motörhead (1979). 'Overkill', on *Overkill*. Bronze.
- Oceano (2015). *Ascendants*. Earache.
- Periphery (2016). 'Prayer Position', on *Periphery III: Select Difficulty*. Sumerian Records.
- Rings of Saturn (2019). 'The Husk', on *Gidim*. Nuclear Blast.
- S.O.D. (1985). *Speak English or Die*. Megaforce Records.
- Sepultura (1986). *Morbid Visions*. Cogumelo Produções.
- Slayer (1986a). 'Raining Blood', on *Reign in Blood*. Def Jam Recordings.
- Slayer (1986b). *Reign in Blood*. Def Jam Recordings.
- Sleep (2003). *Dopesmoker*. Tee Pee Records.
- Slipknot (2014). *5: The Gray Chapter*. Roadrunner Records.
- Suffocation (1991). 'Liege of Inveracity', on *Effigy of the Forgotten*. R/C Records.
- Sunn O))) (2019). *Pyroclasts*. Southern Lord.
- Terrorizer (1989). *World Downfall*. Ear Music.
- Tool (1993). *Undertow*. Zoo Entertainment.
- Venom (1981a). *Welcome to Hell*. Neat Records.
- Venom (1981b). 'Witching Hour', on *Welcome to Hell*. Neat Records.
- Venom (1982). *Black Metal*. Neat Records.

APPENDIX

TABLE 2.1 List of analysed online forums.

<i>No.</i>	<i>Forum name</i>	<i>URL</i>
1	Audio Fanzine	https://en.audiofanzine.com/homestudio/forums
2	Basschat	www.basschat.co.uk
3	Drumchat	www.drumchat.com/forum.php
4	Drummer World	www.drummerworld.com/forums/index.php
5	Gearslutz	www.gearslutz.com/board
6	Homerecording	https://homerecording.com/bbs
7	Recording	https://recording.org
8	Sound on Sound	www.soundonsound.com/forum
9	Talkbass	www.talkbass.com/forums
10	TapeOp	https://messageboard.tapeop.com
11	The Fretboard	www.thefretboard.co.uk
12	The Gear Page	www.thegearpage.net/board/index.php
13	Ultimate Guitar	www.ultimate-guitar.com/forum
14	Ultimate Metal	www.ultimatemetal.com/forum

3

PRE-PRODUCTION, SONGWRITING, AND ARRANGEMENT

Developing a Vision

Building on the systematic framework for heaviness outlined in the previous chapter, which integrates aspects of composition, performance, and production, Chapters 3 to 5 examine the key steps, methods, and considerations involved in crafting a ‘heavy’ metal production through the phases of pre-production, recording, mixing, and mastering. This chapter emphasizes the role of pre-production in metal music production, where foundational decisions shape the sonic vision and direction of the project. It also establishes the overarching vision for the project song ‘In Solitude’, detailing its composition and arrangement while outlining the pre-production process.

3.1 General Pre-Production Considerations

An effective metal music production demands a thorough preparation. While digital tools and unconventional mixing approaches are powerful assets in metal production, they cannot compensate for the need for compelling performances and well-arranged songs. Developing a vision for the final product from the outset is essential, as structure, performance, and production must work in concert for optimal results. Pre-production thus becomes an important phase in which songs are refined, performances are honed, and optimal conditions are set for recording. The primary aim of pre-production is to avoid last-minute decisions that could unintentionally fix undesirable elements in the production. Central tasks during pre-production include finalizing song arrangements, selecting appropriate instrumentation and tones, determining the best recording methods, and creating click tracks, often with tempo maps. Ideally, a producer oversees these steps before the band enters the studio, ensuring that both the artist and producer benefit: the

artist arrives with refined arrangements and polished performances, while the producer approaches recording, editing, and mixing with a well-defined aesthetic vision. Invariably, achieving a ‘heavy’ metal production begins with meticulous pre-production.

3.1.1 *Outlining Pre-Production*

The process of writing metal songs varies considerably between bands. Some bands compose collectively in the rehearsal room, testing songs onstage and making revisions based on feedback from live performances before entering the studio. In contrast, other musicians develop their parts individually, with the full band coming together later in the rehearsal room or during demo production to assemble the song. A third approach involves entering the recording studio with preliminary ideas and refining parts during the recording and mixing phases, which is a method that typically requires a record producer to guide the process effectively.

Regardless of a band’s songwriting approach, it is ideal for the producer to be involved early in the process, attending rehearsals and concerts or reviewing demo recordings to help shape a vision for the record and make necessary preparations to realize that vision. However, due to industry budget constraints or when working with less commercially established bands, the producer’s involvement in these preparatory stages is often reduced. Typical pre-production tasks include finalizing arrangements; developing a production schedule; and managing logistics such as studio bookings, equipment procurement, and accommodation arrangements (Lauzon 2017: 115). In amateur or semi-professional productions, however, these organizational aspects may be limited, with the production process often confined to recording and mixing, without significant input from the producer in shaping performances or tones. Cost-saving measures may also lead bands to self-record, relying on professional mixing and mastering only at the end of the production process. In such cases, a comprehensive ‘production’ phase guided by professionals is typically absent, leaving key aesthetic elements like sonic weight, size, density, loudness, power, aggression, energy, emotion, and intensity (Mynett 2017: 21) to chance. This lack of guidance can result in an imbalance or misalignment of these qualities, undermining the intended impact of the band’s music and performances.

Scholarly literature on the pre-production phase is limited. Russ Hepworth-Sawyer (2009: 22) attributes this lack of attention to the inherently multifaceted nature of pre-production, which varies considerably across projects. By design, pre-production involves preparing songs and performances but can also include recorded performances and sound programming elements that later become part of the final mix. One notable example of this approach is Rammstein, known for their high production quality. Rammstein typically

devote one year to refining songs with their producer, finalizing arrangements, keyboards, and electronic components before entering the studio. In the studio, early recordings of drums, guitars, bass, and vocals are re-recorded in a controlled acoustic environment to ensure optimal sound quality. Few creative changes are made during the recording or mixing stages, as the aesthetic is largely established in pre-production (Herbst 2021: 62–71). Rammstein's approach exemplifies a traditional model, clearly delineating the phases of composition, pre-production, recording, mixing, and mastering. This stands in contrast to contemporary productions across most popular music genres, including metal, where these phases are often more fluid and interwoven (Hepworth-Sawyer 2009: 23).

Regardless of budget or professionalism, pre-production has changed over time and varies greatly between genres. In many popular music genres, individual songs are produced as singles to test their popularity before committing to a full album, a strategy that mitigates financial risk for both artists and record labels (Hull et al. 2011: 198). This single-oriented approach often involves overlapping production phases, with teams writing, arranging, sound designing, recording, and mixing in an iterative process (Bennett 2011; Herbst, Ahlers, and Barber 2024). This workflow is streamlined by the electronic basis of much pop music, which relies heavily on MIDI sequencing and sound design rather than extensive live recording (see Brett 2021). In contrast, metal music rarely follows a singles-based approach; bands typically release extended play (EPs) or full albums that require a systematic production process with a cohesive musical vision. Most arrangements in metal rely on recorded performances, so changes to the music, apart from audio processing, usually necessitate re-recording rather than simple adjustments.

3.1.2 *The Value of Pre-Production*

Substantial evidence indicates that most professional metal bands and producers regard pre-production as essential. In our analysis of interviews published in metal-related media, as well as those we conducted on various occasions, only one artist expressed the view that pre-production was unnecessary. Motörhead's singer and bassist, Lemmy Kilmister, commented on the production of their second album, *Overkill* (1979):

In those days, we didn't have a pre-production process really, we just made sure we could all play the song at the same time. Back then, we all played all together in the studio at the same time and tried to get it right because that's how they did it then. Nowadays, you lay the drums first and then build on top of that. I like how we did it then because it saved a lot of fucking time.

(Kilmister in Brown 2010: 21)

Kilmister suggests that long-term studio rentals may hinder creativity, with shorter studio engagements potentially reducing costs and enhancing time efficiency while fostering more spontaneous and energetic performances, which could improve the overall quality of a record. However, his rejection of the contemporary overdub approach likely reflects personal preference rather than a comprehensive critique of studio practice. In contrast, Joey Vera, producer and bassist for Armored Saint, is a strong advocate for pre-production. He highlights the creative benefits of collaborative songwriting within the studio rather than using the space solely for recording:

We made music all in the same room—that's how music was born with us when we were younger. . . . These songs were born mostly out of songwriting, not performance. . . . It's actually liberating because we don't have to worry about, 'How do we play this live?' or, 'How do you recreate this with a band?' . . . [T]hat was the furthest thing from our concern. We don't care about that. We're making this for the record.

(Vera in Saxon 2011)

Vera's perspective on Armored Saint's album *La Raza* (2010a) illustrates the band's vision, which diverged from capturing a purely live sound. Instead, Armored Saint aimed to fully utilize the studio as a compositional tool (see Moorefield 2005), allowing for multiple overdubs and layered sounds beyond the band's typical instruments. This approach incorporated electronic timbres, non-musical samples, and foley effects, which are evident in the introduction to the opening track 'Loose Cannon' (Armored Saint 2010b). Most metal producers, however, fall somewhere between minimal pre-production and extensive songwriting and arrangement work in the studio.

Cost reduction also highlights the importance of pre-production. To mitigate shrinking budgets (Leyshon 2009), rock and metal producers like Tony Platt (Hepworth-Sawyer 2009: 25) and Rick Rubin (Brown 2009: 9) highlight the pressure to minimize studio time. Contemporary artist-producers, such as Devin Townsend, reportedly enter the studio with nearly completed arrangements and mixes, leaving only the final 10% unprepared to be completed in an optimized mixing and mastering environment (Lauzon 2017: 116).

Beyond budget considerations, interviews with influential metal producers from the 1970s and 1980s emphasize pre-production's role in enhancing song quality before production begins. Long-time Metallica producer Bob Rock has stressed that a song must stand on its own merits, independent of an impactful production:

Pre-production with me—for every band—is the same. Every time I've short-changed pre-production, it's never really worked. I try to get into a

rehearsal hall with a really basic tape recorder and work on all the songs—the structure, the riffs—and find out what’s missing. I work on the drum beats, guitar parts, vocal parts, and figure out what needs to be worked on. It always works; any song worth recording should stand on its own with just one mic in the room.

(Rock in Brown 2017: 60)

Slayer producer Rick Rubin, an influential figure from the 1980s, similarly emphasizes that ‘the most important thing a producer can do is spend time getting the songs into shape before recording’ (Zak 2001: 28). This view is echoed by Chris Tsangarides, who has produced iconic acts such as Judas Priest, Black Sabbath, Tygers of Pan Tang, Anvil, Helloween, and Exodus (The Rockpit 2010). The consensus among these seasoned producers highlights the essential role of strong songwriting. While considerable effort is often invested in production to create a hyperreal aesthetic and, for certain bands, to capture hyper-virtuosic performances, a track is more likely to resonate with listeners if its foundational songwriting is solid. In line with the producer’s traditional role as a creative guide, offering artistic insight as well as technical and organizational expertise, this perspective highlights the producer’s contribution to a metal album’s songwriting and arrangement (Burgess 2013; Moorefield 2005).

Most contemporary metal producers agree, believing that songs should be carefully developed before recording. Depending on budget constraints, this preparatory phase can span months, if not years. Matt Hyde, producer for Slayer, Monster Magnet, and Hatebreed, elaborates:

The earlier I can get involved, the better; I like getting involved at the riff level. Sometimes I have a guitar player write a song and then take the five riffs and see what’s the verse. Some guys write great shit, but they don’t even know what the functions are, or they write a riff, and it’s a cool riff, but we need to mix it with another. I may manipulate the riff and try to sell it to them.

(Hyde 2014)

This perspective highlights the value of a producer’s contribution, particularly in offering a fresh take on the material and an outsider’s view into how to make songs more impactful for the listener (Hepworth-Sawyer 2009: 26–27). As Rick Rubin’s career exemplifies, a background in performance or audio engineering is not strictly necessary for this role (Ferris 2008: 55). Nevertheless, most metal producers possess a versatile skill set and extensive experience, focusing on the audience’s experience and understanding how to achieve the desired sonic effect. Logan Mader, producer and engineer for Gojira, DevilDriver, Soulfly, and Septicflesh, illustrates

this multifaceted approach to pre-production, aligning with Matt Hyde's perspective:

I like to start pre-production with the MIDI drums just for the creative benefits. You can easily arrange. I do a lot of co-writing. Finding the right tempos, building the tempo maps before you go to mic a kit, you take the time to really know where you are going. More often than not, I'm doing the drums last these days. The very last thing I do is drums because the song is fully realized. You know where you are going; it just makes more sense.

(Mader 2014)

However, not all contemporary producers aim to finalize every detail of an arrangement during the pre-production phase. Jens Bogren, producer for bands such as Opeth, Amon Amarth, Katatonia, Hammerfall, Kreator, Paradise Lost, Amorphis, Dimmu Borgir, and At the Gates, emphasizes the importance of leaving room for experimentation during recording:

For me, it's more about working with structures, the key of the song, and the basic rough elements. I never go into finding specific harmonies and every little detail and then treat the recording as a better version of the pre-production. I know some people do that, and perhaps it makes sense, but for me, pre-production has always been a more basic thing, and then a lot of magic happens in the studio.

(Bogren 2014)

Bogren values the spontaneous creative moments that can arise unexpectedly during recording (see Thompson 2019) and intentionally leaves room for uncertainty in the arrangement. However, he aligns with most contemporary metal producers by finalizing the fundamental song structure before recording begins, balancing flexibility with essential structure.

Pre-production encompasses not only the compositional quality of songs but also the technical groundwork of the production. Rock scholars Theodore Gracyk (1996: 1) and Albin Zak (2001: 32) concur that the arrangement of recorded sounds, shaped through recording and processing techniques, is as relevant in rock music as the composition itself. Practitioners Roey Izhaki (2013: 30–33) and Dylan Lauzon (2017: 114) similarly recognize that much of the mix and production is influenced by the recording process, which, in turn, depends on pre-production decisions. Izhaki (2013: 32) highlights that arrangement density is among the most crucial elements in a mix, resulting from factors such as pitch range, chords, inversions, rhythmic complexity, the number of sound sources, and their tonal qualities. While these aspects are shaped during recording, they must be anticipated during pre-production (Mynett 2017: 25).

These decisions are informed by a larger vision for the album, as the arrangement and its translation into recorded form considerably impact the final product. This approach is exemplified in an interview with singer Rob Halford, who reflects on the pre-production decisions that shaped Judas Priest's *British Steel* (1980):

A lot of that [the production aesthetic] came from [producer] Tom [Allom]. Tom had an idea of just really keeping it stripped down and very simple and direct. . . . [S]onically he was aware that if you crammed too much into a track, it starts to get smaller instead of bigger. It sounds crazy, but it's true. So, what you provide by distancing things is making everything stand out more. The drums sound bigger, the guitars sound bigger, everything sounds bigger because it's getting its own space. That worked incredibly well for us with *British Steel*.

(Halford in Wilkening 2020)

The vision for *British Steel* centred on achieving a 'big' sound by limiting the number of sound sources, allowing each to occupy sufficient space and ensuring that they sounded 'big' individually.

When it comes to heaviness, the rhythm guitar arrangement warrants special attention. Beyond choosing between two, three, or four rhythm guitar layers, which influences the density of the guitar wall and the available space for other instruments and vocals, bands and producers adopt various approaches. Producers like Joey Sturgis, Romesh Dodangoda, and Andy Sneap emphasize the value of adjusting the number of guitar tracks between sections to create impact through contrast (Williams 2015), supporting the concept of sonic and structural contrast discussed in the framework of heaviness in Chapter 2. Metalcore producer Joey Sturgis notes that varying guitar textures throughout a song is essential to maintain listener interest: 'You've gotta have things happen, you can't just have everything full blast from start to finish, because the song just becomes one big brick of boringness' (Williams 2015).

A common approach is to reduce the number of guitars in the verses, allowing for greater impact in the heaviest sections, typically the chorus. Density can be increased by adding guitar layers with slight performative variations, which thickens the sound. However, as Romesh Dodangoda explains, some impactful techniques depend more on arrangement choices than on the recording process itself:

One of the biggest things in getting a wide guitar sound is to look at what you're playing on the guitar. Sometimes, I will try a different voicing of a chord a guitarist is playing, as you might find a different voicing of the chord naturally sounds bigger. This is a really important step *before*

finding guitar sounds, as this alone can make the guitar sound bigger with more *weight* to it. Using alternative versions of chords for the left and right sides can also help bring more width to the guitar, as the listener will hear the subtle differences on each side and it can make the guitar feel wider than it is.

(*Dodangoda in Williams 2015; emphasis added*)

Andy Sneap supports Dodangoda's perspective, noting that adding more guitar tracks can compromise clarity and definition. To address this, he advocates experimenting with chord voicings across multiple guitars to achieve width through arrangement rather than relying solely on layering during recording (Williams 2015).

The importance of structural and arrangement-related decisions in enhancing the quality of a recorded product cannot be overstated. At the same time, it is essential to acknowledge that arrangements are shaped by the intricacies of the recording process. Electroacoustic principles both define and constrain how an arrangement can be captured and presented in recorded form, often requiring compromises and adaptations to fit recording conditions (Zak 2001: 32). Metal producers must strategize how to best showcase instruments in the mix, carefully considering the anticipated recording process, instrument selection, and how each sound will be captured within the recording space. Other factors include the intensity of the musicians' performances, whether adjustments in playing technique are necessary to meet production requirements, and how engineering can enhance performances to maximize their effectiveness on the record.

Technical requirements and creativity in metal production are closely interwoven (Thomas 2015). Examples of this interaction between engineering and arrangement include reducing guitar tracks to create space for vocal harmonies in dense sections (Sneap 2014), modifying guitar arrangements with different chord inversions to fill sonic space, adding guitar layers to 'give the chorus a bit of a lift' (Sneap 2014), and adjusting drum sounds to match guitar tones, which helps the drums cut through when guitars shift from dark, clean tones to brighter distortion (Bogren 2019).

This intricate relationship between arrangement and production poses a challenge in predicting how arrangement decisions will sound in the final mix. Unlike the well-established method of demo recording, writing and arranging songs without recording provide limited insight into how an arrangement will translate to the final production. Lamb of God drummer Chris Adler illustrates the value of demoing, noting that 'Each of the songs on *Sacrament* (2006) was demoed several times before we got to the point where we said, "Okay, we're ready to record"' (Dawson 2006: 56). In Adler's experience, demoing allows musicians to 'analyze your parts as a listener', offering a broader perspective on what will best serve the song (Dawson 2006: 56).

While drums are often the most improvisational instrument, it is still common practice for each section, including fills, to be carefully composed. This practice is supported by interviews with drummers Chris Adler (Lamb of God), Brann Dailor (Mastodon), and Tomas Haake (Meshuggah), who emphasize the importance of structuring drum parts (Dawson 2006: 58; Micallef 2009: 52; Parillo 2008: 72). Recording demos not only allows for adjustments to structural changes but also provides an opportunity for producers to evaluate how the arrangement, performance, and sounds from the instruments and recording process interact (Mynett 2017: 26). As discussed in relation to guitar and drum sounds, tonal choices directly influence the arrangement and vice versa. Thus, an arrangement is seldom finalized without assessing it through a high-quality mix representation. When a demo meets the necessary quality standard, it can be adapted for the final production, selectively replacing or retaining elements. This approach is exemplified by Rammstein's aforementioned production workflow, where demo components are refined in the final stages (Herbst 2021: 62–71).

3.1.3 Live Recording and Recording More Than One Musician at the Same Time

A significant pre-production decision that impacts the production process is whether to record the entire band live, an approach far less common in metal than in other genres, or to record select instruments together as a foundation for subsequent overdubs. In the latter case, drum tracks are typically retained, although bass or even rhythm guitar parts are sometimes kept as well. Recording parts of the arrangement live influences the recording's sonic characteristics in two ways: first, microphones capture signals from multiple instruments, and, second, live recording affects the overall performance feel. Notably, tracking foundational elements live can pose challenges for achieving heaviness. If instrument synchronization is not precise, it can reduce the clarity of transients, diminishing both the rhythmic and sonic impacts (Mynett 2019, 2020).

The spill from other instruments captured by microphones in live-recording setups can lead to varying outcomes. On the one hand, it may enhance the width and depth of the recording, potentially benefiting the sense of heaviness. On the other hand, it can introduce phase cancellations from comb-filtering and limit processing flexibility by amplifying undesirable artefacts, which can compromise a heavy aesthetic and restrict options for controlling heaviness. The balance between capturing a live performance 'feel' and meeting the contemporary expectation of hyperreal production, exemplified in deathcore band Lorna Shore's 'To the Hellfire' (2021) (Herbst and Mynett 2023b), presents a challenge in metal production. As the demand for hyperrealism has grown, live recordings have become increasingly rare in metal.

Albin Zak notes that many rock bands feel the need to perform live on record to ‘retain the energy of ensemble interaction . . . [for] an authentic representation’ (2001: 57). In metal, however, this drive for collective authenticity has shifted towards a production approach focused on maximizing impact through isolated recordings of each instrument and vocal track (Thomas 2015; Mynett 2017). The less spill from other signals in a recording, the more control and processing options become available to achieve a specific aesthetic, such as intentionally maximizing heaviness (Herbst and Mynett 2021a, 2021b, 2023a).

Recording practices have also changed over time. In the 1970s, 1980s, and even the 1990s, high-profile metal bands and producers often favoured a more traditional, live-tracking approach to capture authentic performances, as evidenced by producer Chris Tsangarides’s comments on Judas Priest’s *Painkiller* (1990) production:

I took the view that the band should perform the songs as if they were playing live and once we captured the drum and bass performance then we would redo the guitars with their final sound. There is only a snare drum sample that I use playing along with the real snare and that is it for any studio trickery. What you hear is what they played so I’m really proud of them for that and it just shows how great they can be.

(*Tsangarides in Krannila, Asell, and Tattari 2009*)

Other seminal metal records were produced with a live approach. One notable example is Slayer’s *Reign in Blood* (1986), which vocalist Tom Araya described simply: ‘The four of us set up, and we played, and that’s about it. And we just kept playing until Rick Rubin was happy with the drum tracks’ (Ferris 2008: 71). Engineer Andy Wallace noted that satisfactory performances were usually achieved within the first three takes (Ferris 2008: 74). Many of the live-recorded performances were reportedly retained for the final mix, resulting in an aesthetic that Wallace described as ‘super-aggressive’ (Tingen 2014) and which assistant engineer David Tobocman characterized as ‘powerful and tight’ (Ferris 2008: 68). An overdub-based production would likely have created a different aesthetic, perhaps heavier but less aggressive.

Another influential record partially based on live recordings is Metallica’s *Black Album* (1991), produced under Bob Rock’s recommendation to ‘play as a live unit inside the studio’ (Masciotra 2015: 44).¹ Metallica further embraced this live approach on later albums like *Death Magnetic* (2008) and *Hardwired to Self-Destruct* (2016), reportedly omitting the click track entirely (Micallef 2008: 49) to cultivate a ‘lively’ sound with more ambience and a ‘more rocking feel’, as described by *Hardwired* producer Greg Fidelman (Tingen 2017). Unlike *Reign in Blood*, however, *Hardwired*

involved re-recording the bass, most rhythm guitars, all solos, and vocals (Tingen 2017), highlighting how metal's precise performances often benefit from isolated recordings to enhance quality. Reflecting on . . . *And Justice for All* (1988a), Lars Ulrich stated that making records 'was always about not f***ing up' (Masciotra 2015: 6). This expectation of flawless, tight performances, coupled with metal's rhythmic complexity, has prevented thrash metal producer Harris Johns (Kreator, Sodom, Tankard) from adopting a live-recording approach in his 40-year career:

Unfortunately, I did only one live production in the studio [*Die Healing* (1995) by doom band Saint Vitus]. A few were planned, and then in the course of the productions, it was like, 'As long as the drums are okay, we can fix the rest'. . . . In metal, the guitarists play difficult stuff. They don't record pieces that they've already been playing for two years, and then they get it wrong from time to time. Then, they'd rather try it again, each individually. (Johns 2018)

Despite thrash metal's proximity to punk, even this subgenre cannot easily centre around live recording.

Fan discourse often perpetuates myths, one of which has persisted for many decades: Iron Maiden's live-recording approach. However, as long-time Iron Maiden producer Martin Birch explained, this method was chosen for practical rather than artistic reasons. Birch, who began working with the band on *Killers* (1981), recorded the band together to make the recording process more comfortable, reducing the psychological pressure on each musician to perform under the intense scrutiny of individual microphones (Wall 2004: 182). In these sessions, only the drum tracks were retained, with all other instruments and vocals re-recorded (Brown 2011: 44, 72). It was not until *Brave New World* (2000) that Iron Maiden fully committed to a live-recording approach under producer Kevin Shirley, with singer Bruce Dickinson emphasizing the 'raw' sound this method produced (Brown 2011: 152–153). However, this process required much more time and resources than a typical overdubbed production, taking 12 days for initial recording and an additional six weeks to compile takes and record overdubs (Brown 2011: 160). This effort recalls Metallica's eight-month production time after live-recording basic tracks for the *Black Album* (Saccone 1992: 25). Given the expenses involved, few metal bands can afford such a resource-intensive live-recording approach. For Iron Maiden, live recording started as a necessity but gradually became an aesthetic hallmark. Bassist Steve Harris emphasized that their songs are written for the stage rather than the studio (Brown 2011: 39), while guitarist Janick Gers highlighted the band's aim to create an aggressive and powerful sound (Brown 2011: 150). Notably, the live-recorded productions of Iron Maiden and Slayer's *Reign in Blood* (1986) were intended to sound

‘aggressive’ and ‘powerful’ rather than ‘heavy’, suggesting that a ‘heavy’ production aesthetic is more likely achieved through an overdub approach, with instruments and vocals recorded separately.

Live recordings of entire bands have steadily declined in metal, coinciding with the growing reliance on programmed drums and bass guitars (Herbst and Mynett 2021a). Metalcore producer Andrew Wade (2018) attributes this shift primarily to the higher costs associated with studio rentals and the time required for recording and editing live instruments. As a result, instrument programming is frequently incorporated into pre-production, alongside recording and producing vocals and all instruments except drums. Musicians can track and pre-produce their parts in project studios, with drums recorded last once the arrangement is finalized. Metalcore producer Joey Sturgis observes that this workflow resembles that of electronic pop music genres, where the songwriting, recording, and production phases often overlap to save time and foster creativity (Levine 2015). Djent metal band Periphery exemplify this approach, as described by engineer/producer Adam ‘Nolly’ Getgood (2016) and evident in their track ‘Prayer Position’ (Periphery 2016). This reverse recording approach is not exclusive to recent bands and producers. Former Machine Head guitarist and producer Logan Mader (2014) and influential producer Andy Sneap (2014) both advocate recording drums last, noting that this order allows the drummer to play to the full arrangement and adjust fills to avoid overlapping with vocal parts.

An additional consideration in the overlap between pre-production and recording is the tracking of rhythm guitars and bass. Producer Jens Bogren (2018) favours the traditional approach of having each guitarist play their own rhythm parts, as slight variations in interpretation can make the sound wider and more musically interesting. However, in pursuit of maximum sonic impact and following the precedent set by Metallica and Slayer, where James Hetfield and Kerry King, respectively, recorded all rhythm guitar parts, many bands now opt to have a single guitarist handle all rhythm tracks (Saxon 2011). In fact, approximately 80% of Bogren’s productions now take this one-guitarist approach (Bogren 2018). While this method can sometimes create tension within a band, it is widely accepted as a way to ensure the highest musical quality, according to producer Fredrik Nordström (2019). Producer Russ Russell (2019) adds that, to achieve the necessary precision, the designated guitarist may vary from song to song or even from riff to riff. Occasionally, the guitarist will also perform the bass parts for optimal precision, as exemplified in Monuments’ ‘I, the Creator’ (2014) (Browne 2017).

3.1.4 *Click Tracks, Quantization, and Tempo as a Compositional Parameter*

Whether instruments are recorded together or separately, the use of click tracks—as well as editing and drum sample usage—remains a contentious

topic among bands, producers, and metal fans (see Walch 2023: 88–127, 152–202). Much of the controversy stems from misunderstandings about the metronome’s purpose and its association with certain ethical issues. The primary function of a click track is to help bands, typically guided by the drummer, maintain a consistent tempo. However, a click does not necessarily impair ‘groove’, which is created through micro-rhythmic deviations relative to the metronomic beat and other instruments (Danielsen 2006: 54). Mark Mynett (2017: 107) observes that performances in many amateur productions lack rhythmic precision, resulting in unintentional deviations from the metric grid, and recommends quantizing these discrepancies, as they often arise from technical limitations rather than artistic intent. Click tracks have garnered criticism partly because rhythmic imperfections in DAWs can now be corrected easily, which, while improving timing, may create mechanical-sounding performances (Mynett 2017: 106–107). There is also an ethical dimension to consider: timing correction can give the impression of a more technically polished performance than what was originally achieved. This underlying criticism likely explains Metallica drummer Lars Ulrich’s assertion that he has never used click tracks for quantization, only as a reference within the DAW project:

[W]e did a lot of takes and the click kept all those takes in the same zip code tempo-wise. We never used the click for anything other than a guide so that all the takes were usable and we could intercut between them. . . . But we never adjusted snare hits to a click grid or any of that. It was just there as recording support.

(Ulrich in Micallef 2008: 50)

In response to the mechanical sound sometimes associated with click tracks, it is important to note that skilled metal performers can play *in relation to* a metronome while intentionally shaping the rhythmic feel. Necrophagist drummer Hannes Grossmann explains that modern metal drummers differentiate among three fundamental time feels: ‘on top’, ‘in the middle’, and ‘behind’, elaborating as follows:

You’ll just find more drummers that generally play ‘on the top’ of the beat, which means playing slightly ahead of the actual metronomic quarter-note pulse. This provides a frantic, energetic feel, but you have to be careful not to rush. Fast stuff always sounds best in this genre when played ‘in the middle,’ which means as close to the metronomic grid as possible, with every stroke having mathematically the right length in correlation to another. . . . Playing ‘behind’ or laid-back is rarely found in extreme metal music.

(Grossmann 2013: 56–57)

Examples of the precise ‘in-the-middle’ feel can be found on Necrophagist’s *Epitaph* (2004) and The Black Dahlia Murder’s *Nocturnal* (2007), while Cynic’s *Focus* (1993) offers a rare example of ‘behind’, laid-back grooves in metal. Beyond the general alignment with the metrical grid, drummers can avoid a sterile sound and introduce groove through subtle micro-rhythmic variations (see Herbst 2020). Although most research suggests minimal expressive timing discrepancies and limited swing or groove in metal (Mynett 2019; Thomas and King 2019), skilled drummers like George Kollias of the technical death metal band Nile maintain that groove is achievable even at extreme tempos. As Kollias notes, ‘Many drummers wonder if it’s even possible to groove at those extreme tempos, but it is, and that’s what, in my opinion, separates the good musician from the average one’ (Grossmann 2013: iv). The ethical dimension of rhythmic precision is even more apparent in a statement by Shadows Fall drummer Jason Bittner:

That’s something I pride myself on. . . . The click is your friend if you know how to work with it. But in this genre of music it can take away from the feel. You can hear how I fluctuate with the click, and that’s a good thing. It’s still in time, but it shows that I’m also a human.

(Bittner in Micallef 2007: 59)

Thus, expressive timing discrepancies are achievable regardless of click track usage (see also Rashidi 2007: 69–70), which challenges the notion that click tracks inherently minimize groove. Nevertheless, some bands, particularly older ones like Judas Priest (Haid 2002: 78), Slayer (Rashidi 2008: 81), and Pantera (Micallef 2004: 68), reject click tracks, believing that they detract from the emotional quality of their music. A notable example is Machine Head; singer Robb Flynn reflected on their production of *Through the Ashes of Empires* (2003):

We wanted to create some great music and capture it. It’s very popular right now to record everything to a click track and then go in and fix everything. It’s very perfect. Everything is perfect. But you get to the point where you’re just cut-and-pasting guitar riffs, cut-and-pasting drum beats, and you’re sampling everything. It’s almost like it really isn’t even music anymore. Our trip was that we just wanted four guys playing music. . . . There was no cutting and pasting. . . . We wanted to make a heavy, musical, frightening record.

(Flynn in McIver 2012: 116)

Flynn’s concerns about the impact of excessive copying and pasting on musical quality are valid, yet recording to a click track is not a necessity that producers must adopt. Given that a grid facilitates changes to the arrangement,

a compromise could be found in recording drums without a metronome and then creating a tempo map based on the performance. According to Andy Sneap, this approach retains the ‘swing and feel of the drummer’ while simplifying tasks like guitar tracking and editing without ‘going in and moving every little beat’ (2014). However, the complexity of the performance must also be considered. More progressive forms of metal often benefit from using a click track and, at times, even recording section by section, as Between the Buried and Me drummer Blake Richardson notes regarding their album *Colors* (2007):

Because there were different tempos, we’d have to record each riff or section separately and then assemble it all as if we were putting together a big puzzle. Some may think it’s a lazy approach to recording, but that’s not the case at all. Given the complexity of the material and what we were trying to accomplish, it was the best way to go about doing it.

(Richardson in Worley 2009: 84)

Mastodon drummer Brann Dailor opposes the piecemeal approach to recording, considering it ‘cheating’ and taking pride in his ability to record complex songs from start to finish without errors (Micallef 2009: 52). Nevertheless, he agrees that click tracks can offer a valuable support for drummers:

I have to admit that me not using a click had presented us with a few problems in the past. With a lot of our songs they’ll start with a theme, then go somewhere else with a heavier feel, then return to the first theme again. And so I have to be careful that when we return to that part, it’s at the same tempo as we started. . . . It’s a nightmare.

(Dailor in McLachlan 2009: 42)

Mynett (2017: 28) notes that professional metal drummers distinguish between recording *to* a click track—strictly following it—and recording *with* a click, using it as an aid rather than a rigid guide. Programming different metric subdivisions, such as half or double time for specific sections, can further support complex rhythmic performances (Mynett 2017: 29–30). Programming click tracks in this way, drummers can enhance their performance quality by achieving greater precision and potentially heaviness.

Dailor’s perspective highlights an additional consideration for click tracks in pre-production: tempo is a fundamental musical parameter. Tempo maps have long been used in metal production, even predating digital recording. One of the earliest documented examples is Metallica’s ‘One’ from . . . *And Justice for All* (1988a). Since *Ride the Lightning* (1984), Metallica had recorded to a click track (Prato 2018). However, as producer Flemming Rasmussen noted, ‘One’ (1988b) was the first Metallica song for which a

complex, meticulously programmed click track was used—a process that took half a day to complete (Buskin 2011). Since then, recording to a programmed tempo map has become increasingly common in metal, as producer Matt Hyde explains:

With most of these new bands, you're always using click tracks and tempo maps. This is what changes. When I did [Slayer's] *God Hates Us All* (2001), there were some count-offs, but there's no tempo maps or click tracks on those records. And you can hear it: incredible tempo ramps. Places where the drums speed up and slow down, and that's what the music needs. I remember just to try it one time to throw a click up, and let's just try it at an even tempo. It just absolutely killed it. So, for that style, no, I can't do it. In today's music, though, even if there are all those ramps, it's all written in, and everything is precisely mapped out in pre-production. There are different styles of pre-production, and it has to do with the band. Usually, it has to do with what era they came in. I might be making a modern metal record, but if it's with a band that's been around for a couple of decades, they're going to expect to go to a rehearsal space and play their shit, and that's the way they're gonna write and record it. And then I analyse that recording, and I generate a tempo map, and we figure it out that way. A lot of the new bands compose their shit primarily in the computer and primarily via MIDI, so a lot of those tempo maps are manipulated in that process, and I start in the computer. And the scratch tracks and tempo maps and everything that I'm going to need for my recording can be generated straight out of the pre-production out of the fact that it's composed. A lot of the times the kick patterns. . . . You hear certain records, and I can tell for a fact that the kick is MIDI, and the guy is only playing hands over the kick because you get a specialized, ridiculously fake but really extreme sound. But sometimes, it's the right thing to do. It's hyperreality. It's a certain type of thing. It's part of the extreme nature of that style of music that's done that way, and it can only be done if you have clicks and tempo maps.

(Hyde 2014)

Just as volume is compositionally significant in rock (Gracyk 1996: 31–36, 110), tempo changes have become an integral part of composition across genres, including metal. A programmed click track is often essential for hybrid productions that blend performed and programmed elements, even within a single instrument like drums, where a programmed kick can complement live drum parts. Click tracks also help ensure that each section and fill maintains the intended feel. As Andy Sneap notes, 'the trick is to program the click so the songs still push and have the right feel. . . . Also drag and lift certain sections if needs be' (2014), adjusting tempi between sections to create distinct

rhythmic feels. Modulating tempo between sections allows riffs to achieve maximum impact, as playing them too fast or slow may result in a lack of momentum, energy, or a rushed feeling. Suicide Silence drummer Alex Lopez highlights this effect in the production of *No Time to Bleed* (2009):

We preprogrammed the click track to find out what tempo worked best where. There was more of a mechanical perspective to it. It was a borderline thing. If we change the tempo here or there and it's the same riff, no one will notice the time difference if it's only 3 bpm. It's that little difference that sometimes helps a song.

(Lopez in Micallef 2010: 44)

Lopez further explains that some sections were recorded to a click track while others were performed freely, indicating that combining both approaches can enhance the overall feel of a song (Micallef 2010: 44).

Ultimately, programming a tempo map is an often-overlooked art form, as Jens Bogren points out:

In pre-production, one of the important parts for me is finding the tempos for the parts, and my tempo track will be up and down all over the song, sometimes even for a fill-in. . . . I think that's fairly unique in metal. I'm not sure; perhaps loads are doing that, but I never saw it when I mix other projects [in other genres]. I think that's fairly unique in metal.

(Bogren 2014)

Given that such a nuanced approach influences all subsequent recording, editing, mixing, and production decisions, Bogren's perspective highlights the important role of tempo mapping in pre-production. Tempo programming not only shapes the workflow but is also fundamental to the production's aesthetic. While tempo alone may not be the primary determinant of heaviness in metal productions, it is one of many elements that influence performance qualities and affect the perception of an arrangement, collectively contributing to a heavy aesthetic.

3.2 Composing and Arranging 'In Solitude'

3.2.1 Background and Composition

The pre-production stage for 'In Solitude' differed from traditional approaches due to its project-based creation process and, more significantly, the impact of the Coronavirus pandemic. Work began in May 2020, two months into the UK's first COVID-19 lockdown and within the first six months of the HiMMP research project. During this time, the authors became acutely aware of the

severe challenges live music crew members faced, many of whom did not qualify for financial support through the UK's furlough scheme. With the dual aim of raising awareness and funds to support these individuals, donations were directed towards the Stagehand charity (the Production Services Association's live production welfare and benevolent fund). Consequently, various musicians were invited to participate in a remote writing and recording collaboration.

With a bespoke drum-recording session out of reach, the project utilized out-takes and various drum grooves from a prior recording session with the then My Dying Bride drummer Jeff Singer (x-Paradise Lost and Kill II This). These grooves served as the foundation for the participating guitarists to write riffs and parts. Alongside co-author Mark Mynett (Kill II This, Plague of Angels), the guitarists involved included Andrew Craighan (My Dying Bride), Oz Wright (x-Motherload), Richard Shaw (Cradle of Filth), Stan Havard (Xentrix), Chris O'Toole and Matt Gilmour (Divine Chaos), and Neil Hudson (Krysthla). To facilitate remote collaboration, drum grooves were shared online, tailored to each guitarist's principal riffing style: slower grooves for Andrew Craighan, mid-paced grooves for Oz Wright, and faster-tempo grooves for Richard Shaw. Guitarists were asked to return clean DI tracks, typically accompanied by a reference rhythm tone. This approach allowed for a consistent re-amping signal chain, enabling a cohesive rhythm tone as the rhythm tracks transitioned between different guitarists' parts throughout the song.

After receiving a digital treasure trove of riffs from the various guitarist contributors, time was dedicated to determining the most effective tempo ramps and riff transitions, ultimately shaping an intro/verse/chorus arrangement. After designating a section for an extended orchestral breakdown, the final song structure was established, resulting in a complete arrangement lasting 12 minutes and 37 seconds. This track was later released as part of the UK Metal Merger fundraiser campaign.² Following bassist Luke Appleton's (Absolva/Blaze Bailey) bass tracking, a rough mix of drums, bass, and guitars was shared with the vocalists who had agreed to contribute. Using a similar approach to the drum grooves sent to the various guitarists, specific lyric sections, written by Mark Mynett, were allocated to individual vocalists. These included Dan Capp (Wolcensmen), Simon Gordon (Kill II This), Adi Mayes (Krysthla), Aaron Stainthorpe (My Dying Bride), Sophie Dorman (Pythia), and Stacey Gaunt (Broken Piano).

Once the vocal parts were incorporated into the full arrangement, an updated rough mix, now including vocals, was sent to orchestrator Mark Deeks (Winterfylleth, Arð) and cellist Jo Quail. Deeks composed the orchestration using virtual instruments, providing audio and MIDI files that facilitated selective replacement or blending of virtual sounds with live elements. Due to limitations on studio access, Jo Quail recorded and returned multiple layered electric cello parts, adding further depth to the arrangement.

With a strong focus on creating a cohesive sound from the remotely recorded performances of 18 musicians, the track—titled 'In Solitude'—was

mixed and mastered in October 2020. Video director Hal Sinden was brought on to create a narrative-style promotional video, intentionally excluding performance footage or direct involvement from the musicians. The song and video were released on 19 March 2021.³ Supported by an extensive press campaign, ‘In Solitude’ received widespread media coverage, including live interviews on Sky News and extensive BBC coverage.⁴ The UK Metal Merger campaign ultimately raised over £20,000 for the Stagehand charity.

The collaborative writing of ‘In Solitude’, unbound by any record label rights, provided valuable source material for the research phase of the HiMMP project. However, to create a multi-track suited to the project’s specific research aims, several adjustments were necessary, resulting in a complete re-recording of the song. The original runtime of 12:37 was reduced to 4:55 to meet research constraints, and the arrangement was restructured to incorporate a broader range of genres and associated performance styles. Additionally, challenges presented by having multiple guitarists perform the rhythm parts were addressed to achieve a cohesive sound. For this revised version, clicks and guide tracks were sent to drummer Dan Mullins (Blasphemer/My Dying Bride), with a central requirement that some of his drum parts feature fast double kick and blast beats. An essential part of pre-production involved Mullins making simple (four-mic) recordings of various grooves, fills, and blast beats to the click tracks and guides, which were then reviewed by the authors. This iterative cycle allowed for further arrangement adjustments that optimized Mullins’s revised drum parts. These feedback-driven refinements were then incorporated into his re-recorded performances, ensuring that the final recordings retained a natural, performed quality rather than relying heavily on editing. Given the tempo and complexity of the subdivisions involved and the need for the recordings to reflect a performed, rather than heavily edited, drum track, this pre-production approach was essential.

In December 2021, after selecting what was deemed the most suitable drum kit, a Yamaha Oak Custom, a half-day was dedicated to re-heading, bedding-in, and tuning the drums. The kit was acclimatized to the studio environment for 24 hours to stabilize in response to the heat and humidity. Special attention was given to tuning the snare, a Yamaha 9000 model from the UK’s Premier production years. The goal was to achieve a snare sound with punch and projection, yet a tight decay to maintain attack and clarity, particularly in the blast beat sections. Attempts to dampen the snare using Drum Tacs were found to overly mute its tone, so a differentiated tuning approach, varying the pitch between the batter and resonant head, ultimately provided the desired balance of attack and decay. Further details on the recording process for drums, as well as for bass, guitars, and vocals, will be covered in Chapter 4. Notably, the pre-production process for the re-recorded version of ‘In Solitude’ followed a pattern similar to the drum recordings: parts were recorded remotely, exchanged online, and refined iteratively based on the authors’ feedback to align compositions and performance styles.

3.2.2 The Song

The revised version of ‘In Solitude’ incorporated elements from various metal subgenres, blending characteristics of heavy metal, melodic death metal, and black metal while featuring varying speeds of rhythmic subdivision. Our goal with this approach was to examine heaviness within the context of a fully realized, functional song rather than treating it solely as an object of study.⁵ To ensure broader applicability across metal genres, the song is stylistically anchored in ‘heavy’ metal rather than in more extreme subgenres such as death metal, black metal, or deathcore. Although it differs in heaviness from contemporary extreme metal acts like Lorna Shore and Humanity’s Last Breath, it includes growled vocals that complement clean vocals and fast double-kick drumming at sixteenth notes played at 200 bpm.

Lyrically (Table 3.1), ‘In Solitude’ draws inspiration from the COVID-19 pandemic, particularly the atmosphere and isolation of the initial UK lockdown. This experience prompted a reflection on humanity, with lyrics addressing contemporary issues influenced by external stimuli, such as social media and television. The song encourages listeners to retreat from the psychologically challenging news of that period and instead seek inner peace and meaning. While generally metaphorical, the lyrics in the breakdown—‘The only way out is inside/The only way to be noticed is to hide’—are among the more direct expressions of depression and social isolation, contrasting with more uplifting sections like the chorus, ‘I was saved by a plague of angels’. These emotional contrasts are mirrored musically through harmonic modulation (Aeolian to Locrian); dissonant intervals (tritones); eerie vocal harmonies in perfect intervals (fourths, fifths, octaves); and a lower spectral

TABLE 3.1 Lyrics of the various sections of ‘In Solitude’.

Verse 1	Verse 2
From the solitude	Sunk in solitude
Of Trojan’s horse	I disappear
Raise Jericho’s fallen walls	Dead silence upon deaf ears
My victorious	Fallen desert rain
Wordless battle hymns	In darkness bathed
Praise a war played out within	See a blind man run this maze
Praise a war played out within	See a blind man run this maze
Pre-Chorus	Breakdown
In solitude	The only way out is inside
	The only way to be noticed is to hide
Chorus	
In solitude	
I was saved by a plague of angels	
In solitude	

frequency range, achieved through arrangement and production choices, which adds sonic weight.

Structurally, ‘In Solitude’ follows a compound AABA form, the most common structure in metal (see Hudson 2021), framed by brief intro and outro sections. Table 3.2 provides an overview of the song’s sections, including corresponding timecodes.

While formal divisions in metal may be less immediately discernible than in other popular genres, metal compositions are typically structured around guitar riffs, with multiple riffs often appearing within and between formal sections (Elflein 2010). Despite this complexity, metal generally adheres to an AABA macro form (Hudson 2021: [1.1], [1.2]). Supersection A typically consists of a verse-chorus group (verse, chorus, and sometimes a pre-chorus), while section B provides contrast, often featuring guitar solos, bridges, or breakdowns, especially common in modern, ‘core-influenced subgenres’ (Hudson 2023: 9). Musically, sonically, and emotionally, metal compositions rely on riff-to-riff transitions and section-by-section contrasts to modulate intensity throughout the song. Glenn Pillsbury refers to these variations as ‘cycles of energy’ (2006: 13). ‘In Solitude’ exemplifies this approach, with shifts in energy and intensity between nearly every section, largely driven by diverse drum patterns—the backbeat, gallop beat (or punk beat), and blast beat—that incrementally increase intensity (Figure 3.1). This dynamic modulation is primarily achieved through tempo adjustments (e.g. double-time feel) and ‘snare pacing’ (Smialek 2015: 226), where the pacing of the snare adjusts to suit each respective drum pattern.

These shifts in tempo and snare pacing are closely connected to changes in arrangement. Instruments and vocals enter and exit, altering the texture and spectral fullness, while the guitar and bass tessitura (the local pitch range) shifts up or down, along with the spectral centre. Articulation nuances, such as alternating between palm-muted and open strings on the guitar, affect its percussiveness or sustain, shaping the tonal darkness or brightness (see Herbst 2017). These variations modulate energy and intensity and create contrasts by transitioning from sections of ensemble virtuosity with complex rhythms to others that emphasize sustained sound and timbral nuance (Pieslak 2008: 46). In production terms, this could be seen as a shift from clarity to sonic weight.

Such sectional contrasts are essential for enhancing the emotional experience in metal music, as they emphasize the genre’s defining quality of heaviness (Herbst and Mynett 2023b). These contrasts function in a way similar to the build-up and drop climaxes in EDM, where production techniques like thinning the arrangement and applying frequency filters during the build-up create tension and anticipation (Solberg 2014). As discussed in Section 2.3, this effect in EDM is achieved by reducing the presence of bass and kick while a noise band shifts upward, creating a state of anticipation that resolves when

TABLE 3.2 Form chart of ‘In Solitude’.

<i>Form</i>		<i>Orientation</i>		<i>Tempo and Drum Feel</i>		<i>Comments</i>
<i>Supersection</i>	<i>Section</i>	<i>Time</i>	<i>Bars</i>	<i>Beats per minute (bpm)</i>	<i>Feel (Shift)</i>	
Intro	Lead-in	0:00	1–5 (4)	100	Standard (amorphous)	Rhythmically pronounced guitar riff, accentuated by drum hits and underscored by a double-kick drum.
A	Verse 1	0:04	5–21 (16)	100	Standard	Low, belted vocals enter; slow backbeat in standard feel; band/vocals emphasize downbeats; low guitar riff with palm-mutes; high, melodic strings in the background.
	Transition	0:24	21–29 (8)	100	Standard	Higher, more melodic guitar riff reminiscent of melodic death metal; vocals enter in the second half, both clean (octaves) and growled; vocals are supported by a double-kick drum.
	Pre-chorus	0:33	29–37 (8)	200 and 100	Double and standard	Drums perform blast beats at double time (200 bpm) in the first half, then return to a standard-time backbeat (100 bpm); guitars play black-metal-inspired tremolo picking in the first half; vocals introduce the title refrain ‘In Solitude’; melodic guitar and bass lines support the transition to the chorus.
	Chorus	0:43	37–53 (16)	200	Double	Uplifting vibe; gallop, punk-inspired drum rhythm in double time; higher, melodic guitar riff, harmonized in thirds in the second half, reminiscent of melodic death metal; clean vocals with harmonies; high synthesizer pads.
	Post-chorus	1:02	53–65 (12)	100	Standard	Deceleration effect with lower sonic centre; standard-time drum beat with focus on toms; lower guitar riff with palm-muted power chords; vocals sustained from the chorus.
A’	Verse 2	1:16	65–81 (16)	100	Standard	Identical to Verse 1 with different lyrics.
	Transition	1:36	81–89 (8)	100	Standard	Identical to the first Transition but with continued vocals from Verse 2 in the first half and growled vocals in the second half.
	Pre-chorus	1:45	89–97 (8)	200 and 100	Double and standard	Identical to the previous pre-chorus.

<i>Form</i>		<i>Orientation</i>		<i>Tempo and Drum Feel</i>		<i>Comments</i>
<i>Supersection</i>	<i>Section</i>	<i>Time</i>	<i>Bars</i>	<i>Beats per minute (bpm)</i>	<i>Feel (Shift)</i>	
B	Chorus (extended)	1:55	97–121 (24)	200	Double	Extended version of the previous chorus, with more instrumental repetitions without vocals; guitar harmonized in thirds in the second of the three, eight-bar blocks.
	Link	2:24	121–29 (8)	50	Half	Chorus extension without guitars but piano playing the melodic title motif; calm, dreamy atmosphere.
	Breakdown without drums and bass	2:33	129–45 (16)	60	Half (amorphous)	Guitar only; change of tempo (100 to 120 bpm) and key (C minor to C Locrian); slower half-time feel, but acceleration from previous link; darker and more dissonant atmosphere; guitar indicates the new tempo and feel, which remains unconfirmed due to the lack of drumbeat.
	Breakdown with drums and bass	2:49	145–61 (16)	60	Half	Second rhythm guitar plays lower chords that increase dissonance; low brass and high strings add fullness to the arrangement.
	Breakdown with vocals	3:05	161–77 (16)	60	Half	Variation of the previous breakdown riff; vocals create an eerie feeling through harmonization in perfect intervals; wide vocal arrangement.
	Breakdown without vocals	3:21	177–93 (16)	60	Half	Continuation of the breakdown riff with dissonance more emphasized due to the lack of vocals; the most prominent use of the orchestra in the entire track.
	‘Choppy’ breakdown with vocals	3:37	193–208 (16)	60	Half (amorphous)	Variation of the material with synchronized rhythmic stops and accentuations.
A”	Pre-chorus	3:52	208–16 (8)	200 and 100	Double and standard	Identical to previous pre-choruses.
	Chorus	4:02	216–32 (16)	200	Double	Variation of previous choruses; variation in vocals.
	Chorus variation	4:21	232–48 (16)	200	Double	Intensified chorus with blast and gallop beats; vocals reduced to occasional title refrain ‘In Solitude’.
Outro	Chorus riff on piano	4:40	248–56 (8)	50	Half	Guitar drops out, piano plays chorus riff, slow drum groove.

Note: The bar numbers are based on the double tempos of 200 and 240 (breakdown) bpm and do not change during the standard time or half-time feels, as these were the tempos of the click track.



FIGURE 3.1 Back, gallop, and blast beats in the verse, chorus, and pre-chorus, respectively (tempo 200 bpm).

the drop reintroduces the full frequency spectrum, which emphasizes rhythmic groove and sonic weight.

Metal achieves sectional contrast through various means—perceived tempo and rhythmic subdivision, spectral fullness, pitch range, and loudness—while maintaining qualities such as tension and release, energy shifts, and intensity modulation (Herbst and Mynett 2023b, 2022: 24–25). These intensity-modulating techniques are evident in a full-track spectrogram of ‘In Solitude’ (Figure 3.3). The most obvious areas include the piano link and breakdown with reduced instrumentation midway through the track (2:24), high-energy sections featuring fast blast beats (see Table 3.2), and a peak of energy in the final pre-chorus and chorus around 4:00. A comparison of the spectrogram with the multi-track arrangement view (Figure 3.2) demonstrates the relationship between instrumental layers and the resulting energy distribution.

On a macro level, as visible in the arrangement (Figure 3.2) and spectrogram (Figure 3.3), ‘In Solitude’ exhibits sectional contrasts between the A and B supersections in its compound AABA form. While supersection A varies across its three occurrences, it consistently contains a verse-chorus group composed of a verse, pre-chorus, and chorus. In contrast, supersection B, an 80-bar breakdown, introduces distinct musical material that develops throughout. This breakdown is marked by a modal shift from C minor (Aeolian) to C Locrian, alongside new riffs and vocal melodies. The most immediately recognizable feature of the breakdown, however, is its dramatic reduction in performance speed (Gamble 2019; Garza 2021; Hudson 2021, 2023).

Here, it is worth drawing attention to the conceptual difference between the grid-based DAW used in music production and transcription-based

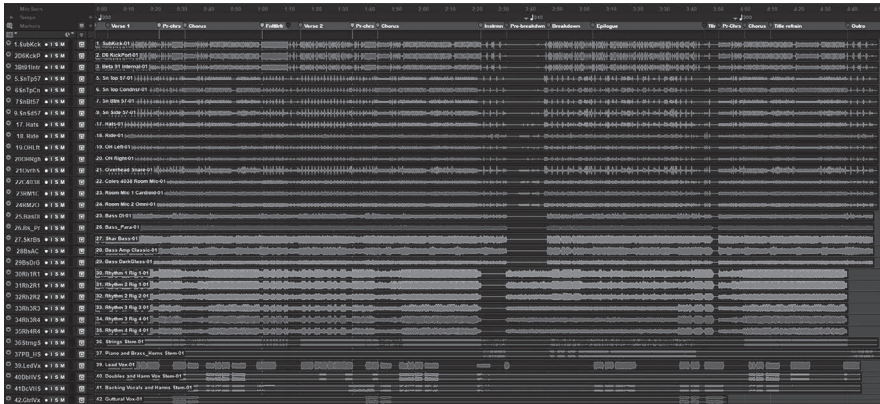


FIGURE 3.2 Arrangement view in Pro Tools; all tracks except toms and production FX.

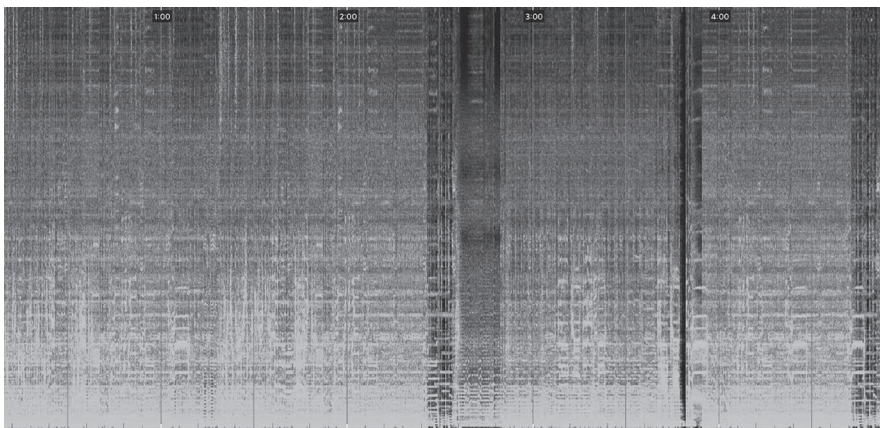


FIGURE 3.3 Spectrogram; visible frequency area: 20 Hz to 7.5 kHz, linear scale.

music analysis, which implies a distinction in tempo and performance feel. Producers often separate tempo from performance feel as the click track remains constant, even with half-time or double-time feel changes. In contrast, music analysts, who may ‘measure a measure’ (Clercq 2016) by auditory perception rather than a fixed click, often define a breakdown by a perceived drop in counted beats per minute (bpm). This interdisciplinary distinction clarifies different kinds of tempo shifts. In ‘In Solitude’, the breakdown involves two types of shifts. Most prominently, the feel drastically slows to a half-time pulse during the piano link at 2:24. This even-ratio tempo division (from 100 to 50 bpm) is characteristic of breakdowns in contemporary metal (see Herbst and Mynett 2023b), signalling a dramatic shift and marking the breakdown as a sectional climax. What

Musical score for "The Sound of Silence" by Simon & Garfunkel. The score is in 4/4 time and B-flat major. It features five staves: Treble Clef (Vocal), Grand Staff (Piano), Bass Clef (Bass), and a Drum Staff. The vocal line includes lyrics: "Hello, hello, good morning to you", "And so it begins", "The sound of silence". The piano accompaniment includes chords and arpeggios. The bass line features a prominent triplet pattern. The drum staff shows a simple beat pattern.

FIGURE 3.4 Intro of 'In Solitude'.

makes this breakdown distinctive is an additional tempo shift when the guitar re-enters at the beginning of the breakdown, subtly increasing the pulse from 50 to 60 bpm. While the initial half-time drop establishes the breakdown's large-scale independence, the slight acceleration adds an element of surprise, which enhances unpredictability, sustains listener interest, and modulates intensity and atmosphere.

As noted, intensity shifts between sections in ‘In Solitude’ are strategically employed to maintain a consistent sense of heaviness throughout the song. These shifts sustain heaviness through a combination of musical and sonic elements, including tempo, rhythmic subdivision, spectral fullness, and centroid (whether focused on low-end weight or high-end presence), as well as performative aspects such as vocal style. The song opens with a brief four-bar intro that features colourful intervals, including the major sixth and extended chords, such as a power chord with an added ninth and a minor chord (Figure 3.4). In the following verse (Figure 3.5), which represents the first primary section of the song, a low spectral centre and a marching quality emerge, with all instruments and vocals synchronized to emphasize the downbeat. The perceived tempo is set at the standard time of 100 bpm, allowing slower rhythmic subdivisions to highlight sonic weight and a pronounced low-end presence throughout the arrangement. This section establishes the foundational heaviness that underpins the rest of the song.

Following the verse, ‘In Solitude’ transitions through an eight-bar section (Figure 3.6) that retains the standard-time feel but introduces a temporary

$\text{♩} = 200$

From the so - li - tude Of Tro - jan's horse Raise Je - ri - co's

fall - en walls My vic - to - ri - ous word - less

batt - le hymns Praise a war played out wi - thin

7

12

FIGURE 3.5 First verse of 'In Solitude'.

♩ = 200

5

Praise a war played out with in

Growled voice

Praise a war played out wi - - thin

FIGURE 3.6 Transition between the verse and pre-chorus of ‘In Solitude’.

uplift. In the first four bars, a melodic death-metal-inspired guitar line ascends, playing a single-note riff, while the bass moves to a higher register, performing melodic lines rather than supporting root notes. A soft synthesizer pad enhances this sense of uplift. However, this lighter, higher timbre is only temporary, as the arrangement reverts to a heavier texture in the second half of the transition. The guitar shifts back to a lower range, combining rhythmically accentuated arpeggiated power chords with melodic single notes alternating with pedal notes on the lowest string, reinforced by a double-kick drum that adds sonic weight. The lead vocal, delivered with a powerful, belted voice, is supported by secondary vocal growls, which enhance the low-end while the synthesizer pad's brightness is attenuated. These arrangement changes dynamically alter the energy and mood within this brief passage, beginning with a lighter texture and culminating in a return to a heavier, more grounded sonic weight.

The next sectional contrast occurs with the transition into the pre-chorus (Figure 3.7), which is musically, if not vocally, reminiscent of black metal through its use of a fast blast beat and high-pitched, tremolo-picked guitars. This is the first time 'In Solitude' shifts into double time at 200 bpm, featuring sustained sixteenth-note double-kick drumming. While synthesizers and orchestral elements are common in black metal, they are intentionally omitted in this section to emphasize pure intensity over atmosphere. Heaviness is achieved through aggressive performances across all instruments and the louder presentation of growled vocals. As with the prior transition, this intense burst is brief, lasting just four bars, before moving into a higher, single-note guitar riff, complemented by melodic bass lines and a standard-time drum backbeat. This release of energy provides contrast and sets the stage for the ensuing chorus.

The chorus (Figures 3.8–3.10) leans more towards energy than pure heaviness, continuing the song's emphasis on contrast. Returning to double time, the drums perform a galloping beat with an offbeat snare—a rhythm commonly found in punk and punk-inspired thrash metal—while the melodic death-metal-influenced guitars deliver a single-note riff on the higher strings, harmonized partially in consonant, diatonic thirds. The bass anchors the arrangement with root notes in a steady eighth-note rhythm in the lower register, which creates a grounding effect that balances the energetic interplay between the drums and guitars. This arrangement yields a broad spectral range, encompassing the low frequencies of the bass's root notes and the kick drum, the higher tones of the guitars, a bright synthesizer pad, and a full vocal choir supporting the lead vocal. Together, these elements form a layered sonic texture spanning the full frequency spectrum that enhances the chorus's energy.

$\text{♩} = 200$

In so - li - tude
In so - li - tude

4

In so - li -

PM-| PM-| PM-| PM-| PM-| PM-|

FIGURE 3.7 First pre-chorus of ‘In Solitude’.

$\text{♩} = 200$

tude I was saved by a plague

of an - gels

FIGURE 3.8 First chorus of 'In Solitude' (part 1).

7

in so - li - tude

Gtr. 1

Gtr. 1

T
A
B

5 0 7 0 8 0 0 0 4 0 5 0 7 0 0 0 0 5 0 7 0 8 0 0 0 5

P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-|

Gtr. 2

8 0 10 0 12 0 0 0 8

P.M.-| P.M.-| P.M.-|

7 7 7 7 7 7 5 7 7 7 7 7 5 7 5 0 0 0 0 0 0 0 0

10

T
A
B

0 7 0 8 0 0 0 0 5 7 8 8 8 8 5 7 8 8 8 8 8 8 5 7 8 8 8 8 5 5 5 5 5

P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-|

T
A
B

0 10 0 12 0 0 0 0 8 8 10 8 12 8 8 8 8 8 10 8 12 8 8 8 8 8 5 10 5 12 5 5 8

P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-| P.M.-|

0 0 0 0 2 3 5 7 8 8 8 8 8 8 8 8 8 8 8 8 8 10 8 7 5 5 5 5 5 5 5 5

FIGURE 3.9 First chorus of 'In Solitude' (part 2).

14

The musical score is written for guitar and voice. It begins with a treble clef, a key signature of two flats (B-flat and E-flat), and a common time signature. The first staff shows a vocal line with the lyrics "In so li" and a guitar accompaniment consisting of a series of eighth notes. The second staff continues the guitar accompaniment with a mix of eighth and sixteenth notes. The third staff is a guitar tablature (TAB) with fret numbers (5, 7, 8, 5, 5, 5, 5, 5, 0, 7, 0, 8, 0, 0, 4, 0, 5, 3, 5, 2, 0, 3) and picking directions (P.M., P.M., P.M., P.M., P.M., P.M., P.M., P.M.). The fourth staff is another guitar tablature with fret numbers (5, 10, 5, 12, 5, 5, 5, 5, 8, 0, 10, 0, 12, 0, 0, 7, 0, 8, 7, 8, 7, 5, 8, 7) and picking directions (P.M., P.M., P.M., P.M., P.M., P.M., P.M., P.M.). The fifth staff is a bass line with eighth notes. The sixth staff is a guitar tablature with fret numbers (5, 5, 5, 5, 5, 5, 5, 5, 5, 0, 7, 0, 8, 0, 0, 4, 4, 3, 2, 3, 0, 5, 3, 2) and picking directions (P.M., P.M., P.M., P.M., P.M., P.M., P.M., P.M.). The seventh staff is a guitar tablature with fret numbers (5, 5, 5, 5, 5, 5, 5, 5, 5, 0, 7, 0, 8, 0, 0, 4, 4, 3, 2, 3, 0, 5, 3, 2) and picking directions (P.M., P.M., P.M., P.M., P.M., P.M., P.M., P.M.). The eighth staff is a guitar tablature with fret numbers (5, 5, 5, 5, 5, 5, 5, 5, 5, 0, 7, 0, 8, 0, 0, 4, 4, 3, 2, 3, 0, 5, 3, 2) and picking directions (P.M., P.M., P.M., P.M., P.M., P.M., P.M., P.M.).

FIGURE 3.10 First chorus of ‘In Solitude’ (part 3).

The following post-chorus (Figure 3.11) marks another shift in energy and may be perceived as heavier than the chorus, embodying a different kind of heaviness compared to the black-metal-inspired pre-chorus. Returning to standard time, the drums establish a continuous double kick (eighth notes at 200 bpm, sixteenth notes at 100 bpm), creating a low-end foundation complemented by a slower backbeat snare and low-pitched toms instead of cymbals. These elements collectively highlight the sonic weight of this section. The guitars deliver palm-muted power chords in a lower register, supported by basslines played an octave lower, resulting in a substantial descent into lower frequencies. This sonic shift intensifies the sense of heaviness through an increased emphasis on sonic weight. This heaviness contrasts with the energetic and aggressive pre-chorus, characterized by a blast beat and frantic, tremolo-picked guitars. While the pre-chorus emphasizes performance complexity and intensity, the post-chorus shifts focus to sonic weight, a dense wall-of-sound timbre, and a groove-oriented feel.

The repeated supersection A concludes with a section functionally described as a link (Clercq 2012: 99–110), where the lead motif is played on the piano over a half-time beat as the guitars temporarily drop out. This

♩ = 200

tude

Gtr. 1 & 2

Gtr. 1 & 2

T
A
B

7 5 0 0 0 0 0 0 0 0 7 5 8 0 0 0 0 5 0 0 7 5 0 0 0 0 7 5 0 0 0 0

PM.-----| PM.---| PM.---| PM.---| PM.-----| PM.---|

0 0 0 0 0 0 0 0 0 0 2 3 5 7 8 8 8 8 0 0 0 0 0 2 3 5 7 7 0 0 0 0 0 0 0 0 2 3 5 7

7

T
A
B

8 5 0 0 0 0 8 0 0 6 4 5 5 6 4 6 4 9 8 7 (8) 5 4 2

PM.-----| PM.---|

8 8 8 8 0 0 0 0 0 2 3 5 4 4 4 5 5 5 5 4 4 4 4 7 7 2 3 2

FIGURE 3.11 First post-chorus of ‘In Solitude’.

The musical score for Figure 3.12 is written in 4/4 time with a tempo of 240 BPM. It consists of several staves. The top staff is a single melodic line in the left channel. The second staff is a cymbal and tom part in the right channel, featuring rhythmic patterns. The third staff is a bass line. The score is written for a single system with multiple staves.

FIGURE 3.12 Instrumental breakdown riff at the beginning of the breakdown.

sudden release of energy from the extended chorus (with no post-chorus) is impactful because it acts as a reset within the song's ongoing cycle of tension and release (Pillsbury 2006: 13) and transitioning into supersection B—the breakdown (Figure 3.12). The reset is further supported by a shift in harmonic mode (from Aeolian to Locrian) and a gradual tempo increase (from 50 to 60 bpm), along with the incremental reintroduction of instruments and vocals (see Table 3.2 and Figure 3.2). For the first 16 bars of the breakdown, a single guitar (in the left channel) plays alongside cymbal swells and tom fills. The breakdown gradually intensifies, building back to full-band instrumentation, enriched with string and brass orchestration, ultimately climaxing with rhythmically accented power chords synchronized across all instruments. This culmination leads seamlessly back into the final supersection A, featuring the pre-chorus, an extended chorus, and a piano outro that reprises the title motif.

Sectional contrasts, like those in 'In Solitude', modulate energy throughout the song, not only between supersections and sections but also within individual sections. Beyond enhancing energy dynamics and creating more varied songwriting, these contrasts help disguise the underlying AABA macro form. This approach is noteworthy, as scholars have suggested that structural complexity enhances heaviness by making the music less predictable and catchy (Berger 1999: 63), thus distancing it from mainstream pop conventions. Additionally, complexity in songwriting and performance demonstrates dedication and seriousness, which can augment heaviness by drawing on transgressive subcultural capital (Kahn-Harris 2007; Hannan 2018: 455).

Consequently, contrasts within and between sections in ‘In Solitude’ contribute to its overall heaviness. As Mike Exeter, a producer participating in the HiMMP project, noted:

There is no heavy without light. . . . It comes down to what comes before it. It’s like if you start with a mid-tempo song; to get a heavier feel, you’ve probably got to slow it down, and you’ve probably got to give yourself space.

In addition to evoking different sensations through contrasts, they also make it possible to surprise the listener. As Andrew Scheps, another participating producer, pointed out, heaviness involves ‘changing perception. You get used to something, and it’s no longer heavy. Some of it has to be that initial rush of adrenaline and the surprise’.

Before returning to the importance of contrast and surprise, as discussed in the HiMMP producer interviews in Chapter 6, the following chapter will examine how recording techniques contribute to achieving heaviness and outline the transition from pre-production to the recording stage of ‘In Solitude’.

Notes

- 1 This statement may need to be taken with a grain of salt, as the documentary *A Year and a Half in the Life of Metallica* (Dubin 1992) depicts the album as being entirely based on overdubs. Once again, this uncertainty contributes to the ideologically charged role of liveness in rock and metal music.
- 2 UK Metal Merger version of ‘In Solitude’: <https://open.spotify.com/track/1QbKn9XWXrmqmhKOdL5n2Q?si=c071e16a777b41a0>
- 3 Music video of ‘In Solitude’: www.youtube.com/watch?v=p7C4kESPLb8
- 4 See www.facebook.com/UKMetalMerger
- 5 The released version of the song mixed and mastered by the HiMMP team is available here: <https://open.spotify.com/track/3qk8nfMpCTLHtGSew8oD7O?si=ace036866dbf4d68>

Bibliography

- Bennett, Joe (2011). ‘Collaborative Songwriting: The Ontology of Negotiated Creativity in Popular Music Studio Practice’. *Journal on the Art of Record Production*, 5. www.arjournal.com/asarpwp/collaborative-songwriting-%e2%80%93-the-ontology-of-negotiated-creativity-in-popular-music-studio-practice. Accessed 8 October 2024.
- Berger, Harris M. (1999). *Metal, Rock, and Jazz: Perception and the Phenomenology of Musical Experience*. Hanover, NH: University Press of New England.
- Brett, Thomas (2021). *The Creative Electronic Music Producer*. New York, NY: Routledge.
- Brown, Jake (2009). *Rick Rubin: In the Studio*. Montreal: ECW Press.
- Brown, Jake (2010). *Motörhead in the Studio*. London: John Blake Publishing.
- Brown, Jake (2011). *Iron Maiden in the Studio: The Stories behind Every Album*. New York, NY: John Blake Publishing.

- Brown, Jake (2017). 'Bob Rock: Metallica, Mötley Crüe, & More'. *Tape Op: The Creative Recording Magazine*, 121: 60–64.
- Burgess, Richard J. (2013). *The Art of Music Production: The Theory and Practice*. Oxford: Oxford University Press.
- Buskin, Richard (2011). 'Metallica "One"'. *Sound on Sound*. www.soundonsound.com/techniques/classic-tracks-metallica-one. Accessed 8 October 2024.
- Clercq, Trevor de (2012). 'Section and Successions in Successful Songs: A Prototype Approach to Form in Rock Music'. PhD thesis, University of Rochester.
- Clercq, Trevor de (2016). 'Measuring a Measure: Absolute Time as a Factor for Determining Bar Lengths and Meter in Pop/Rock Music'. *Music Theory Online*, 22(3). <https://mtosmt.org/issues/mto.16.22.3/mto.16.22.3.declercq.php>.
- Danielsen, Anne (2006). *Presence and Pleasure: The Funk Grooves of James Brown and Parliament*. Middletown, CT: Wesleyan University Press.
- Dawson, Michael (2006). 'Lamb of God's Chris Adler'. *Modern Drummer* 10/2006: 48–64.
- Elflein, Dietmar (2010). *Schwermetallanalysen: Die Musikalische Sprache des Heavy Metal*. Bielefeld: Transcript.
- Ferris, D. X. (2008). *Slayer's Reign in Blood*. 33 1/3. New York, NY: Bloomsbury.
- Gamble, Steven (2019). 'Breaking down the Breakdown in Twenty-First-Century Metal'. *Metal Music Studies*, 5(3): 337–354.
- Garza, Jose M. (2021). 'Transcending Time (Feels)'. *Music Theory Online*, 27(1). <https://mtosmt.org/issues/mto.21.27.1/mto.21.27.1.garza.html>.
- Gracyk, Theodore (1996). *Rhythm and Noise: An Aesthetics of Rock*. London: Tauris.
- Grossmann, Hannes (2013). *Extreme Metal Drumming*. Milwaukee, WI: Hal Leonard.
- Haid, Mike (2002). 'Judas Priest's Scott Travis'. *Modern Drummer* 2/2002: 70–82.
- Hannan, Calder (2018). 'Difficulty as Heaviness: Links between Rhythmic Difficulty and Perceived Heaviness in the Music of Meshuggah and the Dillinger Escape Plan'. *Metal Music Studies*, 4(3): 433–458.
- Hepworth-Sawyer, Russ (2009). 'Pre-Production', in *From Demo to Delivery: The Process of Production*, edited by Russ Hepworth-Sawyer (pp. 21–40). Amsterdam: Focal Press.
- Herbst, Jan-Peter (2017). 'Shredding, Tapping and Sweeping: Effects of Guitar Distortion on Playability and Expressiveness in Rock and Metal Solos'. *Metal Music Studies*, 3(2): 231–250.
- Herbst, Jan-Peter (2020). 'Metronomic Precision of "Teutonic Metal": A Methodological Challenge for Rhythm and Performance Research'. *Samples*, 18: 1–27. www.gfpm-samples.de/Samples18/Herbst2.pdf.
- Herbst, Jan-Peter (2021). 'The Politics of Rammstein's Sound: Decoding a Production Aesthetic'. *Journal of Popular Music Studies*, 33(2): 51–76.
- Herbst, Jan-Peter; Ahlers, Michael and Barber, Simon (2024). '"The Song Factories Have Closed!": Songwriting Camps as Spaces of Collaborative Creativity in the Post-Industrial Age'. *Creative Industries Journal*, 1–22. <https://doi.org/10.1080/17510694.2024.2366163>.
- Herbst, Jan-Peter and Mynett, Mark (2021a). 'Nail the Mix: Standardization in Mixing Metal Music'. *Popular Music and Society*, 44(5): 628–649.
- Herbst, Jan-Peter and Mynett, Mark (2021b). '(No?) Adventures in Recording Land: Engineering Conventions in Metal Music'. *Rock Music Studies*, 9(2): 137–156.
- Herbst, Jan-Peter and Mynett, Mark (2022). 'Toward a Systematic Understanding of "Heaviness" in Metal Music Production'. *Rock Music Studies*, 10(1): 16–37.
- Herbst, Jan-Peter and Mynett, Mark (2023a). '"I Just Go with What Feels Right": Variance and Commonality in Metal Music Mixing Practice'. *El Oído Pensante*, 11(1): 4–31.

- Herbst, Jan-Peter and Mynett, Mark (2023b). 'Lorna Shore's "to the Hellfire": A Study in Heaviness'. *Metal Music Studies*, 9(2): 189–213.
- Hudson, Stephen S. (2021). 'Compound AABA Form and Style Distinction in Heavy Metal'. *Music Theory Online*, 27(1). <https://mtosmt.org/issues/mto.21.27.1/mto.21.27.1.hudson.html>.
- Hudson, Stephen S. (2023). 'Song Form and Storytelling in Mainstream Metal'. *Metal Music Studies*, 9(1): 7–26.
- Hull, Geoffrey P.; Hutchison, Thomas W.; Strasser, Richard and Hull, Geoffrey (2011). *The Music Business and Recording Industry: Delivering Music in the 21st Century*. New York, NY: Routledge.
- Izhaki, Roey (2013). *Mixing Audio: Concepts, Practices and Tools*. Oxford: Focal Press.
- Kahn-Harris, Keith (2007). *Extreme Metal: Music and Culture on the Edge*. Oxford: Berg.
- Krannila, Ville; Asell, Jari and Tattari, Kimmo (2009). 'Chris Tsangarides'. *Steel Mill*. <http://kkdowning.net/steelmill/Interviews/1979>. Accessed 8 October 2024.
- Lauzon, Dylan (2017). 'Pre-Production in Mixing: Mixing in Pre-Production', in *Mixing Music*, edited by Russ Hepworth-Sawyer (pp. 114–121). London: Routledge.
- Levine, Mike (2015). 'A Multitalented Producer/Engineer Who Masters All His Projects and Creates His Own Plug-Ins'. *Audio Fanzine*. <https://en.audiofanzine.com/sound-technique/editorial/articles/joey-sturgis-has-it-covered.html>. Accessed 8 October 2024.
- Leyshon, Andrew (2009). 'The Software Slump? Digital Music, the Democratisation of Technology, and the Decline of the Recording Studio Sector within the Musical Economy'. *Environment and Planning A: Economy and Space*, 41(6): 1309–1331.
- Masciotra, David (2015). *Metallica*. 33 1/3. New York, NY: Bloomsbury Academic.
- McIver, Joel (2012). *Machine Head: Inside the Machine*. London: Omnibus.
- McLachlan, Jordan (2009). 'Brann Dailor'. *Rhythm Magazine* 4/2009: 39–44.
- Micallef, Ken (2004). 'Damageplan's Vinnie Paul'. *Modern Drummer* 6/2004: 64–77.
- Micallef, Ken (2007). 'Shadows Fall's Jason Bittner'. *Modern Drummer* 5/2007: 52–70.
- Micallef, Ken (2008). 'Metallica's Lars Ulrich'. *Modern Drummer* 12/2008: 44–58.
- Micallef, Ken (2009). 'Mastodon's Brann Dailor'. *Modern Drummer* 11/2009: 50–57.
- Micallef, Ken (2010). 'Suicide Silence's Alex Lopez'. *Modern Drummer* 4/2010: 42–45.
- Moorefield, Virgil (2005). *The Producer as Composer: Shaping the Sounds of Popular Music*. Cambridge, MA: MIT Press.
- Mynett, Mark (2017). *Metal Music Manual: Producing, Engineering, Mixing, and Mastering Contemporary Heavy Music*. Abingdon: Routledge.
- Mynett, Mark (2019). 'Defining Contemporary Metal Music: Performance, Sounds and Practices'. *Metal Music Studies*, 5(3): 297–313.
- Mynett, Mark (2020). 'Maximum Sonic Impact: (Authenticity/Commerciality) Fidelity-Dualism in Contemporary Metal Music Production', in *The Bloomsbury Handbook of Music Production*, edited by Simon Zagorski-Thomas and Andrew Bourbon (pp. 293–302). London: Bloomsbury.
- Parillo, Michael (2008). 'Meshuggah's Tomas Haake'. *Modern Drummer* 5/2008: 56–72.
- Pieslak, Jonathan (2008). 'Sound, Text and Identity in Korn's "Hey Daddy"'. *Popular Music*, 27(1): 35–52.
- Pillsbury, Glenn T. (2006). *Damage Incorporated: Metallica and the Production of Musical Identity*. New York, NY: Routledge.
- Prato, Greg (2018). 'Metallica Producer Flemming Rasmussen'. *Song Facts*. www.song-facts.com/blog/writing/metallica-producer-flemming-rasmussen. Accessed 8 October 2024.

- Rashidi, Waleed (2007). 'Trivium's Travis Smith'. *Modern Drummer* 1/2007: 66–74.
- Rashidi, Waleed (2008). 'Testament's Paul Bostaph'. *Modern Drummer* 6/2008: 76–86.
- The Rockpit (2010). 'Interview: Chris Tsangarides—Producer, Musician, Song-Writer: A Career-Spanning Interview'. *The Rockpit*. www.therockpit.net/2010/interview-chris-tsangarides-producer-musician-song-writer. Accessed 8 October 2024.
- Saccone, Teri (1992). 'Metallica's Lars Ulrich'. *Modern Drummer* 2/1992: 20–25.
- Saxon, Jonathan (2011). 'Armored Saint: No Dormir Hasta "La Raza"'. *Tape Op: The Creative Recording Magazine*, 83. <https://tapeop.com/interviews/83/armored-saint>. Accessed 8 October 2024.
- Smialek, Eric (2015). 'Genre and Expression in Extreme Metal Music, ca. 1990–2015'. PhD thesis, McGill University.
- Solberg, Ragnhild T. (2014). '"Waiting for the Bass to Drop": Correlations between Intense Emotional Experiences and Production Techniques in Build-up and Drop Sections of Electronic Dance Music'. *Dancecult*, 6(1): 61–82.
- Thomas, Niall (2015). 'The Development of Technology and Its Influence on Recorded Heavy Metal Music 1969–2015'. PhD thesis, University of Hull.
- Thomas, Niall and King, Andrew (2019). 'Production Perspectives of Heavy Metal Record Producers'. *Popular Music*, 38(3): 498–517.
- Thompson, Paul (2019). *Creativity in the Recording Studio: Alternative Takes*. Cham: Springer.
- Tingen, Paul (2014). 'Inside Track: Linkin Park's the Hunting Party'. *Sound on Sound*. www.soundonsound.com/techniques/inside-track-linkin-parks-hunting-party. Accessed 8 October 2024.
- Tingen, Paul (2017). 'Inside Track: Metallica Moth into Flame'. *Sound on Sound*. www.soundonsound.com/techniques/inside-track-metallica-moth-flame. Accessed 8 October 2024.
- Walch, Florian (2023). 'Extreme Metal across the Digital Divide: Music, Technology, Genre'. PhD thesis, University of Chicago.
- Wall, Mick (2004). *Iron Maiden: Run to the Hills*. Harlow: Sanctuary.
- Wilkening, Matthew (2020). '40 Years Ago: Judas Priest Learn a Crucial Lesson with "British Steel"'. *Ultimate Classic Rock*. <https://ultimateclassicrock.com/judas-priest-british-steel-interview>. Accessed 8 October 2024.
- Williams, Stuart (2015). 'How to Record Huge Guitars: 27 Secrets Revealed'. *Music Radar*. www.musicradar.com/tuition/guitars/how-to-record-huge-guitars-27-secrets-revealed-618727. Accessed 8 October 2024.
- Worley, Gail (2009). 'Between the Buried and Me's Blake Richardson'. *Modern Drummer* 4/2009: 82–87.
- Zak, Albin (2001). *The Poetics of Rock: Cutting Tracks, Making Records*. Berkeley, CA: University of California Press.

Discography

- Armored Saint (2010a). *La Raza*. Metal Blade Records.
- Armored Saint (2010b). 'Loose Cannon', on *La Raza*. Metal Blade Records.
- Between the Buried and Me (2007). *Colors*. Victory Records.
- Black Dahlia Murder (2007). *Nocturnal*. Metal Blade Records.
- Cynic (1993). *Focus*. Roadrunner Records.
- Iron Maiden (1981). *Killers*. EMI.
- Iron Maiden (2000). *Brave New World*. EMI.
- Judas Priest (1980). *British Steel*. CBS.
- Judas Priest (1990). *Painkiller*. CBS.

- Lamb of God (2006). *Sacrament*. Epic.
- Lorna Shore (2021). 'To the Hellfire', on . . . *And I Return to Nothingness*. Century Media.
- Machine Head (2003). *Through the Ashes of Empires*. Roadrunner Records.
- Metallica (1984). *Ride the Lightning*. Megaforce Records.
- Metallica (1988a). . . . *And Justice for All*. Elektra.
- Metallica (1988b). 'One', on . . . *And Justice for All*. Elektra.
- Metallica (1991). *Metallica (Black Album)*. Elektra.
- Metallica (2008). *Death Magnetic*. Warner Bros. Records.
- Metallica (2016). *Hardwired . . . To Self-Destruct*. Blackened Recordings.
- Monuments (2014). 'I, the Creator', on *The Amanuensis*. Century Media.
- Motörhead (1979). *Overkill*. Bronze.
- Necrophagist (2004). *Epitaph*. Relapse Records.
- Periphery (2016). 'Prayer Position', on *Periphery III: Select Difficulty*. Sumerian Records.
- Saint Vitus (1995). *Die Healing*. Hellhound Records.
- Slayer (1986). *Reign in Blood*. Def Jam Recordings.
- Slayer (2001). *God Hates Us All*. American Recordings.
- Suicide Silence (2009). *No Time to Bleed*. Century Media.

Videography

- Bogren, Jens (2018). 'Opeth—Heir Apparent'. *Nail the Mix* 6/2018.
- Bogren, Jens (2019). 'Between the Buried and Me—Millions'. *Nail the Mix* 10/2019.
- Browne, John (2017). 'Monuments—I, the Creator'. *Nail the Mix* 8/2017.
- Getgood, Adam (2016). 'Periphery—Prayer Position'. *Nail the Mix* 9/2016.
- Dubin, Adam (1992). *A Year and a Half in the Life of Metallica*. New York, NY: Elektra.
- Nordström, Fredrik (2019). 'Bring Me the Horizon—Chelsea Smile'. *Nail the Mix* 7/2019.
- Russell, Russ (2019). 'The Haunted—Preachers of Death'. *Nail the Mix* 5/2019.
- Wade, Andrew (2018). 'Attila—Three 6'. *Nail the Mix* 4/2018.

Unpublished Interview Data

- Bogren, Jens (2014). Interview by Mark Mynett. Örebro. 45:25 minutes.
- Hyde, Matt (2014). Interview by Mark Mynett. Los Angeles. 75:06 minutes.
- Johns, Harris (2018). Interview by Jan-Peter Herbst. Berlin. 138:34 minutes.
- Mader, Logan (2014). Interview by Mark Mynett. Los Angeles. 27:57 minutes.
- Sneap, Andy (2014). Interview by Mark Mynett. Ripley. 50:06 minutes.

4

RECORDING

Setting Up the Foundation

In the pursuit of heaviness, metal music has developed into an increasingly hyperrealistic form, with much of this aesthetic shaped during the mixing process. Scholars have noted that the commercial success of metal productions is closely linked to the role of mixing (Thomas and King 2019; Turner 2009). However, this development still aligns with a broader consensus in audio engineering that positions recording as the foundation of the entire production (Thomas 2015; Mynett 2017). Especially in metal music, where performance is central, production decisions are largely shaped and constrained by the recorded sound rather than by programming and sequencing, regardless of later processing. Consequently, the recording phase is essential for achieving heaviness because it sets the parameters and potential limitations for mixing and post-production.

As with all stages of production, metal recordists walk a fine line between adhering to general and genre-specific engineering best practices and deviating from them to achieve originality and advance the craft. In his influential work on the engineering of rock records, Albin Zak III (2001: 63) discusses the expanded creative possibilities enabled by advances in (digital) recording technologies while also challenging the notion that technology allows for the realization of sonic ideas without restrictions. Although technology may support this vision, two constraints remain (Zak 2001: 63, 127): conceptually, imagination is a ‘product of historical accumulation’; and, practically, professionals are guided by conventions. Engineering practices and listening repertoires are embedded in a cultural history that informs professional practice (see also Schmidt-Horning 2004), contributing to higher quality and efficiency while potentially limiting originality and innovation.

Established practices and innovative approaches maintain a dynamic relationship that has historically propelled record production forward. As Samantha Bennett (2019) points out, conventions often stem from experimental innovations that, once successfully evaluated, are widely adopted and become new best practices. These benchmarks are then challenged by emerging approaches that either reinforce the existing practices or introduce modifications and new trends. However, several limitations persist: the physical nature of recording; the acoustic realities of our environment; universal electroacoustic principles; available technology; human perceptual mechanisms (psychoacoustics); and listener responses, which are shaped by the conventions and expectations of musical (sub-)genres (Zak 2001: 97, 127). On a social and systemic level, the involvement and collaboration of individuals such as artists, engineers, and producers create unpredictable work dynamics and outcomes through ‘emergence’, as creativity research suggests (Sawyer and DeZutter 2009). Additionally, interaction with technology and the acoustic environment provides situational stimuli through emergence (Latour 2005).

This chapter examines the primary variables in creating heaviness during the recording stage by surveying recording approaches in metal. The analysis draws on original interview data alongside relevant journalistic and educational material. The investigation is not designed to be comprehensive, offer a best-practices guide (see Mynett 2017), or summarize trends across sub-genres and over time. Instead, it examines the process of recording metal in general and of our project song, ‘In Solitude’.

4.1 Sound at Source

Technological advances, beginning with the capabilities introduced by analogue multi-track tape recording, have greatly enhanced editing possibilities and fostered a prevalent ‘fix it in the mix’ mentality (Schmidt-Horning 2013: 185–191). Our professional experience in the industry, work with students, and prior analysis of online message boards for recordists (Section 2.4) indicate that the smaller the production budget and the less experienced the engineers or producers are, the more likely decisions are deferred to the mixing stage rather than establishing the right sound at source. Unsurprisingly, most professional metal producers reject this approach, instead stressing the importance of capturing the intended sound during recording. As Bryan Carlstrom, engineer for Anthrax and Armored Saint, explains, effective mixing begins with capturing the right sounds:

The mixing really starts with the recording. When I’m recording a record I’m recording it in a way that I know it’ll mix well. . . . [W]hat I need guitar-wise, what I need bass-wise, the drum production, any samples that

I'm going to be using and the ambiance that I'm recording around the drums. So when I get done with a project the songs are mixable.

(Carlstrom in Saxon 2011)

Randy Straub underlines this widespread philosophy of preparing the mix during the recording stage:

I always tell people that you have to create the sound of the record that you want right from the beginning, so that when the mixer first pushes up the fader, the record is there. Everything sounds the way it should, the arrangements are good, the emotion is there, the balance is there, and as a mixer your job is to take it to another level. You pump it up and make it sound larger than life. This rather than trying to create something that wasn't there to begin with.

(Straub in Tingen 2012)

Analysis of various interviews indicated two main reasons for prioritizing recording as preparation for mixing. First, when an engineer is responsible for both recording and mixing, they are more likely to make decisions and commit to processing that streamlines the subsequent mixing process. Fredrik Nordström illustrates this approach:

I love to have my session clean, with as few tracks as possible. If there is one rhythm guitar player, I want one rhythm guitar. I don't want four different kinds of sound that I can possibly blend together. If you don't like it, do it again from the start.

(Nordström 2019)

Committing to specific sounds early on reduces the number of tracks, which potentially enhances the mixing workflow by ensuring that decisions regarding the overall mix and individual instruments or vocals are based on sounds that will largely remain unchanged. This philosophy streamlines the process, aligning the aesthetic vision from inception to the final product.

Additionally, when a producer and an engineer collaborate, the aesthetic direction typically rests with the producer. However, engineers who consider their work both a craft and an art form (Kealy 1979) make decisions based on their personal preferences and what they believe best serves the project (see Zak 2001). By committing to sounds intended for the mixing engineer or producer, recording engineers can create an aesthetic they are comfortable being associated with while also facilitating smoother processing for other professionals. As Russ Russell explains:

I don't just leave them [the recordings] all up flat for someone to deal with later you know, make some choices. I'm all up for different layers and

sounds but some of the stuff I get sent to mix. Six tracks for one take of guitar. And when you've got 4 tracks of rhythm guitar, plus lead overdubs, plus solos you're suddenly faced with 40 odd tracks of guitar.

(Russell in Thomas 2015: 235)

Beyond workflow considerations, the engineer's dual role as both craftsman and artist must also be acknowledged (Zak 2001; Kealy 1979). The aesthetic outcome of metal records is influenced by the engineer's choices regarding the number and type of microphones, their positioning, and the processing applied to the captured signals (known as 'printed processing').

According to Zak (2001: 109–111), the choice of microphone has far-reaching implications because each model possesses an 'aura' due to its unique colouring effect. Therefore, the selection and placement of microphones demand aesthetic judgement grounded in technical expertise. 'In many ways microphones are the technological soul of any recording project; the effectiveness of all other tools and techniques depends upon the quality of the image that the microphone is able to deliver' (Zak 2001: 108). Regarding printed tracking, a previous interview study with known metal producers (Herbst and Mynett 2021b) suggested that processing during recording primarily aims to capture the desired sound from the outset. Beyond workflow benefits, this approach enhances the quality of the artist's performance, which indicates a reciprocal relationship between tone and playing. However, producers such as Jens Bogren (2014) advocate for a balanced approach, noting that while sounds may work well in isolation, they cannot be fully evaluated and finalized during recording because of their interaction within a dense mix. To counteract the often overwhelming and detrimental effects of digital production's infinite processing options, the engineers and producers interviewed generally preferred to commit to sounds early. They viewed printed processing and early decision-making as integral to their artistic identity, allowing them to avoid standard technical procedures they deemed uninteresting and counterproductive to professional success (Herbst and Mynett 2021b). These perspectives illustrate the complexities of metal music production, which extend beyond mere technical and acoustic considerations (Thomas and King 2019). Production is a social endeavour where individual approaches, interests, and aesthetic and economic considerations intersect—and often clash.

4.2 Drums

The importance of drums in achieving the desired heaviness and overall quality of metal productions can hardly be overstated. In addition to providing punch and sonic weight, drums contribute qualities that go beyond tonal aspects such as the aggression conveyed through a hard-hit kit and the phenomenological excitement of an instrument interacting with an acoustic

space (see Herbst and Mynett 2021b). While programmed drums and sample libraries, with multiple hits and velocity layers, can now emulate many of these qualities with relative authenticity, recording a live drum kit remains a hallmark of professional metal production (Mynett 2017: 27–28), even in modern subgenres like metalcore and djent, which often rely less on traditional recording techniques (Getgood 2016; Browne 2017; Lancaster 2018; Larson 2018; Udd 2017).

4.2.1 Preparation

A professional metal drum recording requires meticulous preparation. Depending on the budget, a studio with acoustics tailored to the desired aesthetic of the drums may be preferable to those designed for vocals, other instruments, or mixing (see Herbst 2020). Additionally, different drum kits may be chosen for various songs on an album. While it is uncommon to change the entire drum kit, it is common to use different snares for each song. For instance Daniel Bergstrand prefers to select a snare that complements the specific characteristics of each song:

It all depends on the song, and I really like to change the snare. On the latest album, I've been changing the snare seven times. So, it's seven different snares on one album [Port Noir's *Puls* (2013)]. You hear it just by listening to the riff; ah, we should use *this* snare.

(Bergstrand 2014, *emphasis added*)

The speed of rhythmic subdivisions and the frequency range concentrated within the mix are key factors in snare selection. Faster songs typically require higher-pitched snares due to the reduced sonic space available (Mynett 2017: 44). Similarly, as Jacob Hansen (2019b) notes, slower songs often benefit from larger snares with a low tuning, adding depth that contributes to the necessary heaviness. In addition to tempo, drumhead characteristics and tuning must be carefully selected for each album or individual song based on multiple considerations (see Mynett 2017). For instance, thinner drumheads that produce sharper transients must be weighed against the strength of the drummer's hits (Garfield 2014). As Andy Sneap observes, 'You can change the sound of the whole kit by changing the snare. . . . [T]he snare is what drives the mix, really. So, changing that will give your mix a different feel throughout' (2014). Unlike the kick drum, the snare remains effective across a broader range of tunings, offering producers greater aesthetic flexibility (Mynett 2017: 44).

Beyond the primary factors of snare tuning, that is speed of subdivisions and aesthetic preference, the song's key can also influence tuning for certain producers, such as Andy Sneap (2014), who tunes the snare to the root

note of each song to enhance punch by concentrating energy across instruments. Depending on the snare's effective pitch range, this key-dependent tuning may necessitate changing the snare between songs. The tonal relationship between the snare and kick, the two primary drums, is also significant. Producers like Sneap (2014) prefer each drum to occupy a distinct frequency range, allowing listeners to easily differentiate between them. This goal may involve pairing a 'thumpy lower snare' with a 'clicky' kick drum or a 'pingy' or 'snappy' snare with a kick drum rich in low-end frequencies. Distinct sounds for these instruments not only make them easier to distinguish on lower-quality playback systems but also ensure that both sonic weight and punch are present, which contributes to the overall heaviness.

For the other drum shells—the kick and toms—many producers prefer the lowest possible tuning to maximize sonic weight as an essential component of heaviness. However, as Fredrik Nordström (2014) notes, low tunings do not always sound optimal in the room or when captured by a microphone. Dampening the sustain of the shells can muffle the sound and darken the drums. For this reason, some producers, such as Jens Bogren (2014) and Andy Sneap (2014), avoid excessive dampening, convinced that non-dampened drums cut through a dense wall of sound more effectively, even when reinforced with samples. Instead, they shape the drums' sustain by adjusting the ratio between the top and bottom heads through tuning. Most other modifications to the way drums vibrate concern the kick, which is often filled with blankets or pillows or equipped with a 'click pad' (or occasionally a glued coin on the beater) to create a more pronounced 'click' that enhances the bass drum's attack qualities (Massy 2016: 107–108). These adjustments shape the kick drum's two primary attributes, sonic weight and transient attack/punch, while also enhancing clarity in the mix. If the kick is tuned too high, it lacks sufficient sonic weight to blend well with down-tuned guitars and bass. Conversely, a kick tuned too low, without enough 'click', can impede the drummer's ability to play fast, as the beater does not bounce back quickly (Mynett 2017: 43), potentially causing the kick to lose clarity in the mix.

The song's key may also influence the tuning of the kick drum, though this is less common than with the snare. Some producers, like metalcore specialist Joey Sturgis, tune the kick to match the song's key, allowing its fundamental frequency to blend better with the guitar and bass (Flint 2014). The toms are similarly tuned to the song's key relatively often. Engineer Tony Platt explains this approach, referencing the production of Motörhead's *Another Perfect Day* (1983):

One of the things I picked up from Mutt [producer Robert John 'Mutt' Lange] really . . . was getting the tom toms to be tuned within the chord in the key of the song. When you're putting all these frequencies together, what you don't want is to have them fighting with each other. So it means

them tom toms can occupy a space within the whole sound that is there for them. So every time the floor toms get hit you get dissonance between the note on the floor tom and one of the notes on the bass. It actually takes up rather a lot of space in the mix and you lose a lot of clarity and, therefore, you lose a lot of punch and . . . power.

(Platt in Brown 2010: 77)

Effective frequency management, including avoiding masking and creating punch by synchronizing key sonic areas between instruments, is essential for high-quality metal production and the realization of heaviness (see Mynett 2016). Tuning drum shells relative to one another and to other instruments supports this effect, which would otherwise be challenging to achieve solely through processing at the mixing stage. As the Motörhead example illustrates, tuning drums to match the song has roots in early metal production and remains a common practice today, as seen in records by Tool, engineered by Sylvia Massy (2016: 103), and Monuments, produced by John Browne (2017). According to Browne, mismatched drum tuning and song key can lead to inconsistent sound quality across tracks, highlighting how essential drum tuning is in achieving two core elements of heaviness: a clear low-end and substantial punch.

4.2.2 Miking

Microphone technique has an immense influence on the drum sound. Like drum preparation, microphone choice and placement must consider the recording environment, the drummer, and the specific song. The number of drum tracks varies widely between productions, generally increasing with the advent of advanced digital production capabilities. Known for their elaborate productions, Metallica already captured the drums for their 1988 album . . . *And Justice for All* (1988) with 24 microphones across an entire 24-track reel of analogue tape (Buskin 2011). For Metallica's more recent album, *Hardwired . . . To Self-Destruct* (2016), each kick drum was captured with three microphones, while the snare utilized four, supplemented by numerous spot, overhead, and room microphones (Tingen 2017). Interviews with contemporary metal producers working with hybrid or digital systems suggest that track counts generally range from 20 to 40, as seen in the practices of Jens Bogren (2014) and Nick Raskulinecz (2014), and can extend up to 50, as is common for Matt Hyde (2014). Although additional microphones provide greater processing and blending options, which offer enhanced control over sonic attributes such as heaviness, they can also present technical challenges, as Hyde explains in detail:

Part of a larger issue with metal drum sets is that it's one instrument with fifty different sound sources coming at you at once. There may be 18 to 22

microphones on the drum kit. We're gonna have our left and right overhead; there is something miking the china, spot mics on splash cymbals, spot mic on the ride cymbal, spot mic on the hi-hat. This might have been eight mics just for the cymbals, and what does that mean? There are wild phase issues going on. Every time you add another microphone to the mix, you're adding phase issues. In this case, 22 microphones gotta point at sound sources, pick them up successfully, reject as much as possible, grab the frequency content that you want to supply to your overall picture while rejecting the frequency content that you don't want for that particular source and not disturb the phase of the whole thing. It's an impossible problem. . . . I listen, start pushing stuff up, I start moving things at sources, away from sources. Considering that they are polar patterns and all those decisions, it's just a million decisions that go together.

(Hyde 2014)

Phase correlation is a primary concern when recording drums with multiple microphones. If the low-end suffers from comb-filtering, and the attack transients are blurred by slight timing differences among individual signals, the result is far from being heavy (Bartlett and Bartlett 2009: 219–220). Metal recordists must therefore balance the advantages of increased control and processing options with the potential drawbacks of phase issues. Analysing the preferences of metal producers for engineering each drum component reveals important considerations shaping these decisions.

Approaches to capturing the kick drum vary, particularly when deciding between recording one bass drum with a double-kick pedal or using two separate drums. A double pedal setup reduces the number of microphones needed and minimizes phase issues, offering a more consistent attack, tone, and articulation (Rondinelli and Lauren 2000: 5). However, as Tool drummer Danny Carey points out, using two bass drums allows each drum more time to resonate between hits, producing a fuller sound (Micallef 2006: 64). Session drummer Gene Hoglan adds that slightly tuning the two drums differently can enhance the sound's dimensionality and prevent it from becoming overly consistent or 'machine-gunned' (Ciauro 2010: 51). This nuanced approach to bass drum dynamics is exemplified on Motörhead's *Overnight Sensation* (1996) (Brown 2010: 164).

Regardless of the number of kick drums used, consideration must be given to the quantity of microphones for each drum. As the speed of rhythmic subdivisions increases, the advantages of using additional microphones diminish due to the limited sonic space available. Nick Raskulinecz (2014) notes that blending multiple microphones during fast performances can intensify phase issues, negatively impacting sonic weight, punch, and overall heaviness. Many producers, such as Jacob Hansen (2019a), Daniel Bergstrand (2014), and Andy Sneap (2014), often opt for two microphones: one placed inside

the drum to capture an attack-rich ‘click’ sound and another positioned outside to capture the low-end weight. The exterior microphone may be either a standard microphone that captures the drum’s natural sound and ‘body’ or a specialized one designed for sub-bass frequencies. Modern boundary microphones, like Shure’s Beta 91 and Sennheiser’s E901, are capable of capturing bass and sub-bass frequencies when mounted inside the kick drum. Before such technology was available, innovative recordists achieved a similar effect by repurposing a loudspeaker, commonly the Yamaha NS10 nearfield studio monitor, in reverse as a microphone or by using vintage microphones. An early instance of this technique can be heard on Motörhead’s *Another Perfect Day* (1983), where a vintage Neumann U47 was employed in a way similar to a modern NS10 sub-kick. Engineer Tony Platt elaborates on the rationale behind this choice:

What I’m trying to do with a kick drum is to get the feeling of this large column of air moving. And the pattern of a U47 is particularly useful in that respect because it’s got quite a bit of cardio impact, so you’re not just getting this kind of tiny little ‘tick-tick-tick’ in the middle of the kick drum. Also, you get a really good bass response from a U47 because you get a lot of those low-carrier sub-frequencies. In effect, using a U47, back in those days, kind of does the same thing as when people use a [AKG] D112 [a regular kick microphone] and an NS10 speaker now, looking for that sub-bass thing.

(Platt in Brown 2010: 79)

As Platt explains, combining a standard kick microphone with a sub-kick captures a broad frequency range that effectively enhances sonic weight, clarity, and punch, all essential elements for achieving heaviness.

In Mark Mynett’s metal production manual, three common microphone positions are described: ‘An “attack” mic—primarily focused on capturing transient-based high-frequency energy; a “porthole” mic placement—a relatively balanced perspective of a kick drum’s frequency content; and a low-frequency capture mic’ (2017: 70). All three microphones can be blended to create a robust kick sound, a technique favoured by Matt Hyde (2014). Shaping an effective kick drum sound can sometimes require multiple microphones. For instance Logan Mader (2014) prefers to use four microphones per kick: one inside, one at the porthole, one outside, and a sub-kick. By blending the tracks while paying attention to phase and applying filtering to avoid masking, multiple microphones allow the kick sound to be shaped with relatively little processing during mixing. Another method for crafting a weighty and big kick drum sound involves creating a ‘tunnel’ or ‘cavern’ to capture more of the instrument’s sounds in the room without recording spill from the other drums. Daniel Bergstrand (2014) frequently employs

this technique, which can also be heard on Motörhead's *Hammered* (2002) (Brown 2010: 188) and Mötley Crüe's *Dr. Feelgood* (1989) (Brown 2017). Re-amping is another possible approach: the recorded kick drum track is played back through a loudspeaker placed next to the bass drum, which acts as a reverberation chamber, causing the drumheads to vibrate and resonate in the room, as demonstrated on Meshuggah's *MonstroCity* (2016), produced by Tue Madsen (2017). This sound can then be recorded with close-up or room microphones, mimicking the strategy used by producer Bob Rock on albums for Mötley Crüe and Metallica. Rock's technique, known as 'parallel processing', involves playing the recorded drum sound through speakers in a large hall to capture ambient resonance, creating what Mötley Crüe drummer Tommy Lee describes as 'bombastic drums' without needing artificial reverb (Brown 2017).

For the snare drum, two microphones—typically one above and one below—are usually employed to capture the tone, body, and attack of the top, along with the high frequencies from the bottom's wire rattle. Some engineers, such as Terry Date, prefer to use only a top microphone to emphasize the snare's 'crack' (Brown 2018: 39). Given the snare's prominence in defining the drum sound and overall production aesthetic, producers vary considerably in their preferences for microphone placement and selection (see Herbst and Mynett 2021b). The standard top and bottom microphones can be supplemented with others to achieve special effects, as Daniel Bergstrand explains:

Snare top and bottom, and sometimes it's even more. Sometimes, it's cool to even mic up the rim in a top room. Even the side. . . . Find these nasty frequencies, 2 k[Hz] or something, or even lower, and then distort it, compress the shit out of it, and blend that in. I just put lots of microphones up and think this will probably sound like shit, and in the end, most of the time, it's great.

(Bergstrand 2014)

Blending the unique attributes captured by each microphone during recording creates tonal qualities often impossible to achieve through mixing-stage processing alone. For instance producer Sylvia Massy (2016: 115) likes to capture the snare's air hole to add 'crispness' to the sound, a technique also utilized in Rammstein's 'Waidmann's Heil' (Morton 2020), produced by Jacob Hellner (see Herbst 2021). The recording techniques for the snare in metal, aside from genre-specific preparations, do not fundamentally differ from those used in other genres. The same is true for tom recording; however, some metal producers, such as Daniel Bergstrand (2014) and Max Morton (2020), prefer using two microphones per tom: one on the batter head and one on the resonant head. This approach provides a greater control over stick

attack, body, depth, and overall character, allowing producers to balance sonic weight for heaviness against transient-rich, potentially higher-pitched tom sounds that can effectively cut through dense mixes.

When recording cymbals, metal producers vary their approaches, often using a pair (or multiple pairs) of overhead microphones and sometimes spot microphones for individual cymbals, a preference that contributes to each producer's unique sonic signature (see Herbst and Mynett 2021b). Cymbals play an important role in establishing a strong drum sound and enhancing performance energy (see Mynett 2017: 88–102). However, compared to the shells, cymbals contribute less to the core factors of heaviness. Although cymbals have high-frequency content that might be expected to improve clarity, they can sometimes obscure the short attack transients of other drum components, thereby diminishing the overall punch. This tendency has led to quieter cymbals in metal mixes over time as productions have developed to emphasize a heavier sound. Nevertheless, overheads remain essential, as they capture the kit's spatial dimension and enhance the cohesiveness of the drum sound (Mynett 2017: 88–97), which remains important even in hyperreal metal aesthetics that favour close-miked instruments and sample layering (Mynett 2020). Overheads shape the snare's tone, enhancing its smack and punch, improving the clarity of the drummer's articulation, and providing subtle acoustic 'ear candy' that distinguishes high-quality productions from more basic drum recordings or programmed drums. Additionally, cymbals add dimension and width to the drum sound, contributing to a wall-of-sound effect that supports the overall heaviness of the production.

Room tracks, however, serve a different purpose than overheads and cymbals. Capturing the sound of a drum kit from a distance typically emphasizes cymbals, which many producers seek to downplay in favour of other sonic qualities. For example Flemming Rasmussen (Kerr 2009) recorded the drums for Metallica's . . . *And Justice for All* (1988) in a 'huge wooden hangar-like room with a lot of ambience' to achieve a loud, impactful drum sound that conveyed a phenomenological sense of power. Other producers describe similar effects, aiming to capture the drums' 'explosion' (Hyde 2014; Odeholm 2020) or 'excitement' (Braunstein 2020; Otero 2020). However, there is a consensus among producers that overly large or reverberant rooms generally do not suit metal production, as prolonged decay times can compromise rhythmic clarity. As Matt Hyde explains:

For metal drums, you don't need a huge room; you need a pretty tight, close, smaller space. It's gotta have a high enough ceiling for the low-end to build up. It must be explosive but very controlled. It has to go away really fast because the next attacks come in about forty milliseconds.

(Hyde 2014)

Achieving a balance between clarity and room qualities requires a compromise informed by the song's tempo and the speed of rhythmic subdivisions. In addition to excitement, room tracks contribute 'smack' (Sneap 2014), 'organic energy', and stereo width (Mader 2014). The number of microphones, their placement, and model selection vary considerably among producers (see Herbst and Mynett 2021b). Some, like Jens Bogren (2014), favour a stereo pair, while others, including Daniel Bergstrand (2014) and Randy Straub (Tingen 2012), prefer a blend of multiple stereo pairs and mono microphones. Placing microphones in the corners can further enrich the sound by amplifying low-end frequencies, thereby adding more bass to the room, which is a technique favoured by Tue Madsen (2017) and Carl Bown (2018).

In some cases, producers choose not to use room tracks at all, especially in contemporary subgenres like metalcore and djent, where room recordings have become less common. Examples include Bring Me the Horizon's *Suicide Season* (2008) (Nordström 2019), Archspire's *Relentless Mutation* (2017) (Otero 2018), and Architects' *All Gods Have Abandoned Us* (2016) (Udd 2017). However, the preference for room tracks extends beyond subgenres or contemporary aesthetics. Influential metal producer Colin Richardson, known for his work with Machine Head, Cradle of Filth, Carcass, Napalm Death, and Trivium, has voiced a preference for a direct 'in-your-face' drum sound, expressing a dislike for room tracks because they compromise the directness required for effective metal drums (Taylor 2011). Due to divergent opinions within metal subgenres, it is difficult to quantify room tracks' contribution to heaviness. Where the arrangement allows for sufficient sonic space, and the performance subdivisions are not too fast, room ambience can enhance sonic weight and size, indirectly supporting a sense of heaviness. Conversely, excessive ambience may reduce directness and punch. Apart from these general considerations, subgenre aesthetics likely influence the use of room tracks. Faster technical metal rarely benefits from prominent room sounds in the mix, while slower doom or sludge metal often achieves some of its heaviness from the spaciousness provided by room tracks, as exemplified on My Dying Bride's *The Ghost of Orion* (2021).

4.3 Guitars

Although aspects of the process, such as applying amplifier simulations to the recorded DI guitar tracks, contribute to the sound during the mixing phase—similar to the approach taken with drum samples—the final guitar tone is predominantly crafted at the recording stage (see Herbst and Mynett 2021a, 2021b). This practice is unsurprising, as most professional metal producers

conceptualize the final guitar sound from the outset of recording. As Matt Hyde puts it:

You have to see the finish line, and you make your choices at the beginning to reach that finish line the way you want. There are some important choices about guitar tuning, what style of pickup, what kind of strings.
(2014)

This foresight extends to the combination of amplifiers and their capture.

4.3.1 *Guitar Choice and Tuning*

With the notable exception of black metal, which has traditionally resisted the trend of down-tuning (Reyes 2013), lower pitches resulting from extensive down-tuning have marked a prevailing trend in metal history. Many metal scholars support the common belief that lower pitches enhance heaviness (Kahn-Harris 2007; D. Williams 2015; Herbst 2017; Mynett 2019), which is unsurprising, given the role of sonic weight in achieving a heavy aesthetic. Black Sabbath guitarist Tony Iommi is widely credited with popularizing down-tuning (Cope 2010: 32), with his first down-tuned recordings appearing on Sabbath's third album, *Masters of Reality* (1971). On this album, the pitch was lowered by three semitones to create, in Iommi's words, a 'bigger, heavier sound', making the guitars 'sound as fat as possible' (2012: 94) and giving them 'density and weight' (Kitts and Tolinski 2002: 8). Yet, it was not until the late 1980s and 1990s that down-tuning became widely popular among metal bands, with one early example being Metallica's 'The Thing That Should Not Be' (1986b). Since the 2000s, the proliferation and diversification of subgenres inspired by death metal, such as deathcore, have further intensified the trend towards increasingly lower tunings (see Herbst 2017; Herbst and Mynett 2023b). Down-tuning lowers not only the instrument's general pitch range (tessitura) but also the root note of the lowest string, often performed with palm-muting as the rhythmic foundation of many metal guitar riffs. This practice produces a darker, subjectively heavier sound that moves more air from the loudspeaker, allowing listeners to physically experience performative gestures (Zak 2001: 153), especially when synchronized with drums and bass.

While a DAW allows for pitch shifts, such processing risks degrading sound quality. Consequently, professional producers typically establish the most suitable guitar and bass tunings before recording to align with the vocalist's optimal pitch range. As tuning is part of the musical composition, altering it can significantly impact vocal expression. Nonetheless, some producers advocate for tuning adjustments during recording. For example Bob Rock

convinced Metallica to down-tune their guitars on their influential *Black Album* (1991a), exemplified in ‘Sad but True’ (1991b). This approach amplified the record’s heaviness by increasing sonic weight, inspiring other bands to adopt similar techniques (Ozdiyar 2020). Conversely, for the later album *Death Magnetic* (2008), Rick Rubin recommended that Metallica return to standard tuning to prioritize energy over sonic weight and restore singer James Hetfield’s original vocal timbre (Brown 2009: 215–216). This shift in pitch and key noticeably altered the record’s sound: with higher-pitched guitars and bass, the production on *Death Magnetic* is arguably less heavy than Metallica’s earlier albums produced by Bob Rock.

Irrespective of whether tuning changes are made during recording, guitarists and engineers must ensure the guitar setup maintains pitch stability. Tuning outside the instrument’s designed range presents challenges. Matt Hyde considers proper string tension ‘one of the most critical things of all records’ (2014) because it affects pitch stability. Thicker strings help sustain tuning and produce a fuller, bass-rich sound. However, in keeping with the principles of heaviness, the low-end must be balanced with clarity and definition, leading Andy Sneap to favour thinner strings to achieve sufficient brightness (S. Williams 2015). An increasingly popular solution is the use of extended-range guitars with additional strings, although lower pitches and thicker strings often come at the expense of clarity. This trend has encouraged a shift towards single-note playing instead of conventional power chords (see Pieslak 2007; Smialek 2015: 78; Kennedy 2017: 84–85). Another approach to heaviness focuses on rhythmically synchronized impulses across all instruments rather than the traditional ‘wall of sound’ created by power chords.

4.3.2 Amplification

Distortion is central to the signature metal guitar sound, playing an almost essential role in the perception of heaviness (Mynett 2016; Herbst 2017; Walser 1993; Berger and Fales 2005; Kahn-Harris 2007). As the primary source of distortion, the guitar’s amplification chain is therefore central in determining the quality and success of metal production. In earlier periods, roughly up to the 1980s, achieving or increasing distortion was a challenge, as amplifier circuits were designed to support high levels without overloading the valves and causing overdrive. Amplifiers had to balance delivering clean sounds at concert volume with producing overdrive for expressive purposes (see Herbst 2016: 35–42, 45–106), which explains why pioneering metal guitarists used boosting pedals. Tony Iommi, for example, favoured a treble booster to increase input levels and push the amplifier into a more intense overdrive (Parker 2010). Listening to metal records from the late 1960s onward clearly shows an increase in guitar distortion across each decade (see Berger and Fales 2005; Herbst 2017). A major turning point

occurred with the introduction of high-gain amplifiers suited for rock music, notably Marshall's JCM800 series in 1981. Many influential 1980s' productions, such as Slayer's *Reign in Blood* (1986), featured these amplifiers. Yet, amplifiers with extremely high distortion capabilities did not generally emerge until the mid-1990s, with Mesa Boogie's high-gain Rectifier series (1991), Peavey's 5150 (1992), Engl's metal amplifiers like the Savage model (1993), and newer versions of legacy models, such as the EVH Mk III 5150 (2007), based on Peavey's original 5150 (see Martinelli 2008; Mynett 2016: 78; Herbst and Mynett 2023b). These amplifiers allowed for higher distortion levels while maintaining note definition, striking a balance between the sonic weight and clarity needed for heaviness (see Mynett 2016: 78), and offered voicings favouring the lower frequencies of down-tuned instruments.

Since the late 1990s, the variety of amplifiers suitable for metal has expanded exponentially. Traditional valve amplifiers, as mentioned earlier, now face competition from computer or hardware-format simulations, 'profiling' amplifiers that replicate the sonic fingerprint of hardware amplifier (see Herbst 2019b), and hybrid valve/transistor or pure transistor amplifiers, like those used by Darrell Lance 'Dimebag' Abbott, exemplified on Pantera albums such as *Cowboys from Hell* (1990) (see Brown 2018: 40). Artists and producers gravitating towards contemporary subgenres like metalcore and djent, which often favour computer-based production, are among those more likely to adopt simulation and profiling technologies. These preferences build on earlier subgenres like nu metal and industrial metal, which frequently utilized non-valve amplifier technologies (see Herbst 2019a, 2019b; Herbst and Mynett 2021a). According to metalcore producer Joey Sturgis, amplifier simulations offer more consistent results, which are appreciated within the genre, as he explains:

If a note gets played 10 or 20 times within a riff, we want that note to sound almost the same every time. Not the same in the sense that you would copy and paste it, because that starts to sound fake, but you want the same amount of gain and bottom end, and with amp simulators you get more consistent results than with an amp. I realise that there are flavours of metal where those differences are desirable, but I stick with what I know, and that's [Line 6] Pod Farm.

(Sturgis in *Flint* 2014)

Sturgis highlights his preference for affordable amplifier simulations over costly, high-maintenance valve amplifiers. This viewpoint is also shared by other metalcore and djent producers, including Taylor Larson (2017, 2018) and John Browne (2017).

For many metal producers working outside of metalcore and djent, the emphasis is less on selecting a single amplifier and more on blending multiple

amplifiers, considering variables such as the number of cabinets and microphones used. Sylvia Massy favours splitting the signal between two separate guitar amplifiers, each with its own speaker cabinet. These setups typically have complementary characteristics, with one amplifier providing aggression and the other expressiveness (Massy 2016: 132). The balance between the two can either be predetermined, with all signals ‘printed’ onto a single track, or recorded on separate tracks and adjusted later in the mix to suit the specific guitar part. Similar to the approach taken with drums, Metallica pioneered the practice of constructing a guitar sound for maximum heaviness and sonic impact. On *Master of Puppets* (1986a), they recorded guitars using a stereo setup with six microphones per guitar (Prato 2018). For . . . *And Justice for All* (1988), Metallica used a stereo rig with eight microphones, positioning two close to each of the four cabinets, one capturing the room sound, and one for ambient qualities (Buskin 2011). Metallica continued this multi-microphone approach on later albums with Bob Rock, who described the goal as blending different guitar tones to achieve the desired effect:

I think the big thing that I brought to both Mick Mars [of Mötley Crüe] and James Hetfield was using multiple amps, as well as using the differences in phasing, cabs, and heads that all combined to get one sound. Different volumes on different amps, for different frequencies and clarity. That’s basically what I’ve always done to record guitars. Multiple amps and multiple mics, and finding that sound. It’s basically a process of building the sound in the studio. Some people, like Eddie Van Halen, throw one mic in front of an amp and make it work. I think sometimes you have to build that sound.

(*Rock in Brown* 2017: 62)

Rock’s approach aims to achieve a dense wall of sound that supports a heavy aesthetic while preserving guitar definition within a mix. Using Eddie Van Halen as an example, Rock suggests that metal guitar tones, in contrast to standard rock guitar sounds, benefit from a more manufactured approach with greater layering. In Rock’s words, it is all ‘about size and sheer volume’ to create a ‘big, monster sound’, allowing single-note riffs to be as dense and impactful as power chord riffs (Brown 2017: 62). This sophisticated approach to guitar recording is prevalent across most metal subgenres. A recent example is the symphonic black metal band Behemoth’s *I Loved You at Your Darkest* (2018b). Their engineer, Sebastian Has (2018), combined a Bogner Uberschall with a Mesa Boogie cabinet for a ‘gritty and dirty’ tone, blending it with a Splawn Quick Rod and an Orange cabinet to provide a warmer, rounder tone. For tonal contrast, various microphones were positioned on each amplifier and cabinet setup, capturing three distinct guitar tones: a Flying V for a quintessential metal tone, a Les Paul for warmth, and a

Stratocaster with single-coil pickups for a different colour and to accentuate melodies and arpeggios. This layering of complementary tones yields a dense sound that enhances heaviness while preserving musical detail and performative elements through clear note definition.

Achieving maximum heaviness through guitar layering is complex. While Metallica and Sylvia Massy preferred mixing multiple amplifiers and cabinets from the same performance, Behemoth opted to record separate performances using different guitars, amplifiers, and cabinets. Not all producers favour the first method of using a varied amplification setup with the same performance. Andy Sneap (2014) and Jens Bogren (2014) point to phase issues as being detrimental to achieving an ‘in-your-face’ sound. Instead of re-amplifying the same performance through various rigs, it is more common to record additional performances using distinct guitars, amplifiers, cabinets, or microphones to thicken and widen the sound. This method reduces phase problems while retaining the desired thickening effect (see Herbst 2017; Mynett 2017: 136).

The practice of layering guitars has developed throughout metal’s history. Black Sabbath began double-tracking guitars on their early albums to maximize power and sonic weight (see Thomas 2015: 118–119). Over time, the number of guitar tracks gradually increased from the initial two to four or six tracks, creating a progressively denser and larger wall of sound (see Herbst 2017). By the 1990s and 2000s, four guitar tracks became a common standard, influenced in part by Colin Richardson’s productions (Taylor 2011), which inspired notable producers, including Andy Sneap (Turner 2012: 20–21), Russ Russell (2009a), and Logan Mader (2014), to adopt this approach. Richardson’s signature wide, layered sound can be heard on albums such as Carcass’s *Heartwork* (1993) and Machine Head’s *Burn My Eyes* (1994).

However, as metal guitar tones have developed, the trend towards increased layering has reversed in recent years. Contemporary metal productions often emphasize ensemble tightness and rhythmic complexity over sheer size (see Herbst and Mynett 2021b; Mynett 2019), leading many producers to favour a clearer two-guitar approach (‘double-tracking’). This method is now standard among producers such as Jens Bogren (2014), Daniel Bergstrand (2014), Matt Hyde (2014), and Nick Raskulinecz (2014). Even long-time advocates of ‘quad-tracking’, like Andy Sneap and Logan Mader, have largely embraced the two-guitar approach. Bogren suggests that reducing the number of guitar tracks provides a ‘different weight’, though he leaves this term undefined. This change likely indicates a shift from the broader chorus effect of quad-tracking towards a more defined low-end clarity that better emphasizes the rhythmic articulation of palm-muted power chords or single-note riffs. Nick Raskulinecz similarly notes that excessive layering can ‘make it blurry’, as he prefers a tone where ‘you can hear the pick hitting the strings’ and the

‘diction of the riffs’ (2014). Andy Sneap (2014) summarizes the difference as follows: four guitars sound ‘fat’, while two guitars are ‘punchy’, supporting the aesthetic shift towards rhythm, clarity, and punch in contemporary metal.

Daniel Bergstrand (2014) offers a slightly different perspective, viewing additional layers not as integral to the primary guitar tone but as tools for enhancing specific sections, such as adding a subtle chorus effect to widen parts like the chorus. Hyde (2014) observes that producers may sometimes use layering to showcase their technical prowess rather than to highlight the artist’s unique sound. He cautions against ‘overproduction’, which can detract from the music’s impact and heaviness if the choices do not align with the composition and recorded arrangement. Raskulinecz (2014) echoes this sentiment, favouring the rawer sound of two guitars, which he sees as truer to the band’s live performance.

In a similar vein, metalcore artists and producers, including Bullet For My Valentine (Sharma 2018), Dan Lancaster (Tingen 2015), Joey Sturgis, and Tom Dalgety (S. Williams 2015), argue that fewer guitar tracks can yield a fuller sound compared to excessive layering. Sturgis elaborates:

I think there’s a big misconception about how to get big guitars. People think you need to add more guitar [tracks] to make them sound big. I actually recommend the opposite: I think the less guitars you have, the bigger you can get. If you only have one guitar taking up your left speaker and one guitar taking up your right speaker, you can really push those as far up in the mix as you want. But let’s say you have two on each side; now you have to have those turned down in order for both of them to be heard. It’s a lot easier to set up one tone that really kills, and kind of does the meat of everything, then just play with that.

(Sturgis in S. Williams 2015)

Elsewhere, he expands:

I don’t like quad tracking because you can’t get your guitars as focused or as loud as you could if you just do two, because when you do four, now you’ve got so much extra content frequency wise, that you can’t really push them as loud as you want into the mix, because there’s so much more density to it.

(Sturgis in Levine 2015)

This approach is intriguing because a dense frequency spectrum and accompanying wall of sound are generally considered essential for achieving a heavy aesthetic. However, Sturgis argues that an excessively large and full guitar sound can dominate the mix, ultimately necessitating a loudness reduction

to achieve balance. In contrast, when the guitar sound is less dense, it can be positioned more prominently in the mix (Flint 2014), allowing the distorted guitar to fulfil its musical and sonic role as a central element of heaviness.

Many professional metal productions do not rely on a singular guitar tone throughout. Instead, producers tailor the number of guitar layers to suit the musical arrangement, adding or removing layers as needed. For instance adding a third guitar in the stereo centre allows for thickening sections of the song, like the chorus, as demonstrated on Metallica's *Black Album* (1991a) (McIver 2009: 204). When guitars are tripled throughout a song, they can only gain further impact by stacking additional layers and/or arranging them to play different chord inversions or octaves, thereby broadening the frequency spectrum (Mynett 2017: 141). Likewise, when tracking four guitars, producers rarely use the same tone and level for each. As Andy Sneap (2014) and Kristian Kohlmannslehner (2019) note, while one pair of guitars provides the primary tone, a second, quieter pair may be mixed in to add qualities like note definition or a thicker low-end. Consequently, Tue Madsen (2017) often incorporates a second guitar pair with a lower level and less distortion to blend in a tone that has a crisp, percussive pick attack.

Using more than four guitar performances with varying tones is uncommon. Even with tightly executed performances, timing variations across three or four performances can overly increase density, softening the sound by smearing attack transients and producing comb-filter effects that compromise the low-end, thus detracting from heaviness (see Mynett 2017: 135). An exception is Armored Saint's *La Raza* (2010b), which features six individual guitar performances blended with three different amplifiers (two Bogner, two SansAmp, and two Marshall) (Saxon 2011). In this case, the multiple layers do not hinder the mix's clarity, as the music itself is not overly dense (or heavy). However, recording rhythmically complex, fast-paced contemporary metal with intricate ensemble rhythmic synchronization would not benefit from such a setup. Overall, contemporary producers seldom adhere to a rigid formula; they determine the number of layers based on artist preferences, the precision of performances, subgenre characteristics, and song-specific needs (Herbst and Mynett 2021b). Slower songs, or sections thereof, may benefit from additional layers due to the available sonic space, allowing for a dense wall of sound. Conversely, faster passages benefit from fewer guitars or a blend of 'fat' and percussive tones (see also Mynett 2017: 136).

Another consideration in achieving heaviness involves whether the same guitar tone should be panned to both the left and right channels. Using an identical setup for each side results in a cohesive, dense wall of sound, as found in most previously discussed albums. For a different aesthetic, distinct tones can be assigned to each speaker, mimicking a band's live sound. According to Andy Sneap, maximum width can be achieved with different sounds on the left and right channels (S. Williams 2015; see also Herbst

2017). This technique is evident in Exodus's *Blood In Blood Out* (2014), where guitarist Gary Holt recorded all rhythm tracks but with varied tones for each side (S. Williams 2015). Tonal differences in the mid- and high-frequency ranges between stereo channels widen the guitar sound (see Mynett 2017: 299). This approach results in a more interesting sound, as noted by Andy Sneap (S. Williams 2015), Romesh Dodangoda (S. Williams 2015), and Jens Bogren (2019), because it lends the album a polished, professional quality that distinguishes it from self-produced recordings. Regardless of the approach, whether using identical or contrasting guitar tones on each side, each method produces a distinct type of heaviness: the identical tone creates a compact, dense sound, whereas complementary tones produce a broader sonic image.

4.3.3 *Volume and Distortion Level*

Recording guitars for metal involves balancing two essential, interconnected factors—volume and distortion—that greatly impact the heaviness of the recorded tone. Given the general importance of loudness in metal (Walser 1993; McKinnon 2009; Weinstein 2000), there is a common misconception that recording guitars at high volume is optimal. Although high volumes were essential before the advent of high-gain metal amplifiers, these newer devices can now achieve the desired results at more moderate levels. Colin Richardson explains that relatively low amplifier levels are sufficient for loudspeakers to produce the mid-range frequencies necessary for the guitar to cut through a dense mix (Taylor 2011). Similarly, Fredrik Nordström (2019) cautions that excessive volume can be counterproductive, as it increases the risk of capturing unwanted room resonances and altering the ratio between pre-amplifier and power-amplifier distortion. While the latter can lend a more open sound suited to rock guitar tones, the pre-amplifier stage provides a tighter sound, balancing low and high frequencies and avoiding muddy resonances.

A common technique to further refine a distorted tone is to use a booster pedal, such as the widely popular Tube Screamer. These pedals tighten the low-end by subtly applying a high-pass filter and compressing the upper bass and lower midrange, creating a more controlled and 'harder' sonic weight. Simultaneously, they amplify the presence range, which enhances note definition (see Mynett 2017: 55). This approach, made popular by Colin Richardson and later adopted widely, has been instrumental in achieving a full yet well-defined guitar sound with low tunings (Martinelli 2008; Taylor 2011). It became especially popular in the early to mid-1990s, particularly in Swedish (melodic) death metal, influenced by Richardson's productions such as those for British grindcore and death metal band Carcass (Ekeröth 2008: 15, 119; Purcell 2003: 22). Notably, early metal acts such as Black Sabbath and Motörhead

had already used similar techniques in their productions (Parker 2010; Brown 2010: 56).

Mynett (2016) highlights a ‘distortion paradox’: while distortion is fundamental to a heavy aesthetic, it can also present challenges. Heaviness relies on a dense concentration of musical sound, made possible by distortion’s intensified overtones and lower residual notes (Walser 1993: 42–43; Berger and Fales 2005). However, excessive distortion can impair clarity and diminish the impact of other elements in the mix, ultimately compromising the music’s essential qualities of energy, aggression, impact, and heaviness (Mynett 2017: 1–2). A heavily distorted guitar wall can easily mask other instruments, preventing them from contributing fully to the production’s heaviness (Mynett 2016: 78). Consequently, many metal producers recommend reducing distortion as guitars are layered or tuned lower.

Another technique to maintain note definition within a distorted texture is to mix highly distorted rhythm guitars, typically equipped with active pickups, with a pair of lower-output guitars. For instance Jacob Hansen (2019a) sometimes combines the main rhythm guitars with a vintage Telecaster featuring low-output single-coil pickups. This combination allows for the phenomenological experience of high distortion while preserving the note definition of a percussive and relatively clean guitar. A similar effect can be achieved by lowering gain if the guitarist picks the strings very forcefully, creating a naturally aggressive sound. An example of this approach, yielding a tone rich in heaviness, aggression, and clarity, is Gojira’s *The Way of All Flesh* (2008), engineered by Logan Mader.

4.3.4 Miking

The choice and positioning of microphones serve as a bottleneck in the production process, impacting all elements from the instrument to the amplification chain. According to Nick Raskulinecz (2014), once an amplifier provides sufficient low-end frequencies, the miking process can impact the guitar tone even more profoundly than the amplifier itself. To achieve both sonic weight and note definition, Raskulinecz employs two or three different microphones, each optimized for distinct tonal attributes. Many producers view microphone choice and placement as a form of equalization, refining the guitar and amplifier’s signal chain for maximum effectiveness (Wanasek 2016). Techniques vary widely, not only among producers but also from one production to another. Some opt to combine the same microphone model in different positions, such as on-axis and off-axis, while others mix diverse microphones to capture complementary tonal qualities. Joey Vera, for instance, describes the popular combination of a Shure SM57 and a Sennheiser MD421: ‘The 57 is getting a fairly bright sound—a lot of upper mids and a bright kind of fuzziness—and the 421 is picking up a lot more low-end and beef’ (Saxon

2007: 36). This balance between microphones can be fixed or automated throughout a song. Colin Richardson, for example, often emphasizes the brighter SM57 sound during verses and features the fuller MD421 tone in choruses to add extra heaviness through greater sonic weight in the song's most impactful sections (Taylor 2011). For some producers, like Matt Hyde (2014), a single microphone setup is preferred to minimize phase issues and improve note definition. Others, such as Jacob Hansen (2019b), use up to four microphones—even of the same type—so that, due to variations in placement and individual speaker characteristics, each captures a slightly different tone, ultimately widening the guitar's stereo image.

Approaches to capturing room ambience also vary considerably. When the mix allows for sufficient sonic space, some engineer-producers, including Tony Platt (Brown 2010: 81–82) and Tue Madsen (2017, 2019), prefer to record room microphones panned to the opposite side of the stereo field to utilize time differences for a wider sound. Madsen often fades room microphones in and out depending on the arrangement's density, adding ambience and character during sparser sections. However, most producers prefer a close microphone position, achieving a less reverberant and more rhythmically clear sound. The proximity effect of close-miking not only enhances clarity but also increases sonic weight in ways unattainable through equalization alone. As metalcore producer Taylor Larson explains:

When I capture my guitars, I try to capture it with the most low-end possible. With the proximity effect, I get the mics super close to the speakers. My theory is if you capture it with a ton of low-end, then when you filter out the low end in the mixing process, it still has this larger-than-life low-end sound, but you just filter it out. But it affects the way the top-end works.

(Larson 2018)

Larson typically filters guitar tracks at a high frequency, around 200 Hz, to create space for the kick and bass. Despite this substantial attenuation of the lower frequencies, he finds that the proximity effect captured during close-miking remains discernible, giving the guitars a heavy, impactful sound. A related technique sometimes employed to enhance sonic weight involves positioning a microphone behind an open-backed speaker cabinet. Joey Vera describes this setup as producing a 'sound like a bulldozer going through the city. It has a lot of low-end to it, but so much where it's below 80 Hz—this low mid growl' (Saxon 2007: 36). This method, as demonstrated on Meshuggah's *MonstroCity* (2016) (Madsen 2017), requires phase reversal to avoid signal cancellation and can result in a powerful low-end presence. The sound and movement of air from the speaker create a physical, body-felt tone that amplifies the track's heavy aesthetic.

4.4 Bass

4.4.1 Bass Recording Considerations and Approaches

The bass guitar is fundamental to any metal production, as it provides essential sonic weight that underpins the guitars and contributes to the overall heaviness. This important role is reflected in the typical tracking order of instruments. While bass and guitar often form the foundational layer in many band-based popular music genres, including rock—and are sometimes recorded live together—in contemporary metal, the bass is frequently tracked after the guitars. Bassist and producer/engineer Joey Vera explains why this approach was used for Armored Saint's *Revelation* (2000):

We did the guitars first and I did the bass last. . . . [F]or me it was more of a way to find my place in the mix. When you record loud Marshall [amplifiers] they can tend to take up a lot of room. They can go way down around 100 Hz and all the way up to 6 kHz, or something like that. They can cover such a broad spectrum that for me it was better to wait until the guitars were recorded so that I could dial in a better bass sound and let it be able to find its own place to reside in the frequency spectrum. When you do it the other way, you have no reference. You're just playing with the drums and maybe a couple of scratch guitar tracks. I've done it so many times that way and that's sort of the traditional way. Do drums first, then you do bass, then you do guitars. You can get a killer bass sound when it's just you and the drummer, but then the guitar players show up and they got all this low end coming out of their guitars, and they're covering up this nice mid-range that you'd like to have. It's really hard to make the bass poke out after that.

(Vera in Saxon 2007: 30)

The metal guitar's density reduces the sonic space available for the bass and limits its expressive, gestural qualities, which is an issue far less prominent in other rock genres. Recording and sculpting the bass later in the process have practical advantages, especially in contemporary metal, where guitars are often tuned lower and reach higher into the presence range due to increased distortion levels (Berger and Fales 2005; Herbst 2017). In subgenres like djent, where bass clarity and virtuosity are paramount, this approach is essential. For example in Periphery's *Periphery III: Select Difficulty* (2016), only a direct bass signal was initially recorded, and once the guitar sound was fully realized, the bass signal was crafted during the mixing phase (Getgood 2016).

Many considerations for shaping the bass sound parallel those applied to guitars. Down-tuned guitars typically necessitate a similarly tuned-down bass to maintain a pitch range an octave below that of the guitars. With

thicker strings, bass tuning can achieve stability and clarity; however, as former long-time Machine Head bassist Adam Duce notes, ‘heavier strings can sound muddy’ and may lack the articulation and brightness of thinner strings (McIver 2012: 202).

To enhance harmonic overtones that add proximity and brightness and allow the bass to cut through the dense wall of sound, metal producers generally apply some degree of distortion to bass parts. However, as with guitars, excessive distortion can undermine note clarity and definition (Mynett 2016: 77). Consequently, many metal producers layer bass sounds to balance various tonal characteristics. This process may occur during recording or in the mixing phase once the guitar sound is fully established. For instance in Periphery’s *Periphery II: This Time It’s Personal* (2012), the bass sound was a blend of a clean direct signal and a distorted tone from a bass amplifier (Johnson 2012). The bass was recorded directly into the computer and later re-amped through a 1970s’ Ampeg B-15 amplifier with a modern SVT 8×10 stack, captured using four microphones.

4.4.2 Layering of Bass Tones

Combining different bass tones was relatively uncommon on early metal records due to limited track availability, yet this approach grew increasingly popular in the 1970s and 1980s. One of the earliest documented examples is Thin Lizzy’s bassist, Phil Lynott, who played a stereo bass, routing one output to a bass amplifier and the other to a guitar amplifier, enabling independent control over the low- and high-ends. Engineer Tony Platt adopted Lynott’s approach during the production of Motörhead’s *Another Perfect Day* (1983) to accommodate Lemmy Kilmister’s preference for playing bass through a guitar amplifier, which lacked sonic weight (see Brown 2010: 75–76). Platt split the signal between a bass amplifier and a guitar amplifier, using microphones designed to capture the low-end from the bass amplifier and the mid and high ranges from the guitar amplifier. This configuration provided sufficient sonic weight for a heavy production while allowing the mid and high frequencies to be distorted. The result was a clean low-end with distinct note definition and a brighter mid and high range, which blended effectively with the guitars while keeping the bass prominent in the mix; this method remains foundational in contemporary metal bass processing (see Mynett 2017: 143–153). Typically, a direct signal provides the clean low-end, combined with distorted tracks focused on higher frequencies, using bass or guitar amplifiers or effects pedals. This approach enhances note definition and mitigates the rather dull, ‘boxy’, ‘wooden’, or irritating rattling qualities that a direct signal alone may produce (Mynett 2017: 145).

With the increasing availability of tracks, contemporary production of heaviness can further benefit from additional composite layers. By mixing

layers with complementary sounds, especially those enhancing the direct signal that generally supplies the bass's solid low-end, the bass sound achieves a denser texture suitable for various playback systems, from hi-fi systems to earphones and laptop speakers (Mynett 2017: 153). Matt Hyde explains in detail why he typically records four to six bass tracks:

With modern metal and the down-tuned stuff, you really lose a lot of note definition. You lose a lot of fundamentals. How do you overcome that? It's been my experience that you have to use a guitar amp of some kind along with the bass amp. I generally record four tracks of bass, maybe more. There can be phase issues; it's tricky to do this. It's definitely difficult to get the sounds killer. I record a DI. I use an SVT and an Orange through a Marshall 8x10 or something like that. It's a ridiculously mid-rangey tone, it sounds like shit, but that's where I get that definition and the note definition blending some of that in. So, I have four tracks, and I blend in some of the distorted bass with the regular low SVT sound. And then, maybe I use some different DIs, different basses together. You have to break the bass down just like the drums between functions, maybe heavy low-end, I need note definition, I need gain, and then I have a completely dry DI that I can re-amp later on for other stuff and give it even more gain because with bass it may not be the same sound throughout the whole thing. Maybe I need more gain in this section. And I do that by feeding the DI through a different thing or riding up one of those tracks that has more gain than the others. Multiple channels of distortion and multiple clean channels. Anywhere from four to six tracks I use for bass.

(Hyde 2014)

Each bass layer serves a distinct function: sonic weight; clean mid-range tones for note definition, ensuring intelligibility and clarity; and distortion for character, directness, and cohesion with the guitars. Each of these layers contributes to the essential criteria of heaviness. Furthermore, having access to different tones during the mixing stage allows producers to tailor each riff and section by adjusting the loudness ratios of these layers, which suggests that many producers envision the final sound as early as the pre-production and recording stages. Armored Saint's 'La Raza' (2010a) exemplifies this approach with a composite bass sound that shifts in loudness balance throughout the song. The tones range from a cleanly recorded Ampeg SVT amplifier (captured with an Electro-Voice RE20 microphone) to a highly distorted SansAmp PSA1 with prominent upper-mid frequencies and a moderately distorted, 'growly' SansAmp RBI. While the bass tone remains relatively static, it undergoes a sudden shift from medium distortion to a clean tone to emphasize the low-end (Saxon 2011). Other, more recent examples of heavily layered bass sounds include Evanescence's *Evanescence*

(2011), which employs five bass tracks—a DI, an Ampeg and a SansAmp bass amplifier, a recorded sub-cabinet, and a Marshall JMP1 guitar amplifier (Tingen 2012)—and Mastodon’s *Once More ‘Round the Sun* (2014), which features seven bass tracks from various direct inputs, fuzz distortion pedals, and amplifiers (Raskulinecz 2014).

4.5 Vocals

Vocal styles in metal are highly diverse, evoking emotions such as power, aggression, rage, and anger through various techniques such as singing, belting, shouting, growling, and screaming. These styles contribute to the genre’s heaviness. As with the instruments discussed, processing can only support and enhance what has been captured in the recording, making a strong performance essential for achieving a heavy production. While compressed and distorted vocals may sound more extreme and powerful, no amount of processing can compensate for a performance that lacks aggression, power, or emotion (see Mynett 2017: 325–326).

4.5.1 Miking

Producers generally strive to capture the vocal sound as closely as possible to what is needed in the mix, following a sound-at-source philosophy through microphone choice and printed processing. However, vocal sounds are typically only partially finalized during recording, often requiring further enhancement within the mix. While adjusting the frequency spectrum is relatively straightforward, insufficient dynamic expression or excessive distortion can only be corrected at the expense of audio quality. Given the voice’s large dynamic range relative to the limited dynamic range of guitars in metal production, along with extensive compression applied elsewhere, most producers still apply compression during recording (see Mynett 2017: 162–164). Processing during recording serves two primary purposes: it facilitates later mixing and allows producers to colour the vocal sound so that the voice is aesthetically shaped or even ‘pre-mixed’ rather than merely captured (see Herbst and Mynett 2021b).

While many producers have go-to microphones for recording drums, guitars, or basses that are adaptable to various setups, vocal recording demands more flexibility. In addition to providing a tried-and-tested tonal quality, a preferred microphone can significantly alter the sound through positioning. Unlike the static positioning of drums or guitar and bass cabinets, vocalists are dynamic performers; expressive vocal performance often involves notable body movements or postural adjustments to accommodate shifts in vocal style. The ideal recording setup from an engineering standpoint, a static vocalist positioned in front of a stand-mounted pop shield, may not always meet the needs of

an expressive vocalist. To accommodate varying degrees of movement, artist preferences, and vocal timbres, microphones with different transducer types (e.g. dynamic, condenser, ribbon) and directional patterns (e.g. unidirectional, cardioid) are employed. This flexibility allows for vocal recording with either a fixed microphone or a mobile handheld microphone (see Mynett 2017: 161).

Beyond microphone placement, transducer mechanisms, and polar patterns, selecting the right microphone can greatly enhance vocal effectiveness. For instance a death metal vocalist may benefit from a microphone that captures low frequencies well, amplifying the chest cavity's resonance to add depth to the voice. However, using such a microphone risks making the voice overly dark and boomy, compromising intelligibility in the mix. A microphone that accentuates middle and higher frequencies might be preferable, as it would enhance articulation and make the voice more present (see also Mynett 2017: 156). Switching microphones between songs or sections to select a model best suited to the vocal style can also yield effective results. Another option is to record vocals with multiple microphones, similar to the layered approach used for guitar and bass. For example Adam Michał 'Nergal' Darski's vocals on Behemoth's *I Loved You at Your Darkest* (2018b) were recorded using two microphones simultaneously. A dynamic Shure SM7 captured the voice directly from the mouth, harnessing the proximity effect and enhancing 'grit', while a condenser microphone (Peluso P67) picked up facial resonances from the sinuses, nose, and forehead. With correct phase alignment, mixing these two tracks creates a hyperreal vocal sound that, according to engineer Sebastian Has (2018), exaggerates the extremity of the performance. This layering not only increases the sound's extreme expression but also adds fullness and brightness, which improves the articulation of features like grit. This approach contributes to the heaviness of growled or screamed vocals. There are also contrasting approaches that do not aim to maximize vocal size. According to Motörhead engineer Ryan Dorn, Lemmy Kilmister stood farther from the microphone, without pointing it directly at his mouth, to create a smaller vocal sound that better fits within the mix:

When you're talking about trying to fit a vocal sound into a wall of guitars and that bass tone, if you had this huge vocal sound, it would be very difficult to get those vocals naturally to fit in the track. So what he'd learned over the years is, if you sing off the mic, it has this tendency to make the vocal smaller, therefore allowing it to fit into the track, therefore it doesn't compete with the rhythm guitar. It was a very, very smart way to do it and I learned a lot from him with regard to that.

(Dorn in Brown 2010: 153)

Whether this approach is prevalent in contemporary metal music production remains to be determined. On the one hand, vocal sounds have become

increasingly hyperreal to enhance heaviness and extremity, as exemplified by Lorna Shore's 'To the Hellfire' (2021) (see Herbst and Mynett 2023a). On the other hand, mixes have become denser, featuring a substantial wall of guitars, bass, and drums, often supplemented with samples. Emphasizing a wall of guitars and bass is likely to produce a different form of heaviness than allowing an extreme vocal to occupy more space within the mix.

4.5.2 *Vocal Layering*

When it comes to layering, vocal strategies mirror those used in guitar recordings. Some vocalists prefer to double their main vocals to add size and power. This effect can be enhanced by recording the doubled performances with different microphones, thereby thickening the overall sound through subtle spectral differences (see also Mynett 2017: 157). Doubling is a signature technique of Ozzy Osbourne, although it may not be immediately noticeable due to his tightly synchronized performances (Brown 2010: 114). Another prominent example is James Hetfield, who doubled his main vocals on Metallica's early albums up to . . . *And Justice for All* (1988). However, after Bob Rock took over production from Flemming Rasmussen, he felt that the vocal details became lost through doubling (Masciotra 2015: 41), prompting Hetfield to switch to single main vocal lines.

Opinions on doubling vary widely among producers, with approaches often influenced by subgenre, vocal style, and desired aesthetic. Fredrik Nordström (2019) believes that while some vocalists benefit from doubling, others lose their individuality. In such cases, he reduces the number of doubled parts to avoid what he terms a 'meat organ', a synthetic vocal sound that simply increases volume without adding distinct qualities. Nordström also lowers the level of the doubled tracks and positions them in the same space in the stereo field to create room for harmony vocals and add additional texture. Producers such as Russ Russell (2019), Jens Bogren (2018), and Daniel Bergstrand (2017) agree that doubling can dilute character, aggression, and expressiveness. Consequently, they typically avoid doubling in verses and sections where lyrics are most prominent, though they do employ it for vocal harmonies in the chorus and other dense sections to enhance fullness. A middle-ground approach, favoured by Jacob Hansen (2019a), involves reducing the level of the doubled tracks to about half that of the main vocal, thereby preserving expression while adding depth. Other producers, including Joey Sturgis (Flint 2014) and Carson Slovak and Grant McFarland (2019), prefer doubling as a default, particularly to achieve greater size, as Sturgis explains:

I like vocals as wide as I can go—almost gang vocals. I double everything, triple some things and quadruple others. The top vocal that I intend for you to be listening to gets its own treatment throughout the song, and

everything around it is designed to work with it. So I might have four low screams that combine to support one centre scream. And I might be notching out certain frequencies in those background vocals to make them fit better. Sometimes there's a centre vocal, two doubles panned left and right, and I might even go as far as adding chorus to those background vocals to make an even wider effect.

(Sturgis in Flint 2014)

Sturgis, Slovak, and McFarland primarily produce metalcore, but this limited sample does not conclusively establish whether vocal doubling is more prevalent in this subgenre. However, irrespective of conventions associated with various subgenres, giving substantial space to vocals introduces a specific kind of heaviness distinct from that achieved by emphasizing guitars, bass, or drums.

In vocal recording, the emphasis is less on the number of microphones used for a single performance and more on whether to blend different vocal styles. Combining low and high vocals, such as growls and screams, produces an otherworldly, often inhuman and extreme quality (see Wallmark 2018), which intensifies the perception of heaviness. Moreover, alternating vocal styles within a song can heighten heaviness through contrast, influencing the overall aesthetic of that section. Both techniques are evident in Behemoth's 'Dog=God' (2018a) and Lorna Shore's 'To the Hellfire' (2021). While the former combines vocal styles typical of black metal, the latter—voted Song of the Year 2021 by *Loudwire* magazine—garnered acclaim for its heaviness and the extremity of its vocal performance and production (Herbst and Mynett 2023a).

4.6 Recording 'In Solitude'

To accommodate the preferences of the various producers involved, a comprehensive approach to drum microphone selection and placement was chosen. The kick drum was triple-miked using three distinct microphones: a sub-kick to capture low frequencies, a Shure Beta 91 positioned approximately 8 inches away from the batter head contact point within the kick shell to emphasize the high-frequency 'click', and an Audix D6 placed at the porthole to achieve a balanced capture of both 'boom' and 'click'. The snare top was miked with a Shure SM57 and a Neumann KM184 taped together on the same stand, with the diaphragms phase-aligned (the tip of the KM184 set slightly further back than the tip of the SM57). An SM57 was also used on the snare bottom, along with an additional microphone placed horizontally on the side of the snare, positioned approximately 6 inches away to capture the combined qualities of the top and bottom. An overhead-style snare microphone, a Neumann U87 set to cardioid mode, was positioned

about 3 feet above the snare's centre for an ambient capture. For the three rack toms, a Sennheiser MD421 was placed on both the batter and resonant heads. However, due to limited space, a bottom microphone for the floor tom's resonant side and the studio floor was not feasible. Overhead capture for the cymbals was achieved with a spaced pair of Neumann KM184s, positioned to capture the relatively wide spread of drummer Dan Mullins' cymbal array. Three room microphones were placed at knee height: a Coles 4038 (a figure-of-eight ribbon microphone), a Neumann U87 set to omni mode, and another Neumann U87 set to cardioid mode. Each room microphone was processed with hardware compression: a Urei 1176 was used for the Coles 4038, while two Warm Audio WA76s were used for the Neumann U87s, applying a nominal 8 dB of gain reduction during peaks.

Before recording, Mullins' extensive array of cymbals was cleaned to enhance their brightness. After replacing and tuning the drumheads, a complete recording of clean drum hits was tracked. The final drum performance was recorded across multiple Pro Tools playlists, which were subsequently comped together.

After a rough mix of the comped drums and a separate click track was sent out, Richard Shaw remotely quad-tracked the rhythm guitars in full, returning only a clean DI for each rhythm track. This re-recording was an essential aspect of the revised version of 'In Solitude', as using consistent DI signals from a single guitarist (rather than multiple performers) allowed for more straightforward re-amping. Each producer had the option to work with either double-tracked or quad-tracked guitars and could choose to re-amp from the provided DI files. This approach offered the flexibility to tailor rhythm tones according to individual preferences while also reducing the time typically required for re-amping. For instance some producers might choose the same rhythm tone for both left and right double-tracked guitars, whereas others may prefer distinct left/right rhythm tones, achieved by using four entirely different amplifier/cabinet/microphone signal chains. In the latter case, two of the four rhythm performances were re-amped through two separate setups, utilizing a total of four different rigs. The gear included an oversized Mesa Rectifier cabinet loaded with V30 speakers, featuring varied combinations of Shure SM57 and Sennheiser MD421 microphones for each setup, as well as a Peavey Mk. I 5150, a Peavey 6505, an EVH 5150 III Stealth, and a Mesa Boogie Mk. V Kemper profile.

Playing along with the rough drum mix and re-amped guitars, bassist Luke Appleton—also tracking remotely—provided both a clean DI signal and a processed signal from a Dark Glass Alpha Omega pedal. The DI was later re-amped through an Ampeg Classic amplifier connected to an Ampeg 4×10 cabinet, captured with a Sennheiser MD421 microphone, and processed through a Trondheim Audio SkarBassOne pedal into a Two Notes Torpedo CAB M+ IR (impulse response) loader. Additionally, the bass DI

was virtually re-amped using Neural DSP Parallax software to provide further tonal options.

The revised strings and orchestration for ‘In Solitude’ were again arranged by Mark Deeks, this time benefitting from a more complete context provided by a rough mix of drums, bass, and guitars. As with the UK Metal Merger project (see Section 3.2), wave file format and MIDI files were returned, allowing for the replacement or blending of additional virtual instrument sounds with the original. However, this process generated a substantial number of files for orchestration, piano, and brass. As the selection, blending, and processing of these elements extended beyond the project’s primary focus, we provided sub-mixed stems for strings, piano, and brass, with the option for individual file access upon request.

The lead vocals were recorded by Ralf Scheepers, the vocalist for the heavy/power metal bands Primal Fear and Avantasia. Scheepers’ recordings, captured in his acoustically treated, high-standard home studio, featured printed processing. Given the large number of backing vocal, doubling, and harmony tracks produced during this session, sub-mixing was again necessary. This approach resulted in separate stems for lead vocals, stereo backing vocals with harmonies, stereo doubles, and additional harmony stems.

Aaron Stainthorpe from My Dying Bride contributed death metal-style backing and alternative vocal options. These recordings were tracked in person by the authors using a Neumann U87 microphone with a moderate level of Urei 1176 printed compression. Stainthorpe’s performance included a main vocal line along with three additional takes, resulting in four vocal tracks that were combined into a stereo stem. As with other elements, individual files for these vocal recordings were also available upon request.

Bibliography

- Bartlett, Bruce and Bartlett, Jenny (2009). *Practical Recording Techniques: The Step-by-Step Approach to Professional Audio Recording*. Amsterdam: Focal Press.
- Bennett, Samantha (2019). *Modern Records, Maverick Methods: Technology and Process in Popular Music Record Production 1978–2000*. New York, NY: Bloomsbury.
- Berger, Harris M. and Fales, Cornelia (2005). ‘Heaviness in the Perception of Heavy Metal Guitar Timbres: The Match of Perceptual and Acoustic Features over Time’, in *Wired for Sound: Engineering and Technologies in Sonic Cultures*, edited by Paul D. Greene and Thomas Porcello (pp. 181–197). Middletown, CT: Wesleyan University Press.
- Brown, Jake (2009). *Rick Rubin: In the Studio*. Montreal: ECW Press.
- Brown, Jake (2010). *Motörhead in the Studio*. London: John Blake.
- Brown, Jake (2017). ‘Bob Rock: Metallica, Mötley Crüe, & More’. *Tape Op: The Creative Recording Magazine*, 121: 60–64.
- Brown, Jake (2018). ‘Terry Date: Avoiding a Signature Sound?’ *Tape Op: The Creative Recording Magazine*, 123: 38–142.
- Buskin, Richard (2011). ‘Metallica “One”’. *Sound on Sound*. www.soundonsound.com/techniques/classic-tracks-metallica-one. Accessed 8 October 2024.

- Ciauro, David (2010). 'Hero with a Thousand Faces'. *Modern Drummer*, 11/2010: 44–55.
- Cope, Andrew L. (2010). *Black Sabbath and the Rise of Heavy Metal Music*. Farnham: Ashgate.
- Ekeröth, Daniel (2008). *Swedish Death Metal*. Brooklyn, NY: Bazillion Points.
- Flint, Tom (2014). 'Joey Sturgis'. *Sound on Sound*. www.soundonsound.com/people/joey-sturgis. Accessed 8 October 2024.
- Herbst, Jan-Peter (2016). *Die Gitarrenverzerrung in der Rockmusik: Studien zu Spielweise und Ästhetik*. Berlin: LIT.
- Herbst, Jan-Peter (2017). 'Historical Development, Sound Aesthetics and Production Techniques of the Distorted Electric Guitar in Metal Music'. *Metal Music Studies*, 3(1): 24–46.
- Herbst, Jan-Peter (2019a). 'Empirical Explorations of Guitar Players' Attitudes towards Their Equipment and the Role of Distortion in Rock Music'. *Current Musicology*, 105: 75–106.
- Herbst, Jan-Peter (2019b). '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): 53–69.
- Herbst, Jan-Peter (2020). 'Views of German Producers on "Teutonic" Metal: Production Approaches and Generational Effects', in *One Nation under a Groove: Nation als Kategorie populärer Musik?*, edited by Ralf von Appen and Thorsten Hindrichs (pp. 183–206). Bielefeld: Transcript.
- Herbst, Jan-Peter (2021). 'The Politics of Rammstein's Sound: Decoding a Production Aesthetic'. *Journal of Popular Music Studies*, 33(2): 51–76.
- Herbst, Jan-Peter and Mynett, Mark (2021a). 'Nail the Mix: Standardization in Mixing Metal Music'. *Popular Music & Society*, 44(5): 628–649.
- Herbst, Jan-Peter and Mynett, Mark (2021b). '(No?) Adventures in Recording Land: Engineering Conventions in Metal Music'. *Rock Music Studies*, 9(2): 137–156.
- Herbst, Jan-Peter and Mynett, Mark (2023a). 'Lorna Shore's "to the Hellfire": A Study in Heaviness'. *Metal Music Studies*, 9(2): 189–213.
- Herbst, Jan-Peter and Mynett, Mark (2023b). 'Mapping the Origins of Heaviness between 1970 and 1995: A Historical Overview of Metal Music Production', in *The Cambridge Companion to Metal Music*, edited by Jan-Peter Herbst (pp. 29–42). Cambridge: Cambridge University Press.
- Iommi, Tony (2012). *Iron Man: My Journey through Heaven and Hell with Black Sabbath*. London: Simon & Schuster.
- Johnson, Kevin (2012). 'Getting Heavier: An Interview with Periphery's Adam "Nolly" Getgood'. *No Treble*. www.notreble.com/buzz/2012/12/20/getting-heavier-an-interview-with-peripherys-adam-nolly-getgood. Accessed 8 October 2024.
- Kahn-Harris, Keith (2007). *Extreme Metal: Music and Culture on the Edge*. Oxford: Berg.
- Kealy, Edward R. (1979). 'From Craft to Art'. *Sociology of Work and Occupations*, 6(1): 3–29.
- Kennedy, Lewis (2017). 'Functions of Genre in Metal and Hardcore Music'. PhD thesis, University of Hull.
- Kerr, Dave (2009). 'Metallica's Justice Days Revisited'. *The Skinny*. www.theskinny.co.uk/music/interviews/metallicas-justice-days-revisited. Accessed 8 October 2024.
- Kitts, Jeff and Tolinski, Brad (2002). *Guitar World Presents the 100 Greatest Guitarists of All Time!* Milwaukee, WI: Hal Leonard.
- Latour, Bruno (2005). *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
- Levine, Mike (2015). 'A Multitalented Producer/Engineer Who Masters All His Projects and Creates His Own Plug-Ins'. *Audio Fanzine*. <https://en.audiofanzine.com/>

- sound-technique/editorial/articles/joey-sturgis-has-it-covered.html. Accessed 8 October 2024.
- Machine Head (1994). *Burn My Eyes*. Roadrunner.
- Martinelli, Riccardo (2008). 'Interview: Colin Richardson'. *Maelstrom*, 61. www.maelstromzine.com/ezine/interview_iss61_254.php. Accessed 24 September 2020 [no longer accessible].
- Masciotra, David (2015). *Metallica*. 33 1/3. New York, NY: Bloomsbury Academic.
- Massy, Sylvia (2016). *Recording Unhinged: Creative & Unconventional Music Recording Techniques*. Milwaukee, WI: Hal Leonard.
- McIver, Joel (2009). *Justice for All: The Truth about Metallica*. London: Omnibus.
- McIver, Joel (2012). *Machine Head: Inside the Machine*. London: Omnibus.
- McKinnon, Colin A. (2009). 'Louder Than Hell: Power, Volume and the Brain', in *Heavy Fundamentalisms: Music, Metal, and Politics*, edited by Rosemary Hill and Karl Spracklen (pp. 113–126). Oxford: Inter-Disciplinary Press.
- Micallef, Ken (2006). 'Tool's Danny Carey'. *Modern Drummer*, 7/2006: 58–68.
- Mynett, Mark (2016). 'The Distortion Paradox: Analyzing Contemporary Metal Production', in *Global Metal Music and Culture*, edited by Andy R. Brown, Karl Spracklen, Keith Kahn-Harris, and Niall Scott (pp. 68–88). London: Routledge.
- Mynett, Mark (2017). *Metal Music Manual: Producing, Engineering, Mixing, and Mastering Contemporary Heavy Music*. Abingdon: Routledge.
- Mynett, Mark (2019). 'Defining Contemporary Metal Music: Performance, Sounds and Practices'. *Metal Music Studies*, 5(3): 297–313.
- Mynett, Mark (2020). 'Maximum Sonic Impact: (Authenticity/Commerciality) Fidelity-Dualism in Contemporary Metal Music Production', in *The Bloomsbury Handbook of Music Production*, edited by Simon Zagorski-Thomas and Andrew Bourbon (pp. 293–302). London: Bloomsbury.
- Ozdiyar, Yunus E. (2020). 'Bob Rock Recalls His Reaction to Metallica's James "Like He Wanted to Kill Me"'. *Chaospin*. <https://chaospin.com/bob-rock-reaction-metallica-james-hetfield-wanted-kill-me>. Accessed 8 October 2024.
- Parker, Matthew (2010). 'Tony Iommi Interview Part One: Gear, Tone and Early "Sabbath"'. *Music Radar*. www.musicradar.com/totalguitar/tony-iommi-interview-part-one-gear-tone-and-early-sabbath-310167. Accessed 8 October 2024.
- Pieslak, Jonathan (2007). 'Re-Casting Metal: Rhythm and Meter in the Music of Meshuggah'. *Music Theory Spectrum*, 29(2): 219–245.
- Prato, Greg (2018). 'Metallica Producer Flemming Rasmussen'. *Song Facts*. www.songfacts.com/blog/writing/metallica-producer-flemming-rasmussen. Accessed 8 October 2024.
- Purcell, Natalie J. (2003). *Death Metal Music: The Passion and Politics of a Subculture*. Jefferson, MI: McFarland.
- Reyes, Ian (2013). 'Blacker Than Death: Recollecting the "Black Turn" in Metal Aesthetics'. *Journal of Popular Music Studies*, 25(2): 240–257.
- Rondinelli, Bobby and Lauren, Michael (2000). *The Encyclopedia of Double Bass Drumming*. Cedar Grove, NJ: Modern Drummer Publications.
- Sawyer, R. Keith and DeZutter, Stacy (2009). 'Distributed Creativity: How Collective Creations Emerge from Collaboration'. *Psychology of Aesthetics, Creativity, and the Arts*, 3(2): 81–92.
- Saxon, Jonathan (2007). 'Joey Vera: Recording Armored Saint, Anthrax and More'. *Tape Op: The Creative Recording Magazine*, 62: 30–36.
- Saxon, Jonathan (2011). 'Armored Saint: No Dormir Hasta "La Raza"'. *Tape Op: The Creative Recording Magazine*, 83. <https://tapeop.com/interviews/83/armored-saint>. Accessed 8 October 2024.
- Schmidt-Horning, Susan (2004). 'Engineering Performance: Recording Engineers, Tacit Knowledge, and the Art of Controlling Sound'. *Social Studies of Science*, 34(5): 703–731.

- Schmidt-Horning, Susan (2013). *Chasing Sound: Technology, Culture, and the Art of Studio Recording from Edison to the LP*. Baltimore, MD: Johns Hopkins University Press.
- Sharma, Amit (2018). 'Bullet for My Valentine'. *Music Radar*. www.musicradar.com/news/bullet-for-my-valentine-right-now-i-believe-more-than-ever-that-our-strengths-are-in-songwriting-not-just-guitar-playing. Accessed 8 October 2024.
- Smialek, Eric (2015). 'Genre and Expression in Extreme Metal Music, ca. 1990–2015'. PhD thesis, McGill University.
- Taylor, Mick (2011). 'Interview: Metal Production Guru Colin Richardson'. *Music Radar*. www.musicradar.com/news/guitars/interview-metal-production-guru-colin-richardson-400260. Accessed 8 October 2024.
- Thomas, Niall (2015). 'The Development of Technology and Its Influence on Recorded Heavy Metal Music 1969–2015'. PhD thesis, University of Hull.
- Thomas, Niall and King, Andrew (2019). 'Production Perspectives of Heavy Metal Record Producers'. *Popular Music*, 38(3): 498–517.
- Tingen, Paul (2012). 'Inside Track: Recording Evanescence's "What You Want"'. *Sound on Sound*. www.soundonsound.com/people/inside-track-recording-evanescences-what-you-want. Accessed 8 October 2024.
- Tingen, Paul (2015). 'Inside Track: Bring Me the Horizon'. *Sound on Sound*. www.soundonsound.com/people/inside-track-bring-me-horizon. Accessed 8 October 2024.
- Tingen, Paul (2017). 'Inside Track: Metallica 'Moth Into Flame''. *Sound on Sound*. <https://www.soundonsound.com/techniques/inside-track-metallica-moth-flame>. Accessed 24 September 2020.
- Turner, Dan (2009). 'Outlining the Fundamental Production Aesthetics of Commercial Heavy Metal Music Utilising Systematic Empirical Analysis'. *Art of Record Production Conference*. www.artofrecordproduction.com/content/view/231/114. Accessed 8 October 2024.
- Turner, Dan (2012). 'Profiling a Metal Mastermind: The Mixing Techniques of Andy Sneap'. MRes thesis, University of Glamorgan.
- Wallmark, Zachary (2018). 'The Sound of Evil: Timbre, Body, and Sacred Violence in Death Metal', in *The Relentless Pursuit of Tone*, edited by Robert Fink, Melinda Latour, and Zachary Wallmark (pp. 65–87). New York, NY: Oxford University Press.
- Walser, Robert (1993). *Running with the Devil: Power, Gender, and Madness in Heavy Metal Music*. Hanover, NH: University Press of New England.
- Weinstein, Deena (2000). *Heavy Metal: The Music and Its Culture*. Cambridge, MA: Da Capo Press.
- Williams, Duncan (2015). 'Tracking Timbral Changes in Metal Production from 1990 to 2013'. *Metal Music Studies*, 1(1): 39–68.
- Williams, Stuart (2015). 'How to Record Huge Guitars: 27 Secrets Revealed'. *Music Radar*. www.musicradar.com/tuition/guitars/how-to-record-huge-guitars-27-secrets-revealed-618727. Accessed 8 October 2024.
- Zak, Albin (2001). *The Poetics of Rock: Cutting Tracks, Making Records*. Berkeley, CA: University of California Press.

Discography

- Architects (2016). *All Gods Have Abandoned Us*. Epitaph.
- Archspire (2017). *Relentless Mutation*. Season of Mist.
- Armored Saint (2000). *Revelation*. Metal Blade Records.
- Armored Saint (2010a). 'La Raza', on *La Raza*. Metal Blade Records.
- Armored Saint (2010b). *La Raza*. Metal Blade Records.
- Behemoth (2018a). 'Dog=God', on *I Loved You at Your Darkest*. Nuclear Blast.

- Behemoth (2018b). *I Loved You at Your Darkest*. Nuclear Blast.
- Black Sabbath (1971). *Master of Reality*. Vertigo.
- Bring Me the Horizon (2008). *Suicide Season*. Visible Noise.
- Carcass (1993). *Heartwork*. Earache.
- Evanescence (2011). *Evanescence*. Wind-up, 2011.
- Exodus (2014). *Blood in Blood Out*. Nuclear Blast.
- Gojira (2008). *The Way of All Flesh*. Prosthetic Records.
- Lorna Shore (2021). 'To the Hellfire', on . . . *And I Return to Nothingness*. Century Media.
- Mastodon (2014). *Once More 'Round the Sun*. Reprise Records.
- Meshuggah (2016). 'MonstroCity', on *The Violent Sleep of Reason*. Nuclear Blast.
- Metallica (1986a). *Master of Puppets*. Elektra.
- Metallica (1986b). 'The Thing That Should Not Be', on *Master of Puppets*. Elektra.
- Metallica (1988). . . . *And Justice for All*. Elektra.
- Metallica (1991a). *Metallica (Black Album)*. Elektra.
- Metallica (1991b). 'Sad But True', on *Metallica (Black Album)*. Elektra.
- Metallica (2008). *Death Magnetic*. Warner Bros. Records.
- Metallica (2016). *Hardwired . . . To Self-Destruct*. Blackened Recordings.
- Mötley Crüe (1989). *Dr. Feelgood*. Elektra.
- Motörhead (1983). *Another Perfect Day*. Bronze.
- Motörhead (1996). *Overnight Sensation*. Steamhammer.
- Motörhead (2002). *Hammered*. Steamhammer.
- My Dying Bride (2021). *Ghost of Orion*. Nuclear Blast.
- Pantera (1990). *Cowboys from Hell*. Atco.
- Periphery (2012). *Periphery II: This Time It's Personal*. Sumerian Records.
- Periphery (2016). *Periphery III: Select Difficulty*. Sumerian Records.
- Port Noir (2013). *Puls*. Razzia Notes.
- Russell, Russ (2009a). 'Extreme Metal Production Masterclass Pt.1'. *Sound on Sound*. www.youtube.com/watch?v=2yOEs_whudo. Accessed 8 October 2024.
- Slayer (1986). *Reign in Blood*. Def Jam Recordings.

Videography

- Bergstrand, Daniel (2017). 'Meshuggah—Future Breed Machine'. *Nail the Mix* 9/2017.
- Bogren, Jens (2018). 'Opeth—Heir Apparent'. *Nail the Mix* 6/2018.
- Bogren, Jens (2019). 'Between the Buried and Me—Millions'. *Nail the Mix* 10/2019.
- Bown, Carl (2018). 'Bullet for My Valentine—Over It'. *Nail the Mix* 5/2018.
- Braunstein, Daniel (2020). 'Spiritbox—Holly Roller'. *Nail the Mix* 11/2020.
- Browne, John (2017). 'Monuments—I, the Creator'. *Nail the Mix* 8/2017.
- Getgood, Adam (2016). 'Periphery—Prayer Position'. *Nail the Mix* 9/2016.
- Hansen, Jacob (2019a). 'Amaranthe—365'. *Nail the Mix* 3/2019.
- Hansen, Jacob (2019b). 'Dyscrat—Iron Strengthens Iron'. *Nail the Mix* 3/2019.
- Has, Sebastian (2018). 'Behemoth ILYAYD Recording & Production Studio Sessions'. *YouTube*. <https://youtu.be/B1s9zgm10g4>. Accessed 8 October 2024.
- Kohlmannslehner, Kristian (2019). 'Aborted—Vespertine'. *Nail the Mix* 1/2019.
- Lancaster, Dan (2018). 'Bring Me the Horizon—Doomed'. *Nail the Mix* 3/2018.
- Larson, Taylor (2017). 'Jason Richardson—Fragments'. *Nail the Mix* 1/2017.
- Larson, Taylor (2018). 'Asking Alexandria—into the Fire'. *Nail the Mix* 1/2018.
- Madsen, Tue (2017). 'Meshuggah—MonstroCity'. *Nail the Mix* 3/2017.
- Madsen, Tue (2019). 'Suicide Silence—Unanswered'. *Nail the Mix* 11/2019.
- Morton, Max (2020). 'Jinjer—on the Top'. *Nail the Mix* 7/2020.
- Nordström, Fredrik (2019). 'Bring Me the Horizon—Chelsea Smile'. *Nail the Mix* 7/2019.

- Odeholm, Buster (2020). 'Vildhjarta—Den Helige Anden'. *Nail the Mix* 2/2020.
- Otero, Dave (2018). 'Remote Tumour Seeker'. *Nail the Mix* 11/2018.
- Otero, Dave (2020). 'Allegaeon—Roundabout'. *Nail the Mix* 7/2020.
- Russell, Russ (2019). 'The Haunted—Preachers of Death'. *Nail the Mix* 5/2019.
- Slovak, Carson and McFarland, Grant (2019). 'Rivers of Nihil—Where Owls Know My Name'. *Nail the Mix* 6/2019.
- Udd, Henrik (2017). 'Architects—Gone with the Wind'. *Nail the Mix* 6/2017.
- Wanasek, Joel (2016). 'Machine Head—Is There Anybody Out There'. *Nail the Mix* 8/2016.

Unpublished Interview Data

- Bergstrand, Daniel (2014). Interview by Mark Mynett. Uppsala. 44:22 minutes.
- Bogren, Jens (2014). Interview by Mark Mynett. Örebro. 45:25 minutes.
- Garfield, Ross (2014). Interview by Mark Mynett. Los Angeles. 17:19 minutes.
- Hyde, Matt (2014). Interview by Mark Mynett. Los Angeles. 75:06 minutes.
- Mader, Logan (2014). Interview by Mark Mynett. Los Angeles. 27:57 minutes.
- Nordström, Fredrik (2014). Interview by Mark Mynett. Gothenburg. 28:45 minutes.
- Raskulinecz, Nick (2014). Interview by Mark Mynett. Nashville. 46:35 minutes.
- Sneap, Andy (2014). Interview by Mark Mynett. Ripley. 50:06 minutes.

5

MIXING AND MASTERING

Shaping and Refining Heaviness

Mixing is a fundamental stage in metal production, as it is the phase where recorded performances are meticulously refined and blended to produce a cohesive sound that aligns with the intended artistic expression and listener expectations. As William Moylan asserts, mixing ‘defines the relationships of individual sound sources to the overall texture’ (2007: 233). It encompasses balancing the relative loudness levels of instruments and vocals, thereby shaping performance intensity; spatial positioning of sound sources within the virtual field (width, depth, height) (see Section 2.1); and processing the recordings to adjust their dynamic range, timbre, and ambient qualities. Ultimately, mixing is directed towards reinforcing the musical concept and the ‘communication of meaningful (musical) messages’ (Moylan 2007: 37) by enhancing or creating the emotional context and qualities of a song, achieved by accentuating attributes such as power, aggression, or heaviness (see also Izhaki 2013: 4–5).

Recorded sound represents a performance, encapsulating a constructed, schematic version of reality. Simon Zagorski-Thomas (2014, 2016) introduced the concept of ‘sonic cartoons’ to describe this representational nature in recorded music. Sonic cartoons arise as producers sculpt the recorded sound to enhance its compatibility with the chosen medium and its musical effectiveness. According to Zagorski-Thomas (2016: 408), sonic reality often appears messy and falls short of the high production standards typical in contemporary music genres, with metal being a notable example. The challenge lies in balancing fast performances and frequency-rich instruments to yield a clear, powerful, heavy, and effective production. Sonic cartoons are a means of achieving this balance: sounds and performances are simplified and distilled to their core characteristics, which are then exaggerated and refined

to suit the production's objectives (Zagorski-Thomas 2014, 2016). Zagorski-Thomas (2016: 408) delineates three common strategies for tidying up this sonic reality: (1) reducing reverb in lower and middle frequencies to minimize muddiness; (2) amplifying a sense of closeness using the proximity effect of microphones alongside complementary processing; and (3) creating wide stereo images with psychoacoustic enhancers. Metal producers employ these and other strategies extensively as genre-specific sonic cartooning—a process important to capturing and communicating metal's defining sonic attributes and emotional intensity. Unique sonic characteristics in metal often rely on these specialized techniques. For instance emphasizing mid and high frequencies enhances clarity in fast-paced heavy metal, while adding sub-drops and low-end-focused drum samples enhances sonic weight in death metal and deathcore breakdowns. Modern metal productions frequently feature hyperrealistic, exaggerated performances and instrumental or vocal sounds, achieved by stripping away superfluous details and enhancing advantageous elements that cater to the genre's aesthetic expectations.

5.1 Challenges of Mixing and Mastering Metal Music

These foundational aspects of mixing highlight its essential role in achieving the qualities that define successful metal production. Attributes such as heaviness, aggression, and power are shaped through the careful orchestration of musical elements, with each stage of the mix contributing to the overall impact and intensity of the final sound. While the meticulous engineering required for these qualities is heightened in metal, the mixing process does not fundamentally differ from that in other genres; rather, it is the emphasis on certain qualities that distinguishes it. Indeed, some producers view mixing metal as being similar to mixing any other genre, with differences arising more from the specific demands of metal's sonic palette than from a fundamentally unique approach. For some, the essential techniques remain consistent across genres. Metal producer Daniel Bergstrand, for example, reflects this perspective, suggesting that mixing metal does not inherently diverge from mixing other genres. In his words:

I don't really see it as a different thing. I approach it the same way. If you look at all the different instruments, the drums should sound like drums to me, the bass should sound like a bass, and the guitars like guitars. It's just the matter of the extra frequency thing and the add-ons. The starting approach is more or less the same.

(Bergstrand 2014)

While Bergstrand's approach emphasizes consistent instrumental integrity across genres, his reference to the 'extra frequency thing' hints at the unique

challenges posed by metal's sonic density and the high levels of distortion, which require careful frequency management and processing.

The complexities of metal music production are widely acknowledged, as producers and scholars note that the genre poses unique mixing challenges. Niall Thomas and Andrew King (2019: 505) identify several distinctive obstacles, such as achieving intelligibility within sound sources characterized by 'abnormal frequency content', which is a result of low tunings and high levels of distortion; maintaining *sonic weight* in compositions with changing arrangements and rhythmic subdivision speeds; and separating individual signals to ensure *clarity* in the mix. These demands align with Mark Mynett's (2017: 21) deliberations on the challenges of realizing metal's foundational qualities: clarity, heaviness, sonic weight, and performance precision, each of which must be carefully balanced to preserve the artist's intended impact. At the heart of metal's complexity is the inherent tension between its defining qualities, such as heaviness and sonic weight, and the need for clarity and performance precision (see Chapter 2). Often, these attributes exist in opposition: while sonic weight is driven by low-frequency energy, clarity depends on the articulation of attack transients within higher frequency ranges. The production's loudness and density compound this tension, necessitating significant compression and brick-wall limiting, which can sacrifice transient detail for an intensified, dense sonic profile. Dynamic range compression becomes essential, particularly in shaping percussive elements like drums to cut through the wall of distorted guitars. However, excessive compression risks a lifeless, flat sound that lacks the punch and impact metal requires.

Each metal subgenre has its own sonic requirements tied to tempo and arrangement specifics (see Mynett 2019a). For example, the fast tempi and speed of subdivisions in death and thrash metal necessitate an emphasis on mid and high frequencies to preserve clarity, whereas slower doom metal benefits from a bass-heavy aesthetic, allowing ample space for low frequencies to resonate fully (Mynett 2019b: 75–76). Beyond subgenre-specific demands, metal production is defined by aesthetic decisions, which require trade-offs between different production values. These decisions may involve prioritizing low-end weight over clarity; favouring an authentic performance over a hyperreal, polished aesthetic; or choosing emotional 'feeling' over technical precision. As producer Stefano Morabito aptly observes, 'We sacrifice something to have something else, but that's what mixing and mastering is' (2019). This sentiment captures the delicate balancing act inherent in metal production, where each choice influences the overall impact of the final mix.

A central challenge in metal production is preventing masking, a phenomenon where overlapping spectral content among instruments causes the loudest or densest sources to dominate the mix, obscuring quieter elements and compromising clarity and definition (Mynett 2017: 282). This issue is particularly pronounced in dense arrangements, where each element competes

for space within the same frequency ranges. Among the primary culprits of masking is the distorted guitar because its extensive frequency range and sustained nature present a unique challenge. As Jens Bogren observes:

It's the density, the total sonics in metal, especially the guitars. If you have quad-tracked guitars, they will take up everything in your frequency spectrum. And that's a challenge to get things cut through. If you have a nice-sounding drum kit with a nice-sounding room, and then you add these guitars, suddenly your drums sound like popcorn. So, you will have to start to mix it to still have that, for the drums to be able to cut through. That's a big difference from other genres; I've been doing gospel albums and jazz albums back in the day, and that was never an issue.

(Bogren 2014)

Here, Bogren's remarks highlight how guitars, with their frequency saturation and quad-tracking, require careful treatment to ensure that other instruments, particularly drums, maintain their punch and clarity.

To avoid overshadowing other elements, many producers monitor the guitars while mixing other instruments or start a mix with them, as does Gene 'Machine' Freeman: 'To me, this is a constant wall of guitar, and I'm very concerned with that wall of power and sound. So, I'm gonna start with my two main guitars' (2018). This practice acknowledges the guitar's dominating presence across the frequency spectrum, from low to high, which transforms it from being a percussive instrument into a sustained layer that effectively blankets the mix (Berger and Fales 2005). Russ Russell (2019b) and Carl Bown (2018) share similar philosophies, with Russell typically initiating his mix by addressing the guitars and using frequency filtering to carve out space for other instruments. Bown describes this stage as 'window cleaning', a process that lays the groundwork for clarity by removing less beneficial frequencies from the guitars, thereby allowing space for each instrument to be distinct. This pre-emptive treatment of guitars not only sets up an effective mix but also enables more strategic processing of the remaining elements, an important consideration for achieving clarity and the intended sonic weight in metal production.

The lower frequency spectrum is often regarded as the most challenging area in metal production due to its propensity for masking, where denser sound sources can overpower quieter ones, diminishing clarity. Andy Sneap elucidates the difficulty of balancing this spectrum in metal:

It's really getting the low-end right. Be able to control that, especially with the faster stuff. If you can get to grips with blast beats and fast double kicks, then you can pretty much mix any type of rock. In fact, it makes it easy. When I'm mixing something like Accept [hard rock], after I have

done an Exodus [thrash metal] record, it comes together really quick. You can appreciate the space you can get into those slower songs. The depth of the low-end you can get in where if you get that going on double kicks, you've almost got to figure out where you get your low-end from for the fast stuff. It can't be as fat. It's gonna be snappier kicks, snappier snares, less [re]verb. You gonna limit where you're going with it. I'd say the low-end and compression are the main focus, really.

(Sneap 2014)

Sneap's quote indicates that metal may not prioritize the most pronounced low-end among genres; instead, it faces the unique challenge of balancing clarity with sufficient sonic weight amid fast performances and dense low-frequency content. This high sonic density, created by numerous performance events with considerable low-end emphasis, is a defining characteristic of metal, setting it apart from genres like EDM or hip-hop, which often rely on a singular, amplified low-end focus. Rather than simply boosting low frequencies, metal producers must carefully control this spectrum to avoid muddiness. Aiming for the 'biggest bass', 'giant boomy kick drum', or 'biggest guitar sound in the world' (Raskulinecz 2014) is counterproductive, as excessive low-end can obscure individual elements and degrade overall performance quality.

In contemporary metal production, an unmasked, precisely managed low-end is essential for each instrument and vocal to fulfil its role with clarity and definition in the mix (Mynett 2017: 283). Too much low-frequency emphasis results in a boomy, uncontrolled mix, while too little creates a transparent yet thin sound that lacks impact. Similarly, although distortion is fundamental to metal's heavy aesthetic and expressive qualities, excessive distortion can blur the clarity of riffs and mask other elements. Therefore, clarity becomes paramount, as noted by Colin Richardson: 'I think with metal, you're always looking for clarity—it can be between 200 and 240 bpm!' (Taylor 2011). While clarity is less relevant to slower subgenres like doom metal, it is essential for most other subgenres because the structural and performative intricacies would be lost through masking in the low and mid-frequency ranges. Matt Hyde summarizes the fundamental challenge:

We're trying to play super, super fast stuff at super, super low frequencies, and it's all supposed to be very tight and clear and precise and detailed. Those are your specific challenges with this genre versus doing cool mid-tempo rock or even a stoner rock band or a heavy band.

(Hyde 2014)

In faster metal genres, fast rhythmic subdivisions limit the decay time for bass frequencies, necessitating a shift towards higher frequencies that enhance

attack transients and definition. This shift highlights the importance of strategic engineering decisions for each instrument and vocal part, aiming to preserve clarity while maintaining the genre's characteristic sonic weight. For a thorough exploration of metal mixing techniques, Mynett's *Metal Music Manual* (2017) and analytical works by Herbst and Mynett (2021, 2023a) provide a comprehensive foundation that will not be duplicated here. Typically, metal producers initiate the mix with a bottom-up approach, starting with drums, followed by guitars, bass, and vocals. As each layer is added, earlier elements are revisited to avoid masking, ensuring that separation and cohesion are optimized (Yang 2024).

Though a full discussion of mastering is beyond this chapter's scope, its impact on the mix warrants attention. Prominent metal producers like Fredrik Nordström and Jens Bogren often master their own mixes to retain the flexibility for adjustments. By mixing through mastering chains (including dynamic range compression and limiting), producers avoid adverse effects on their mixes that would otherwise be unavoidable when maximizing loudness in the final mastering (see Herbst and Mynett 2021). Anticipating the compression's effect, they may mix kick and snare louder, given that percussive elements typically attenuate more in mastering (Mynett 2017: 202, 335). Mixing through a mastering chain allows for more creativity in Jacob Hansen's (2019b) experience, such as making a song's verse smaller on the master buss or pumping up the chorus by boosting the limiter to create excitement. As with other popular music genres, mastering has long been an integrated part of the metal mixing process, not an isolated final step. As Steve Savage argues: 'It is now impossible to consider mixing and mastering as separate activities. Yes, they have different goals and outcomes, but they have become completely intertwined, bound together with brickwall limiting' (2014: 278). Enabled by advanced digital production tools, this integration enhances both mix and master quality, allowing metal producers to optimize audio across diverse playback systems.

5.2 Drums

5.2.1 Editing

Editing is seldom discussed in producer interviews or mix documentaries, despite its importance for the final mix. This phase, which typically occurs between recording and mixing, influences the sound considerably but is often understated, especially in metal production, where editing can be viewed as a form of 'sonic cartooning'. Due to the stigma surrounding heavy editing, which is often perceived as diminishing the authenticity of the performance, producers generally try to shield their clients from it. However, editing is far from being a recent development; it was already in practice on analogue

metal recordings. Producer Flemming Rasmussen's work on Metallica's . . . *And Justice for All* (1988) serves as an early example of this technique in action:

It took forever. I edited a lot of the drum takes to make them as tight as they were. I'd cut small pieces of tape out if Lars [Ulrich] was late. If we had one really good bit and there was just one snare hit that was late, I'd cut a bit of the tape out. And if he was early I'd take that bit I'd cut out earlier in the process, stick it in there and nobody could hear that.

(*Rasmussen in Kerr* 2009)

The adoption of digital music production by metal producers from the early 1990s made editing considerably easier and more precise. For example, Motörhead's *Bastards* (1993) stands as one of the first computer-created metal albums, as producer Howard Benson explains (Brown 2010: 134). Engineer Ryan Dorn noted that the production team quickly capitalized on digital editing to correct pitch and refine performance accuracy (Brown 2010: 135). This focus on precision intensified with the release of Pro Tools version 5.1 in 2000, which introduced the Beat Detective feature that allowed for drum quantization by separating, moving, and crossfading regions without introducing artefacts. This development enabled highly precise, hyperreal performances in metal, aligning recorded drums and instrumental parts with a machine-like, hyperreal consistency. Alongside these editing advancements, drum sample libraries like Toontrack's DFH Superior Drummer (2005) and EZ Drummer (2006) emerged as additional tools for achieving hyper-precise aesthetics (see Lux and Herbst 2025). Around that time, the trend towards hyperrealistic metal productions began, characterized by quantizing recorded drum performances, replacing some with programmed MIDI events, adding additional hits to refine the performance (e.g. kick building), or creating entirely sequenced drums (see Herbst and Mynett 2021). This push for exact synchronization within and across instruments is largely motivated by its contribution to punch, clarity, and, heaviness. Without the precise alignment required for consistent transient energy, rhythmic subdivisions lose impact, diminishing the overall sense of heaviness (see Mynett 2017: 20).

Heaviness and punch fundamentally rely on tight ensemble synchronization, making drums one of the prime factors in metal's sonic impact. The drums' rhythmic complexity and the presence of numerous instruments make them susceptible to deviations. For example in a sixteenth-note pattern at 180 bpm, each note event has only 83 milliseconds to occur. Deviations of even 10 to 20 milliseconds, smaller than the intended groove deviations typical in genres like soul (Danielsen 2006), can obscure rhythmic clarity and precision. This loss of synchronization weakens both the rhythmic impact and tonal presence, resulting in diminished heaviness (Mynett 2020).

Editing decisions in metal production are primarily aimed at enhancing performance quality, yet producers must also address the balance between clarity and heaviness derived from sonic density and weight. A notable challenge in achieving this balance is managing ‘bleed’ or ‘spill’, particularly from cymbals. Cymbals are prone to masking and can obscure rhythmic note onsets—especially when using sustained crashes or washy rides—thereby undermining performance precision, clarity, and punch, all of which contribute to the perception of heaviness. Cymbal bleed complicates processing options for other instruments and vocals, as the compression and equalization frequently applied to drum shells tend to accentuate this spill, sometimes resulting in harsh or abrasive qualities (see Mynett 2017: 272–273). Consequently, many producers opt to minimize or completely remove cymbal bleed using noise gates or waveform editing. However, the degree of signal separation varies considerably depending on the recording material, composition, and aesthetic goals of each project. While cymbal bleed often presents challenges, it can also positively contribute to the cohesion of individual drum tracks, preserving a natural quality that counterbalances the artificiality often introduced by sample enhancement. As a result, producers like Fredrik Nordström (2014, 2019a), Nick Raskulinecz (2014), Ross Robinson (2014), Matt Hyde (2014), Daniel Bergstrand (2014), and Jens Bogren (2014) adopt a selective approach to attenuating bleed. Strategies to manage bleed include automating loudness to reduce excessive spill in specific sections by using noise gates that lessen rather than completely mute spill and adjusting drum shells with wave-shaping tools like compressors or expanders. This process also varies by section, accommodating different drum phrasings, from loud backbeats to intricate ghost notes. These choices illustrate the need to weigh heaviness against other sonic qualities such as the expressiveness and naturalness of drum performance.

In many cases, producers do not maximize heaviness at the expense of human qualities; instead, they work to preserve expressive nuances within the hyperreal standards of metal (see Thomas and King 2019). However, this approach varies by instrument: toms, for instance, are generally cleaned up the most to maximize isolation, articulation, and control, preserving sonic space amid the dense and fast nature of modern metal (Hansen 2019a). Similarly, the kick drum’s quality remains largely unaffected by extreme isolation because spill from kick microphones is rarely beneficial to overall cohesion (Mynett 2017: 194). In contrast, the snare drum is seldom fully cleaned up, as doing so would compromise its expressive and tonal characteristics, which are central to the overall drum sound.

5.2.2 *Processing of Drum Shells and Cymbals*

The kick and snare drums are the core elements of a metal drum mix, with the kick often requiring extensive processing to achieve the desired impact.

As Tue Madsen notes, this processing is essential because, in metal, the bass drum is paradoxically the quietest instrument in the room but the loudest in the mix:

That's the thing about metal. The bass drum is usually the loudest instrument in the mix and, in reality, is the quietest instrument in the room. So, of course, you have to alter reality to make it sound good. Now, the bass drums are 300% louder than they were before, and that's what's going to work in the end because you want to punch it in your face.

(Madsen 2017)

Achieving this 'punch-in-your-face' effect requires a hyperrealistic treatment of the kick drum, often involving what Zagorski-Thomas (2014) refers to as 'sonic cartooning'. This approach includes extensive filtering, equalization, dynamic range manipulation, and occasionally distortion, all aimed at exaggerating the kick's characteristics to ensure that it cuts through the dense mix with clarity and impact.

To shape the kick drum effectively in metal production, a combination of corrective (attenuation) and creative (amplification) equalization is commonly applied. A high-pass filter typically cleans up the low-end to eliminate rumble, while attenuation in the lower-middle frequency range helps to reduce muddiness and 'boxiness'. This selective attenuation serves two main purposes: it minimizes masking with other instruments and enhances the kick's low-end clarity and attack transients, both of which are essential for impact and intelligibility (Mynett 2017: 265). Although reducing certain frequencies might seem counterproductive to achieving sonic weight, these cuts are necessary for the kick to cut through the thick layers of guitars and bass without overwhelming the mix with excessive low-mid content. The extent of low-end frequency allowance often depends on the tempo and rhythmic subdivision speed, with faster performances requiring low-end roll-off as high as 70 Hz, while slower sections may extend down to 50 Hz or lower (Mynett 2017: 263–264). In addition to low-end sculpting, the kick's upper frequencies are essential, with a pronounced 'click' often added to ensure the kick remains intelligible within the mix. This click, balanced with sonic weight, enhances clarity and contributes to the perceived heaviness of the production (Mynett 2017: 267). To support this clarity, the kick drum's upper-mid and high-frequency ranges can be selectively boosted, sharpening the attack transients and helping the kick cut through even the densest mixes (Zagorski-Thomas 2010: 203). The drum shells must be intelligible to provide the energy of the performance, which is an essential factor contributing to heaviness (Mynett 2019b: 69–70). Equalization also allows for the subtle boosting of lower frequencies across the drum group to increase overall sonic weight. However, such equalization must be balanced carefully, as too much

low-end emphasis can compromise higher-frequency transients, while excess presence can make the drum sound thin. Producers aim to balance each drum and the collective drum group to maintain a cohesive blend with the other instruments and vocals.

Dynamic range compression further enhances the kick drum's presence. Significant gain reduction is often applied, sometimes across multiple stages on individual tracks or group busses. Some producers, including Jacob Hansen (2019b) and Andy Sneap (2014), even use hard brick-wall limiting to keep the kick consistently foregrounded, although this can sometimes weaken transient impact. Consistent dynamics are essential for impact (Mynett 2017: 185–186), yet compressors and limiters, which react more strongly to lower frequencies, risk diminishing sonic weight. To address this issue, Fredrik Nordström (2014) favours gentle compression on the entire drum buss to maintain low-end presence. Taylor Larson (2018) bypasses the kick from the drum buss altogether to preserve the low-end by only compressing it through the master buss, a technique that prevents unwanted frequency suppression while ensuring the kick's clarity and power in the overall mix.

Distortion serves as a versatile tool in kick drum engineering, either as an alternative to compression or as a complementary effect. By introducing harmonic overtones, distortion enhances the kick's higher frequency spectrum, enabling it to cut through the thick layers of guitar and bass (Morton 2020). However, if applied broadly across the entire frequency range, distortion can compromise the kick's low-end definition, muddying the sound and reducing its perceived heaviness. To mitigate these issues, producers like Will Putney (2019) employ distortion selectively, concentrating it on the higher frequencies. Techniques such as side-chain filtering and frequency bracketing, where the frequency spectrum is divided into distinct ranges across multiple tracks, allow producers to apply distortion only where it amplifies clarity without muddying the low-end (Mynett 2017: 267).

The snare drum requires a more nuanced approach due to its broad expressive range, which encompasses powerful backbeats and delicate ghost notes. Unlike the kick drum, which is typically intended to maintain a consistent sound, the snare's varied phrasing benefits from techniques such as 'multing', where separate tracks are created for different sections. This technique enables tailored processing and supports the automation of parameters to meet the demands of specific sections, particularly ghost notes, where subtlety is important. Given the range of expression and variability in snare sounds (see Chapter 3), processing the snare often requires considerable flexibility, allowing producers to adapt to acoustic differences and granting greater aesthetic freedom (see Herbst and Mynett 2021, 2023a).

In dense mixes, reinforcing the snare with samples is common to ensure that it maintains its presence among other instruments. Consequently, excessive compression on the recorded snare is often unnecessary, as it can detract

from its natural dynamics. Instead, producers like Daniel Bergstrand prefer using compression to shape the snare's waveform:

I compress the snare but try to not do too much. I prefer to manipulate the waveform, so I'm trying to compress it that way instead. When it's not present enough, I will be enveloping it. All the way through the song. It takes some time, but it's worth it.

(Bergstrand 2014)

This approach, known as wave-shaping or 'enveloping', allows for precise control over the snare's transient dynamics, decay, and the balance between attack and sustain, enhancing its punch and clarity within the mix (Figure 5.1).

Wave-shaping offers producers a way to make drum sounds 'sharper' without merely increasing their loudness in the mix. This technique affects level balance, which may cause the instrument to sound disconnected from the overall drum kit and mix if not handled carefully (Mynett 2017: 221). A range of processing techniques allows for nuanced control. For example blending compressed and uncompressed versions of the signal, often referred to as 'parallel compression', maintains the drum's original tonal quality while adding subtle enhancement. Alternatively, brick-wall limiting can achieve a more consistent level but sacrifices some transient detail (see Herbst and Mynett 2021). A popular technique is serial processing, which involves a combination of compressors, limiters, and saturators. Each processor contributes differently: some enhance dynamic consistency, while others facilitate wave-shaping or add colouration (Mynett 2017: 218). Compression and gating are often used together for shaping transients and providing a greater control over the waveform. This control allows producers to manipulate

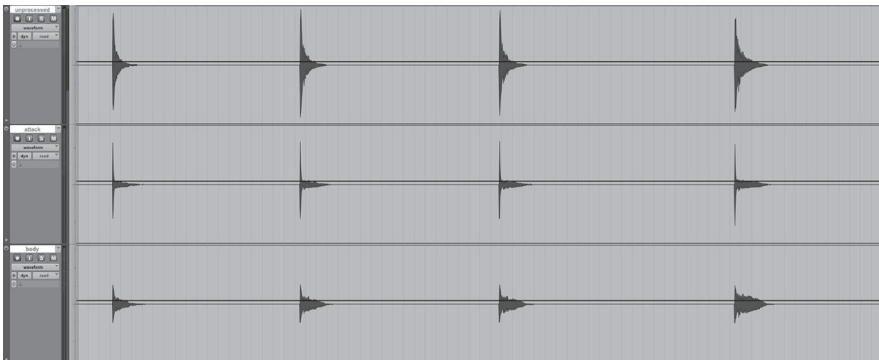


FIGURE 5.1 Three snare tracks in Pro Tools: unprocessed (top), focused on attack (middle), and emphasizing body/sustain (bottom).

the attack transients or shorten the decay (Bogren 2014), enhancing punch by sharpening the note onset or creating a small ‘pop’ in cases where the recorded audio lacks sufficient transient detail. This technique can be heard on Linkin Park’s *The Hunting Party* (2014), engineered by Andy Wallace (Tingen 2014).

Distortion, another popular choice, is used to reduce dynamic range while enhancing the snare’s ‘smack’. Similar to compression, distortion can be applied in parallel to blend the original signal with the processed one, preserving the desired qualities of the original sound while introducing subtle aggression and presence. Dan Lancaster describes his approach to parallel distortion: ‘I turned it [distortion] up until the snare started to ring a bit, and the great thing about that plug-in is that you can balance the dry signal against the distorted signal, without killing the transient’ (Tingen 2015). Using distortion in this way results in a fatter sound (Hansen 2019a), as well as a more direct and foregrounded tone (Larson 2018) that highlights the snare’s character (Hansen 2019a; Lancaster 2018). Contrary to the common assumption that distortion degrades sound quality, it can actually enhance sonic detail.

A variation of distortion known as ‘clipping’ is especially effective on snares and toms in digital systems. This technique cuts off the signal above a strict threshold and creates significant non-harmonic distortion. While clipping may seem undesirable, it has gained popularity in metal production for adding aggression and punch to the sound (Bogren 2018). Emphasizing the sustain and decay rather than the initial attack, clipping creates an impression of increased loudness while retaining the drum’s punch (Wanasek 2015). In contemporary metal, particularly metalcore, waveform clipping is commonly employed to boost perceived loudness and aggression in drum shells (Wanasek 2015).

In comparison to compression and distortion, spectral processing, particularly equalization, is applied less frequently in parallel within metal production. The key objectives of equalization typically include reducing mid-range frequency build-up across instruments to prevent masking, enhancing the body of an instrument in the upper bass range, and refining transient detail to accentuate character and punch (Mynett 2017: 261–262). As Russ Russell explains, equalization is essential for maintaining a sonic distinction between core drum elements like the kick and snare:

I try not to boost the same frequencies on the kick and the snare. I do try and differentiate between the smack of the kick and the smack of the snare because you hear a lot of records where you can’t really tell the difference.
(Russell 2019a)

By carefully separating the tonal identities of these central drum components, producers can enhance both the intelligibility and overall clarity of the mix.

This distinction is particularly important in metal, as it directly contributes to the genre's characteristic heaviness. The differentiated tonal qualities of the kick and snare not only reinforce clarity but also convey the performance's energy and intensity, which are important elements in achieving the desired impact of the genre.

For toms, processing techniques resemble those applied to snares, with some overlap with kick drum methods, particularly for floor toms. Toms serve a dual role in metal production: they act as transitional elements during fills and add sonic weight and heaviness to riffs by accentuating or complementing guitar and bass lines. Achieving these effects may require automated processing or dividing the signal into separate tracks for different sections, each needing specific processing approaches. For instance heightened transient information and enhanced high-frequency content improve the intelligibility of toms in fills, while floor toms used for accentuation benefit from an enriched low-end, lending weight to the mix. To further boost sonic weight, producers sometimes lower the pitch of toms, as Madsen (2019) did on Suicide Silence's 'Unanswered' (2007). Whether the focus is on clarity or sonic weight, parallel distortion can increase the attack and aggression, as exemplified by its use in Jinjer's 'On the Top' (2019) (Morton 2020). Additionally, heavy compression is often applied to regulate dynamics during fast tom rolls and to reinforce sonic weight and punch in sections with softer dynamics.

Cymbals, recorded through spot, overhead, and room microphones, provide rhythmic subdivisions that add drive and energy; however, excessive presence risks abrasiveness (Mynett 2017: 191, 202). In many genres, overhead microphones aim to capture an authentic and natural representation of the drum kit within the recorded acoustic space. In metal, however, this approach typically differs. The kick and, sometimes, the toms and snare are often attenuated in overhead recordings (Mynett 2017: 279). When overheads do capture these drums, the kicks may become ambient and unfocused, while the toms may resonate excessively, resulting in a muddy quality. In fast and dense compositions, this practice distinguishes metal from rock or slower metal, where there is more room for a natural ambience to fill the sonic space (Mynett 2017: 278–279).

Andy Sneap highlights the challenge of balancing overheads, stating, 'Overheads are one of the hardest things to get right. Too much cymbals and [hi-]hat, and it will kill your mix; too little, and you have no dynamics' (2014). To manage this balance, Sneap recommends high-pass-filtering the overheads up to 600 Hz to attenuate the kick and toms, paired with a multi-band compressor to control middle frequencies, which in turn reduces the prominence of the snare and hi-hat. This technique is similarly preferred by Jens Bogren (2014) and Daniel Bergstrand (2014). Carl Bown (2018) takes a slightly different approach by using compression to dampen the snare's body while preserving its attack transients, whereas Nick Raskulinecz (2014)

favours broadband compression to boost the snare's 'smack' without excessive attenuation. Compression, in general, can create a more 'explosive' and exciting sound for cymbals (Bown 2018). The choice of spectral processing for overheads depends on the specific sound sources; Jacob Hansen, for instance, uses parallel processing to reduce abrasive qualities while blending in a brighter version for added clarity in sections that benefit from 'crispy sounding ride hits and splashes' (2019b) that might otherwise be buried under the regular overheads.

Room tracks are also widely regarded as useful in metal production for instilling a sense of realism in the drums (see Herbst and Mynett 2021). Tue Madsen articulates this point clearly, stating:

I want it to sound like if you are in the room with a drum kit but in a better way. I don't like everything to be sticking out as individual sounds. I like to hear the drum kit as one instrument. I like to get a collective feel of the drum kit.

(Madsen 2017)

For Madsen, room tracks play a central role in creating cohesion by capturing the drum kit as a unified entity (see Yang 2024: 55–59). Without room tracks, productions that rely solely on spot microphones can produce an isolated, fragmented sound where individual drum instruments lack integration within the mix. Rooms and ambient sound soften the transient, staccato nature of drums, contrasting with the more sustained characteristics of guitars and bass, ultimately enhancing the cohesiveness of the mix (Mynett 2019b: 71–72).

Integrating room recordings into the mix can effectively emphasize expressive gestures in drum performances. Jens Bogren highlights the power of this technique, explaining that an 'impossibly hard-hitting drummer' (2019) can be conveyed by applying equalization, compression, and distortion to room tracks. Daniel Bergstrand (2014) often bandpass-filters room recordings to exclude frequencies below 2 kHz and above 10 kHz; however, in some instances, an upper cut-off between 4 and 5 kHz is applied (Lancaster 2018). Max Morton (2020) supports this approach, noting that filtering in this manner enlarges the perceived room sound while preventing an abrasive quality when blended with overheads. When the room spectrum is left full-bandwidth or adjusted with additive equalization, the room tracks can add body to the drum sound, extending the kick drum's decay, provided the density and speed of subdivisions allow it (Larson 2017). The room recordings are also valuable for shaping the snare's reverb length, which directly affects the cohesion and impact of the drum sound. Producers like Dan Lancaster (2018) therefore adjust the decay time of the room tracks to match the tempo, ensuring that the snare reverb decays naturally before the next hit, thereby preserving clarity and rhythm.

To create a compelling room sound, producers frequently apply heavy compression, limiting, or distortion to room recordings. This approach amplifies the intensity, excitement, attitude, and overall size of the drums by accentuating the drummer's gestures and enhancing the captured reverb from the acoustic space (Robinson 2014; Madsen 2017; Kohlmannslehner 2019). However, excessive reverberation can be problematic in dense mixes, as exemplified in Motörhead's *Sacrifice* (1995). Engineer Ryan Down describes the issue: 'I think that room was too live of a room, so you wind up getting all this clouding in the mid-range, and your separation and everything got murky' (Brown 2009: 146). When adequate sonic space is available, however, producers often favour the natural room ambience over artificial reverb (Bogren 2018; Lancaster 2018; Madsen 2017). According to Jens Bogren, this natural ambience can be further enhanced with distortion, which helps blend room tracks with the drum kit by reducing low-mid and boxy mid frequencies:

I get rid of a lot of the low-mid and boxy mid-frequencies, so even a poor room can sound much more expensive when you blend it into the kit, and it would help to get the room through even if you have these quad-tracked guitars in a way you would have to over-use EQ and compression to be able to do that.

(Bogren 2014)

Compression, limiting, and saturation are all waveform-altering processors that contribute to a sense of loudness (Hansen 2019b), an effect closely linked with the perception of heaviness (Czedik-Eysenberg, Knauf, and Reuter 2017). However, room tracks are not universally employed; more recent generations of metal producers often omit them, opting for a less naturalistic sound instead (Herbst and Mynett 2021). The effectiveness of room tracks in a mix also depends on the song's tempo and the speed of rhythmic subdivisions. For faster subdivisions, prolonged ambiances can blur transients and diminish rhythmic clarity (Mynett 2017: 307). Conversely, in slower performances, room tracks can enhance 'organic size' (Mader 2014) and 'smack' (Sneap 2014), effectively filling sonic space and reinforcing impact.

The speed of subdivision of individual drum instruments often varies considerably within a composition, for instance, a backbeat snare against a sixteenth-note double kick. This variance allows each instrument differing amounts of decay time before the next hit, influencing the application of reverb for each. Producers often add artificial reverb to spot microphones, most frequently on snares and toms, although some, like Andy Sneap (2014) and Logan Mader (2014), occasionally apply it to the kick. Mader notes that reverb can enhance the kick 'when it's really open, in a really slow part or a part where there is only a kick' (2014). The approach to artificial reverb

varies among producers. While Daniel Bergstrand (2014) typically relies on room ambience and rarely adds reverb artificially, Matt Hyde (2014) utilizes multiple reverbs with varying lengths and tonal characteristics across different drum elements and sections. Hyde explains that by aligning reverb duration with the rhythmic values of the song's tempo and placing reverb on parallel busses, a higher level of ambience can be achieved without it becoming overly prominent. Instead, this method adds depth and cohesion to the drum sound. Artificial reverb also offers more automation flexibility than room mics, enabling control over not only loudness but also acoustic and tonal characteristics. A striking example of automated reverb is found in Suicide Silence's 'Unanswered' (2007), where Tue Madsen applies a longer reverb during slower sections without blast beats to 'increase heaviness' (2019). In faster sections with blast beats, Madsen attenuates the reverb to avoid the extended reverb trails characteristic of black metal, which would conflict with the intended death metal aesthetic.

Producers develop individual preferences regarding processing applications, whether on individual tracks, grouped instrument tracks such as kick or snare, or the entire drum group. However, it is essential to recognize that audio processors interact within a signal chain, creating a complex and often unpredictable configuration. This setup can lead to both creative impulses, known as 'emergence' in science and technology studies and computer music (see Holland 2010; Bateman 1980: 247), as well as potential psychoacoustic issues. Further complicating the process, many metal producers favour parallel processing groups, which not only provide an enhanced tonal control but also introduce an added layer of complexity. Randy Staub articulates the benefits of parallel processing in his documentation of the mixing approach for Evanescence's 'What You Want' (2011):

On this song, I had a pretty solid amount of compression and EQ, and I'd blend the compression group in with the original channels. It's something that Bob [Rock] and I started doing years ago, and that's now pretty standard. I also often send some of the bass to the drum compression group. It is intended to make the drums and bass sound punchy, and larger than they really are. Part of mixing rock music is to get more excitement in a track than really is there, and compression seems to do that. Again, it makes it sound larger than life.

(Straub in Tingen 2012)

Since the early experiments with parallel processing in 1980s' metal, the technique has developed considerably, with many producers now employing it for enhanced control (see Herbst and Mynett 2023b). Jens Bogren (2014), for example, typically combines a slightly compressed drum group with two or three parallel versions processed through different compressors, distortion

units, and settings to create a blend of tonal characteristics. This approach thickens the timbre while preserving the clarity and defined attack transients of the lightly compressed original drum buss, thus maximizing sonic weight and energy in ways that serial processing alone cannot achieve. Although the fragmented nature of such processing might appear to compromise cohesion, in practice, it often has the opposite effect (Mynett 2017: 229). However, substantial parallel processing, which frequently involves heavily processed segments of the signal, may not be optimal for fast performances or dense arrangements, as it extends the decay of drum instruments and amplifies ambient features, thereby diminishing the punch and clarity of the drum sound (Mynett 2017: 191, 230). Nevertheless, when sufficient sonic space is available, heavy parallel compression and distortion can increase aggression and punch, enhancing the drum sound while potentially lessening the need for intensive creative spectral processing (Russell 2019a).

5.2.3 *Samples*

Drum samples have become an essential tool in crafting the ‘sonic cartooning’ that defines the intense heaviness expected in modern metal production. In contrast, many older metal productions, particularly those from the 1990s and earlier, typically feature drum sounds that are less pronounced and punchy than those found in contemporary productions. This difference largely stems from the increasingly sophisticated use of samples, which enhance the drum sound beyond what can be achieved with a recorded kit alone, even after processing.

To allow the kick, snare, and toms to cut through the dense wall of sound and contribute to a production’s perceived heaviness, these elements often require augmentation that enables them to penetrate effectively, especially considering the demands on drummers to execute fast tempos and complex subdivisions with consistent impact. Samples provide this necessary consistency (Mynett 2017: 177) and ensure that even a well-recorded kit can be enhanced to meet the demands of modern production. As Nick Raskulinecz notes:

Sometimes, it’s not till the mix we have to put some samples in just to get the drums to compete with all the guitars and bass and vocals that we just recorded on top of them. We’re talking about acoustic drums. No matter how hard you hit it or EQ or compress it, at the end of the day, [you’re] going against all those other tracks. Just sonically, sometimes the drums need a little help, a push over the cliff. This doesn’t have anything to do with the way they were recorded; it has to do with just giving them a little bit more power or clarity because of the wall of sound we’ve put on top of that. So, it’s more about pushing the samples up into the drum set

as the song is playing. And if you look at the faders, the snare's at zero. Sometimes, the sample is at -20 [dB Full Scale], but if you solo it, it's there in the background, but it gives it a little more smack.

(Raskulinecz 2014)

Raskulinecz describes 'sample reinforcement' as a subtle technique that enhances a recorded drum kit by layering pre-recorded samples, either from the same kit or a different one, to boost punch, density, weight, and dynamic consistency without fully replacing the original sound. This approach retains an organic quality, whereas 'sample replacement' involves entirely substituting the original drum recordings with samples (Mynett 2017: 177). While many producers favour sample reinforcement for maintaining a more natural sound, productions using sample replacement can achieve a comparable, or even greater, sense of heaviness. Sample replacement is particularly popular in contemporary metal subgenres like metalcore and deathcore, where the aesthetic leans towards an intense and controlled sound.

Sample replacement manifests in several ways. In some productions, drums are fully programmed using samples from commercial libraries to enhance the sense of 'heightened reality' (Smyth 2018). Notable examples include Bless-thefall's 'Cutthroat' (2018) (Smyth 2018) and Emmure's 'Flag of the Beast' (2017) (WZRD BLD and Dunne 2017). In other cases, such as Humanity's Last Breath's 'Abyssal Mouth' (2019), programmed drums are augmented with samples from the drummer's own kit, avoiding the generic qualities of library samples (Odeholm 2020). Programmed or replaced drums need not always detract from a track's intensity or authenticity. For instance in Gemini Syndrome's 'Anonymous' (2016), programmed drums were paired with the originally recorded samples and later overdubbed with live cymbals and drums to juxtapose human and machine elements, fitting the band's industrial metal aesthetic (Churko 2018). In Loathe's 'New Faces in the Dark' (2020), the recorded acoustic drums initially lacked the desired aesthetic impact, so the sounds were replaced with samples to enhance character and detail that better aligned with the band's sonic vision (Lever 2020).

Whether used for replacement or reinforcement, the overuse or misuse of drum samples can risk sterilizing the raw energy, aggression, and intensity of a drum performance, which are central to the heaviness of contemporary metal (Mynett 2016: 82). However, expectations have changed over time. Will Putney (2019) suggests that the current market demands a hyperreal, sample-reinforced drum aesthetic, essentially a simplified and exaggerated version of reality (Zagorski-Thomas 2016), for commercial success:

With productions like this or any production where you keep it kind of rough, it's like less sheen and less processed. . . . A lot of kids will be like, 'This sounds weird'. Because some people just aren't used to hearing it

nowadays; these sounds don't sound right; well, these are actually drums. Just what you're used to hearing is a version of a drum, but it doesn't sound like a human being anymore. There's this balance where it's too rough, although the idea is awesome; it's kind of a disservice to the band, knowing that a lot of people won't think this sounds good. So, we have to find a balance where it still feels a bit rough, but people will like it. You just want to make a record that sounds good and is most likely to connect with a lot of people.

(Putney 2019)

Even established metal bands like Machine Head feel compelled to use samples to meet the expectations of fans and record companies (see Thomas 2015). Despite the band's preference for a rawer, organic sound, producer Joel Wanasek (2016) replaced the original kick drum and reinforced the snare on Machine Head's single 'Is There Anybody Out There' (2016) to achieve a commercially viable aesthetic. This decision exemplifies the complex balance between artistic integrity and commercial or audience expectations in crafting heaviness, as Andrew Wade notes:

If you want to have a modern sound, you have to have samples. There is only so much you can do with real drums. You can make real drums sound really good, but to make them sound modern, especially in heavier productions, you have to mix in samples. I don't think there is a way around it unless you play elements of the kit separately, perhaps. Maybe that could work. But most drummers don't want to do that.

(Wade 2018)

Artists and producers face a dilemma in striving for heaviness: some opt to record each drum component separately (e.g. isolating foot pedals from hand-played elements) to reduce spill and enable granular processing, albeit at the expense of an organic, unified feel. Others maintain the integrity of a full-kit performance to capture a cohesive live essence, compensating with samples to achieve the hyperreal sonic standards of contemporary metal. For instance Lorna Shore achieved a powerful, heavy, and cohesive sound on their EP . . . *And I Return to Nothingness* (2021a) by recording the entire drum kit together but plan to isolate components for their next album to attain even heavier production qualities (Schroeder 2022). Similarly, for Gojira's *The Way of All Flesh* (2008), the kick drum was recorded as an overdub, allowing for precise editing and enhancement without interference from other drum sounds (Mader 2016). Some extreme metal producers, such as Kristian Kohlmannslehner (2019), Carson Slovak and Grant McFarland (2019), even avoid capturing the acoustic kick through overhead or room microphones. Instead, they record a trigger signal that activates a sample,

making the kick sound more pronounced, heavy, and isolated from ambient bleed. This approach maximizes punch and sonic weight while sidestepping unwanted artefacts. Lorna Shore's 'To the Hellfire' (2021b) exemplifies this technique with a single sample kick drum, creating a relatively thin sound that efficiently occupies minimal sonic space, essential for managing the arrangement's density and high-speed drumming (Schroeder 2022).

Rather than debating whether to use samples, producers generally consider how many samples to blend with the acoustic drums and the purpose of each one. Typically, a mix may include three to five samples for the kick and snare and one or two for toms (see Herbst and Mynett 2021). However, six or seven layered samples for the kick or snare are not uncommon (Bergstrand 2014; Raskulinecz 2014). Integrating these samples involves balancing cohesion with isolation for optimal control. Room microphones and parallel compression can restore a natural sense of space and cohesion (Mynett 2017: 191), while each sample contributes specific timbral characteristics. For example kick samples do not require precise pitch alignment with the acoustic kick, as pitch perception is limited in lower frequencies (Schneider 2001). However, snare and tom samples must blend with the acoustic components to avoid dissonance and maintain punch and heaviness (Nordström 2019a; see also Mynett 2017: 179, 182). When pitches are aligned, individual samples enrich the drum sound by adding weight, attack, sustain, tonal depth, ring, or natural ambience. This layered approach enhances the acoustic component without requiring artificial reverb, achieving the illusion of an exceptionally large drum sound (Bogren 2018; Hansen 2019b).

It is noteworthy that samples in metal production extend beyond conventional drum kit sounds; alternative sources can substantially contribute to a track's heaviness. For example adding white noise to a snare sample enhances its presence and creates an added 'spit' quality, while a tuned sine wave can introduce controlled low-frequency reinforcement to a composite kick, enhancing each hit with substantial sonic weight (Mynett 2017: 329). A similar technique borrowed from EDM involves incorporating samples from the Roland TR-808 drum machine. Andy Sneap illustrates this practice, describing how an 808 sample can deepen the sonic weight in a metal mix:

Something obviously has to give the low-end to the mix. It's funny when you put an 808 under the kick, it can give the bass a whole new depth. It almost feels like the bass guitar's got it. It almost tricks the ear in a way.
(2014)

Though this 'alien' sound may go unnoticed by the listener, it subtly amplifies the overall heaviness. Producers like Carl Bown (2018), Logan Mader (2016), and Russ Russell (2019a) also employ this technique to enhance low-end weight in their mixes.

Further methods include blending the sonic attributes of different instruments to maximize impact. For example according to producer Karl Bauerfeind (2017), Bob Rock incorporated tom attack transients into the snare on Metallica's *Black Album* (1991) to create what journalist Joel McIver described as the 'snare drum from hell' (2009: 209). This layering approach gives the snare a punchier and more aggressive sound, enhancing its impact in the overall mix.

Samples play a significant role in contemporary metal production and are, in most cases, not only conducive but often essential to a heavy aesthetic. Producer Dan Lancaster (2018) emphasizes that integrating samples is an art, and the previous considerations have highlighted some, but by no means all, of the artistic and technical complexities involved. Effective sample use is rarely static across an arrangement; instead, it adapts to the demands of each section. For instance snare samples are often attenuated or omitted during quieter passages or intricate ghost-note sections to maintain the performance's dynamic integrity (Sneap 2014). Similarly, the intensity and frequency of kick drum samples are adjusted in response to subdivision speeds and the mix's density, ensuring they fit each section's sonic space without overwhelming other elements (see Mynett 2017: 181–186).

5.3 Bass

In metal music production, the bass is essential for establishing a continuous low-end presence that complements the kick drum's punch and rhythm while compensating for its intermittent nature. Due to the processing techniques often applied to the kick, such as equalizer (EQ) cuts to control its low-frequency power and prevent it from dominating the mix, the bass must maintain a steady foundational weight, adding fullness to the arrangement that might otherwise be lost.

5.3.1 Placement in the Arrangement

Depending on its intended function within the arrangement, the bass requires specific processing to enhance the production's heaviness effectively. A fundamental consideration is the placement of the bass's low-end relative to the kick, as both benefit from different spectral allocations that ensure pronounced sonic weight without masking one another. Joey Sturgis describes this as the 'compounding bass problem', asserting that layering sounds rich in sonic weight results in a 'garbled, unidentifiable mess. . . . The bass is being crammed into a compact space, making it impossible to hear each instrument with any discernible difference from one another' (n.d.). Mynett (2017: 285) advises placing the bass above the kick's weight region by setting high-pass filters at different levels for each instrument and boosting different low-end frequencies.

From a psychoacoustic perspective, Mynett argues that attenuating or removing the bass's fundamental frequency does not muddle the low-end region of a mix; instead, it leads the listener to cognitively reconstruct something that is physically absent. For this mechanism to function, a sound source's harmonic series must be present, as is the case with pitched instruments rather than percussive ones. Consequently, most productions benefit from positioning the bass spectrally above the kick (Mynett 2017: 285). Taylor Larson (2018) supports this approach, noting it as a common modern production style since the early 2000s. This perspective aligns with Joel Wanasek's (2017) observations. Wanasek notes that, in most metal mixes before the mid-2000s, the bass primarily contributed sonic weight through a pronounced sub-bass spectrum, while the kick, with its comparatively thin-sounding low-end, was positioned above it. He argues that this preference shifted in the mid-2000s, although frequency allocation varies with song tempo. Generally, the bass is positioned above the kick drum, but the order may switch in breakdowns or slower sections to give sustained instruments, like the bass guitar, more sonic space in the very low frequencies.

According to Wanasek, both configurations can produce a heavy wall of sound. When the kick sits below the bass, the mix gains energy, power, and excitement, although this setup is less suited to fast tempos or low tunings. Conversely, placing the bass below the kick creates a sound that feels less energetic, more relaxed, and 'rounder', which works well for fast songs, as the low-end is less muddled by the kick. Examples of the lower bass approach include Children of Bodom's *Hate Crew Deathroll* (2003) and Soilwork's *Stabbing the Drama* (2005), while Metallica's *Black Album* (1991) and Gojira's *Fortitude* (2021) exemplify the lower kick alternative.

In addition to the kick, the bass must work with the guitar to form a defined and heavy bottom-end. Typically, the bass and guitar are pitched an octave apart, providing some separation; however, their spectra still overlap substantially, particularly when guitars are tuned down, extending into the pitch range of the bass (see Mynett 2019a: 309). As with the kick, frequency filters are considered essential for managing the production's sonic weight (Sturgis n.d.). Even with low tunings on both instruments, fundamental frequencies are often attenuated, with high-pass filters typically set between approximately 50 and 90 Hz for bass and between 90 and 180 Hz for the guitar (Mynett 2017: 285; Wanasek 2017).

Producers have varied opinions on the prominence of bass in the mix. Jacob Hansen emphasizes that he is

really looking for the bass to be able to stand out in some way and emphasize the guitar sound and not just be a low-end instrument because that is boring and not very interesting in metal. It's so cool when you can listen to a mix and find the bass in there and hear what it does.

(Hansen 2019a)

Hansen's perspective aligns with that of Adam 'Nolly' Getgood, who views the bass as 'not just a background instrument. It's an aggressive instrument in its own right' (Johnson 2012) that can feature prominently in the mix. To accentuate string clank and other playing noises that carve out space from the guitars, these sounds are often enhanced in the higher range of the frequency spectrum. Contrary to standard engineering practices, Getgood demonstrates in Periphery's 'Prayer Position' (2016) that using algorithmic reverb on the bass can provide a more natural spatial presence, widening its sound and enhancing its expressiveness.

Another widely favoured approach among producers such as Jacob Hansen (2019b), Taylor Larson (2018), and Russ Russell (2019b) is widening the bass in the stereo field. While the lowest frequencies remain mono to avoid phase issues (Wanasek 2017), spreading the middle and higher frequencies with added chorus and ambience highlights the bass's individuality within the mix. In Dyscarnate's 'Iron Strengthens Iron' (2017), Jacob Hansen (2019b) spreads the bass frequencies above 500 Hz on a parallel buss to enhance its aggressiveness and clank. He argues that this processing approach integrates the bass into the band sound without restricting it to the centre of the stereo field, thereby heightening its presence. Similarly, in Asking Alexandria's 'Into the Fire' (2017), Taylor Larson (2018) separates the bass into three frequency-specific tracks, applying a chorus effect to the middle track to enhance its character and support the guitars, particularly in the cleaner sections.

Conversely, some producers view the bass primarily as support for the guitars. In this role, the bass reinforces sonic weight by outlining the guitar riff an octave lower, providing 'guitar riffs with a greater level of perceived heaviness' (Mynett 2019a: 309). This perspective does not diminish the bass's contribution to heaviness; rather, it repositions its role by emphasizing its impact as a source of low-end sound instead of as an expressive instrument in its own right. For Fredrik Nordström, 'the bass in metal music is not an important instrument, but it is, at the same time, super important. But it's not important if it is audible' (2019a). This view suggests that while the bass's low-frequency spectrum is essential for reinforcing heaviness, its distinct audibility may be secondary to its function in anchoring the guitar's sonic weight.

5.3.2 *Bass Processing*

To achieve cohesion between the bass and guitars, the bass must blend effectively with the guitars, which can be accomplished through complementary equalization or by applying distortion to the bass. Distortion imbues the bass with an aggressive quality to make it more exciting (Massy 2016: 92–93) and to align it with the distorted guitar tone, resulting in a more integrated, cohesive sound (Mynett 2017: 145). While distortion can risk

compromising clarity, strategic application, such as focusing on the middle and higher frequencies or isolating it on a parallel track, often enhances definition. By enriching the harmonic spectrum, a distorted bass aligns more closely with the guitars, making it feel less detached and more smoothly integrated into the mix (Mynett 2017: 190). Additionally, the thicker texture from this expanded harmonic content contributes to the overall heaviness of the production.

For the bass to impart both sonic weight and heaviness, it must achieve dynamic consistency without sacrificing punch. This balance can be managed by minimizing natural loudness variations between notes and strings while retaining the punch provided by clear attack transients and well-defined note onsets (Mynett 2017: 234). Producers adopt varied approaches to meet this challenge. Jens Bogren (2014) and Joel Wanasek (2017) apply combinations of broadband compressors, multiband compressors, and limiters to control dynamics. Broadband compressors serve both dynamic control and sonic colouration, often adding saturation and overtones (Tingen 2014), whereas multiband compressors target dynamic range reductions without compromising low-end fullness or introducing spectrum-wide pumping effects. Limiting, whether as an alternative or supplement to compression, enhances dynamic consistency but can alter frequencies in ways that necessitate corrective equalization (Wanasek 2017). Parallel compression and limiting are often employed as a balanced approach to achieve consistency while preserving tonal qualities, though these techniques can increase ambient elements if applied to tracks recorded with microphones rather than DI (Mynett 2017: 240).

A minority of producers, including Daniel Bergstrand, avoid compressing or limiting bass altogether:

I don't use that much bass compression. I think that's also messing up the 'in your face' feeling of the bass. No compression at all, neither when tracking nor mixing. If you're using a lot of distortion, you have these cool distorted mid-frequencies that are complementing the guitars, or if you're using the fuzz, for example, it's super compressed already. For a band like Meshuggah, there is no compression at all on the bass, nothing. It's quite an overdriven tone. But not even with rock music, whatever. Work on the levels instead. It's more time-consuming, but it's better.

(Bergstrand 2014)

Bergstrand argues that compression can diminish the punch of the bass and prefers to manually balance uneven notes through loudness automation. He also leverages distortion's natural compression effect, which helps the bass blend with the guitars and integrate cohesively into the mix.

Metal producers face numerous challenges, particularly in achieving dynamic consistency while balancing frequencies to prevent masking.

Advances in digital music production have enabled processors to respond to the performance of other instruments, making this approach increasingly popular. The bass, in particular, benefits from ‘side-chain’ processing, a technique that ensures consistency while creating space for other instruments when needed. When side-chained to the kick, the bass can be ‘ducked’ (attenuated) on each kick hit, allowing the kick to punch through the sustained bass. This method permits a louder and weightier bass mix without diminishing the kick’s impact (Mynett 2017: 241). Similarly, the bass can be momentarily ducked during floor tom hits to prevent the low-end from becoming overly dominant, thereby reducing the risk of distortion in the mastering phase (Bogren 2018).

Another advanced technique frequently used is adding sub-bass energy through a synthesizer or subharmonic generator, which augments sonic weight and perceived size. Alternatively, psychoacoustic manipulation can shift the bass’s centre frequency by selectively adjusting partial frequencies to create space for other instruments and enhance clarity on smaller playback systems. The first approach yields added sonic weight, as exemplified by At the Gates’ ‘The Chasm’ (2018) (Russell 2019a), while the second technique improves bass clarity on compact speakers, as heard on Machine Head’s ‘Is There Anybody Out There?’ (2016) (Wanasek 2016). Although the bass guitar may not be the most prominent instrument in the mix, its tailored processing through sonic cartooning reinforces the heaviness and sonic weight fundamental to metal production.

5.4 Rhythm Guitars

The guitar sound and much of its sonic cartooning are primarily defined at the source during recording. Nonetheless, as with other instruments, processing remains indispensable for achieving two objectives: presenting the guitar as ‘larger than life’ and integrating it cohesively within the mix. A production that successfully meets these aims typically employs standard techniques, including strategic placement in the stereo field, spectral enhancement, and dynamic range control. These processes help to magnify the guitar’s presence while ensuring that it occupies its intended sonic space without overwhelming other elements in the mix.

5.4.1 *Guitar in the Virtual Soundstage*

A heavy production aesthetic inherently relies on a wall of sound, with its lateral size determined by the frequency spectrum. Guitars, producing sustained signals across a broad spectrum—where distortion contributes harmonic overtones and residual tones that extend both the high and low ends (Herbst 2017a, 2017b)—serve as the primary contributors to heaviness.

For an effective wall of sound, both lateral size and width are essential. To achieve this effect, most producers pan rhythm guitars fully to the sides of the stereo spectrum, occasionally using psychoacoustic enhancers to widen them beyond the natural limits of the panorama. However, this approach risks negative effects such as reduced mono compatibility or degradation of the frequency spectrum. When quad-tracking guitars aligns with the aesthetic vision, producers like Fredrik Nordström (2014), Andy Sneap (2014), and Jacob Hansen (2019b) often pan one pair slightly less widely, at about 80% to the sides, to create a more spacious and three-dimensional sound (Mynett 2017: 205). Nevertheless, the prevailing method remains to pan all guitars to the extremes to maximize the width of the mix. Equalization further enhances width; treble boosts subtly broaden the guitar wall (Mynett 2017: 205), as does varied EQ between left and right channels (Getgood 2016). Another technique is to gradually widen the signal at higher frequencies, forming a V shape of width in relation to frequency (Figure 5.2). To maintain a sense of proximity on the depth plane, avoiding an overly three-dimensional perspective is customary. Minimal ambience, typically from room tracks or time-based processors, is applied to rhythm guitars to prevent them from receding within the mix.

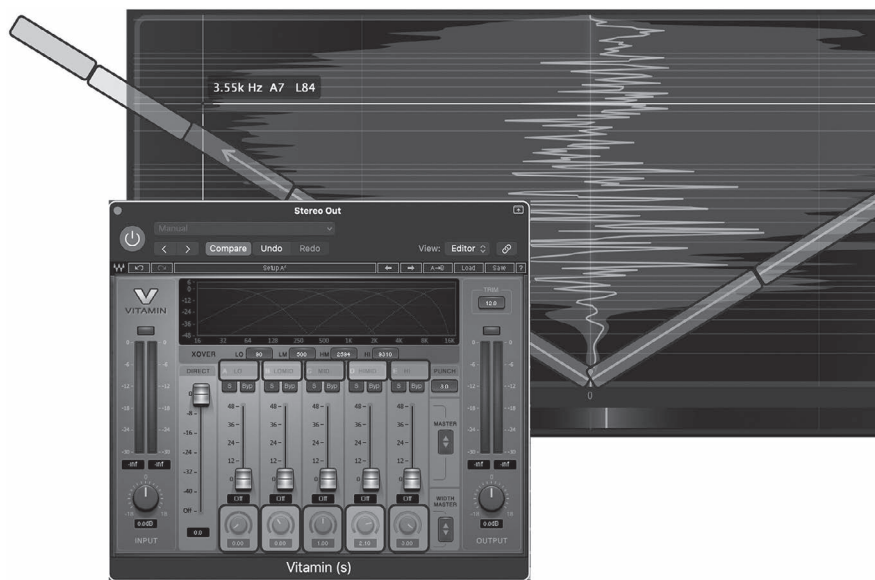


FIGURE 5.2 V-shape panning settings of a guitar signal, with each increasing frequency band panned further to the sides, exemplified using the Waves Vitamin plug-in.

5.4.2 Equalization

Guitar equalization in metal production is influenced by multiple factors, including the captured signal, mix context, and aesthetic goals, leaving little room for rigid guidelines. Joel Wanasek describes his ideal guitar tone with particular attention to achieving a balanced sound across the spectrum:

EQing guitars, in my opinion, in metal, is about getting a good, solid top-end, where the guitar has presence and cuts through the mix, but it isn't hissy, it isn't harsh. Having a nice mid-range that's tight, kind of scooped, but tight, meaning present; balanced is the key. A balanced mid-range that sounds punchy, has a lot of definition, and a tight bottom-end. Sometimes, you want a fat bottom-end, but it depends on what kind of guitars you have. Getting that really tight, nice bottom-end that complements the bass.
(Wanasek 2017)

This balance across spectral regions, both within the guitar tone and in the broader arrangement, is one of the producer's primary mixing tasks, which requires both technical skill and creative vision.

The low-end, essential for achieving sonic weight and, consequently, heaviness (see Chapter 2), is a focus. Ron Vento, in his guide to producing death and black metal, warns against overemphasizing this frequency range:

Even though it's death metal, whatever you do, don't overdo the low end. This is one of the most common mistakes people commit when trying to make the record sound heavy. . . . The heaviness doesn't come from boosting guitar low end to an insane amount. Don't be afraid to low cut by a few dBs, even as high as 80 Hz.

(Vento 2009: 26)

Achieving effective sonic weight involves amplifying beneficial bass frequencies, reducing rumble and resonant energy, and carving out space for the bass and kick by attenuating unnecessary frequencies. Even with down-tuned guitars, energy below certain frequencies often adds limited value and can detract from the guitars' texture and impact (Mynett 2017: 295). While a degree of 'cabinet thump' below 125 Hz may enhance the mix's quality, these long wavelengths can undermine the more stable frequencies in the upper bass range of the bass spectrum (125–250 Hz). As a result, most metal producers consider high-pass filters essential for a controlled sonic weight that maintains punch and impact (Herbst and Mynett 2021). The optimal high-pass filter setting depends on factors such as the kick and bass frequencies, guitar tuning, where the guitar's low-end becomes less defined due to cabinet thump, and the subdivision speed. For example slower songs or sections generally allow for lower filter settings.

The upper low-end, particularly between 125 and 250 Hz, warrants careful adjustment. Mynett (2017: 296) identifies this range as a potential source of unwanted ‘woolly’ resonance in guitars, which can obscure clarity and soften the low-end. Attenuation here is often useful for achieving a more defined and impactful bass weight. Conversely, amplification in this range may be advantageous in certain contexts, especially for adding fullness and enhancing the bass response on smaller speakers (Mynett 2017: 296). Adding to Mynett, Joel Wanasek (2017) emphasizes that this upper bass range is pivotal in determining the overall power and thickness of the mix; it is instrumental in shaping whether the mix sounds weak and thin or powerful, thick, and big. The low-end placement of kick and bass typically dictates the lower frequency range of the guitars. In mixes where the bass is positioned below the kick, guitar weight can be enhanced in the 90–130 Hz range. Conversely, if the bass is placed above the kick, guitar weight often results from frequencies above 150 Hz. Notable examples of this high region placement include As I Lay Dying’s ‘Cauterize’ (2012) and In This Moment’s ‘Adrenalize’ (2012), where the guitars, despite their higher spectral centre, still achieve substantial sonic weight through a balance of separation and cohesion between instruments.

Wanasek emphasizes the importance of the crossover between guitars and bass: if the guitars lack sufficient low-end presence, they may sound detached from the bass and kick, creating a weak mix. On the other hand, if the guitars are overly thick, they can mask the low-end, which results in a muddy sound. This balance becomes even more complex in contemporary extreme metal, where down-tuned guitars and bass require unique spectral placements. Moreover, because very low tunings might require entirely different spectral positions for the guitar, bass, and kick, guitar tuning needs special attention. From Wanasek’s experience, in contemporary extreme metal with very down-tuned instruments, the bass and guitars are so low that the kick must often be placed above the guitars, as can be heard on Behemoth’s ‘Ov Fire and the Void’ (2009).

Balancing low and high frequencies is essential for achieving a heavy, well-defined production. Insufficient treble can make a mix sound dull, as it lacks definition in the low-end and fails to deliver punch due to deficient transients. The lower-high frequency range, between 4 and 7.5 kHz, is particularly important for metal guitar tones, as it imparts density, sharpness, aggressiveness, and proximity, all key factors in perceptual heaviness (Mynett 2017: 300). However, as human hearing is especially sensitive to the 2–5 kHz range, which is important for speech intelligibility, an excess of energy in this range without sufficient lower frequency balance can lead to an abrasive perception (Zwicker and Fastl 2007: 17, 20). If the guitar tone becomes too harsh, the clarity typically provided by this range can instead compromise note definition (Mynett 2016: 77). To mitigate this effect, many producers

opt to smooth the guitar's high-end by attenuating around 4 kHz and applying a low-pass filter to eliminate hiss, thereby creating space for drum cymbals and vocals (Russell 2019b; Nordström 2019b). The high-cut threshold, which can vary between 5 and 10 kHz (see Herbst and Mynett 2021), is typically set at the point where 'pleasing aggressive brightness transitions into coarse rasping "fizz"' (Mynett 2017: 300).

Due to the overlapping frequency energy of instruments and vocals in the mid-range, metal guitars often have their mid-range 'scooped' (attenuated). The sustained nature and extensive overtone spectrum produced by distortion can cause the guitar to mask other instruments; therefore, reducing mid-frequencies in the guitar can increase overall clarity in the mix. This technique is especially beneficial in the lower mid-range (250–500 Hz), which tends to be dense and responds well to deeper and broader subtractive equalization. Complementary equalization, in which different frequencies are cut and boosted across instruments, ensures that each instrument occupies its own space within the dense mid-range (Mynett 2019b: 76). Rather than viewing the bass and guitar as distinct in terms of pitch alone, allocating specific frequency ranges to each instrument across the full spectrum often proves more effective. Many metal producers scoop the guitar's mid-range to create space for the bass, enhancing the bass's pitch clarity and allowing more room for expressive playing. Simultaneously, this approach gives the guitars a more defined low-end and lends the mix greater sonic weight, clarity, and note definition (Mynett 2017: 286–287).

The popularity of scooping the guitar tone stems not only from its ability to enhance mix clarity by reducing the masking effects of the mid-range but also from its efficacy in improving note definition and emphasizing the guitar's sonic weight and presence. By attenuating the low-mid 'mud-range', a mid-scoop achieves a psychoacoustic effect similar to that of amplifying the low and high frequencies, which enhances both sonic weight and presence without directly boosting those frequencies (Mynett 2017: 262). This approach avoids the potential distortion or imbalance that can result from excessive low- and high-end amplification. Moreover, it creates an impression of greater loudness and intensity because, at high volumes, human hearing naturally attenuates the more sensitive mid-range (Fletcher and Munson 1933). This perceptual effect is further enhanced as the heightened low and high frequencies contribute to a sense of vertical height in the mix, enlarging the wall of sound (Mynett 2019b: 74). Many metal producers leverage this psychoacoustic phenomenon by scooping multiple instruments, including guitars, kick drums, toms, and sometimes bass, to achieve a mix that feels louder, more intense, and powerfully aggressive, a characteristic well-suited to metal's heavy aesthetic (Mynett 2019b: 68). Historically, the use of mid-scooping has become more pronounced over time (Herbst 2017a). Early experiments, such as Black Sabbath's 'Into the Void' (1971), laid the

foundation for the technique. By the 1990s, it had become a hallmark of thrash and especially US death metal, with producer Scott Burns at Morri-sound Studios in Tampa, Florida, applying it to iconic releases like Cannibal Corpse's debut album *Eaten Back to Life* (1990), solidifying the scooped tone as a signature of heavy and aggressive metal production (Berger 1999: 176).

While an attenuated mid-range can reduce masking and enhance clarity, shaping this frequency range is far more complex than simply turning it down. Metallica's James Hetfield describes this challenge as a

never-ending quest for the Holy Grail of guitar sounds. For me it's got to be percussive. It's got to push air, what we call bark. It's got to bark. But I don't want it really abrasive, so any fake fuzz to me really just takes away from the sound. . . . So we're trying to find that balance of enough mid push while still sounding big and what I've found is the wider and bigger you make it sound the thinner it becomes in a way. . . . You've got to find your space. Elbow your way in there and sonically make some room. And it varies throughout certain songs.

(Hetfield in Laing 2016)

Hetfield's preference for a mid-rich sound aligns with producer Jacob Hansen (2019b), who, in contrast to the prevailing trend of mid-scooping, favours a mid boost for its 'angry' quality, recognizing that the guitar's core frequency spectrum lies in the mid-range. As Hansen contends, these frequencies are integral to the guitar's tonal identity (Mynett 2017: 257). However, while the guitar is typically the instrument most likely to mask others, there are situations where it needs to be more audible in the mix. In such cases, Andy Sneap recommends enhancing the 1 kHz range to improve clarity, warning against excessive mid-scooping: 'Don't be fooled by trying to suck the mids out and thinking that the scooped sound's gonna give you the [best] sound. It's fun to play with, but you need that controlled tone in your hands' (Williams 2015). If the mid-range does not provide sufficient note definition, it becomes difficult to discern the playing gestures. Similarly, Colin Richardson emphasizes the 1 to 2 kHz range, which he views as essential for achieving an 'in-your-face effect', reinforcing the aggressive, assertive qualities a mid boost can bring to the guitar tone (Taylor 2011). This convergence of perspectives suggests that, while balancing the mid-range may be challenging, it is a central component for achieving clarity, aggression, and presence in metal guitar production.

There is broad agreement that the mid-range is highly relevant in shaping metal guitar tone, but producers hold varying views on how it should be managed in relation to the guitar's tuning. Andy Sneap (2014) stresses the importance of the 1 kHz range for down-tuned guitars, highlighting it as essential for maintaining clarity and punch. Conversely, Joey Sturgis (2015) contends that with lower tunings, such as A or below, the guitar's mid-range

centre shifts downward, suggesting an emphasis between 500 and 250 Hz. This discrepancy reflects the variety of tunings employed in metal, which can span nearly an octave, from standard E tuning down to drop G, as exemplified in Born of Osiris's 'Ascension' (2011). Such a wide range of tunings and respective tessituras requires producers to adapt their equalization strategies to accommodate the distinctive timbres, roles, and mix placements of the guitar. Each tuning necessitates a tailored approach, as the instrument's tonal and spectral qualities change substantially across these ranges, which affects not only the guitar's contribution to the mix but also how it interacts with other instruments.

5.4.3 Distortion, Compression, and Dynamic Range Control

Because distortion produces a dense frequency spectrum, one primary task in mixing guitars is to sculpt their tone so they can integrate effectively within the mix. However, as distortion inherently compresses the signal, controlling uneven loudness levels becomes less of an issue. As a result, many producers, including Daniel Bergstrand (2014), Colin Richardson (Martinelli 2008), and Jens Bogren (2014), avoid applying broadband compression to guitars, opting instead for loudness automation. Compression can diminish the guitar's punch and directness because distortion already flattens transients, and further compression could overly reduce them. Some productions counter this effect by bypassing master buss compression for guitars to prioritize punch over cohesion, as exemplified by Metallica's *Black Album* (1991). Producer Bob Rock recalls:

When we started to mix I used the bus compressor on the SSL. That's how I got it aggressive. So, I had the first mix in shape and James [Hetfield] came in. He said, 'I don't want any compression on my guitars.' I said, 'Well, this is what I do.' He just said, 'Nope.' I had to solve the problem. I wasn't sure what I was going to do. Luckily, I was at Hansen's and they had a 6K console, which has three busses, A, B, and C. They go to the main bus. SSL had just released the compressor in a rack unit. So, I figured out I'd use that on the A bus, James' guitars on the B bus, and everything else on the C bus. That was how I ended up working the record. Otherwise, if I couldn't solve the problem, I wasn't going to be doing the record. It was a complete workaround. That's why the guitars are crushing without compression. That's just the guitars. They're in-your-face crushing. The drum compression doesn't affect James' guitars.

(*Rock in Dick* 2017)

Opinions differ, however, with some producers favouring broadband compression on guitars for tonal shaping. For instance, Andy Sneap contrasts

Hetfield's stance, noting that a subtle amount of compression gives guitars a 'bit more in-your-face sound' (2014). Jacob Hansen (2019b) prefers parallel compression to achieve added aggression without sacrificing the transients of the original guitar tracks, while Tue Madsen (2017) applies compression to colour the sound through the compressor's circuitry. Additionally, Matt Hyde points out that compressing the guitar group smooths out occasional level spikes, an effect that acts as a 'safety net' to achieve a 'finalized mix sound' (2014).

The placement of guitars in a mix can either amplify or mitigate the effects of distortion. While distortion typically compresses the signal, it may still require dynamic range control. Specifically, distortion on palm-muted, thicker strings and lower pitches generates loudness spikes, as palm-muting shifts the guitar's sound from a sustained character to a staccato phrasing. This shift accentuates the low-frequency spectrum, increasing speaker excursion and cabinet vibration and producing a brief resonant energy known as 'chug-thump' (Mynett 2017: 244). Consequently, this change in playing technique creates a spectrum-specific dynamic issue, which gives the guitar's low-end a wider dynamic range than the higher frequencies. As palm-muting is not consistently applied to every low note within a riff, this variance introduces fluctuations in the low-end response that a regular high-pass filter or static equalizer cannot adequately address without causing an overly droning or weak low-end. A more adaptable approach involves using dynamic equalization or multiband compression, which can respond dynamically to playing gestures, articulations, and pitch ranges.

Multiband compression has become a go-to solution for managing these irregular low-end spikes. Andy Sneap popularized this approach, activating only one band in the multiband compressor, in the early 2000s by sharing a screenshot (Figure 5.3) of his compression settings, showcasing an effective method for controlling excessive bass on palm-muted notes (see Herbst and Mynett 2021). Other producers, including Fredrik Nordström (2014), had already been implementing this technique since the 1990s, and it gained widespread traction in the 2010s with the rise of accessible, high-quality digital dynamic processors. However, recent research suggests that while multiband compression remains popular, newer generations of producers are increasingly opting for brick-wall limiting across the guitar signal (Herbst and Mynett 2021). This strategy minimizes the dynamic range even further (King 2017; Levi 2016; Sturgis 2016; Wanasek 2015). Joel Wanasek (2015) notes that limiters, unlike compressors, manage level without adding tonal colouration, making them suitable for achieving a modern, digitally compressed sound with a minimal dynamic range and without the warmth or colour imparted by analogue-modelled compressors.

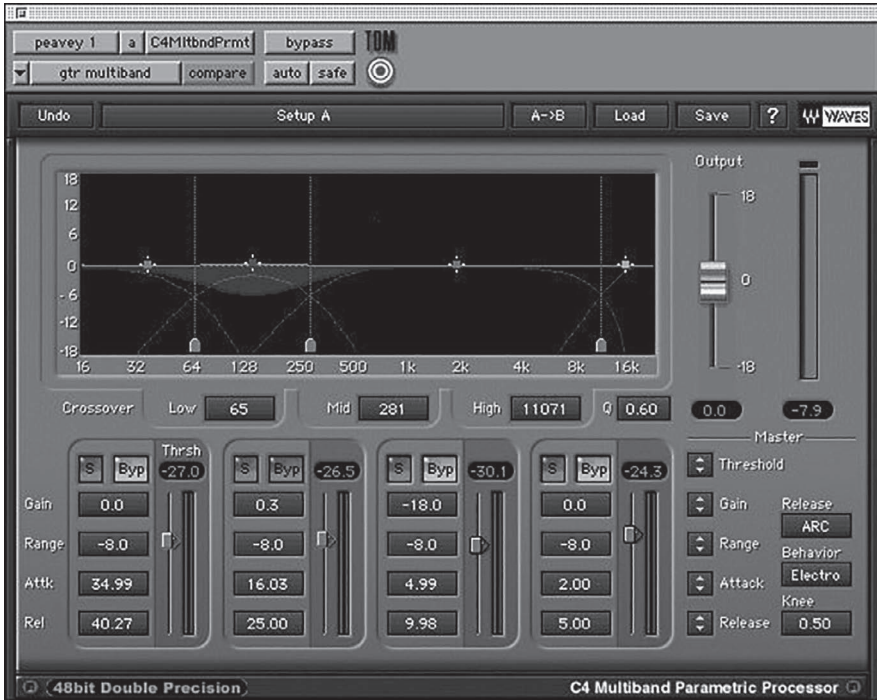


FIGURE 5.3 The original screenshot from Andy Sneap's multiband compression settings, taken from Roach (2016).

An alternative method for dynamically processing guitars is side-chaining, although it is a less common practice compared to the bass. In Behemoth's 'Wolves ov Siberia' (2018), the rhythm guitars are side-chained to the kick drum, allowing the guitar signal to be briefly ducked during each kick hit (Has 2018). When a broadband compressor is used, the entire guitar signal undergoes attenuation, while a multiband compressor confines the ducking effect to the low-end portion to make the impact subtler. Amaranthe's '365' (2018) employs full-spectrum side-chaining of the guitar signal, which not only creates space for the kick but also introduces an EDM-inspired pumping effect that enhances excitement, according to producer Jacob Hansen (2019a). A more targeted example of side-chained multiband compression can be found in At the Gates' 'The Chasm' (2018), where the guitars are keyed to the snare drum, ducking at 200 Hz to allow room for the snare's body and at 3 to 5 kHz to accentuate its 'crack'. However, as producer Russ Russell (2019a) cautions, this approach can detract from the guitar's sonic weight and 'bite' and presents a trade-off between mix clarity and the integrity of the guitar tone.

5.5 Vocals

Vocals hold a central role in (extreme) metal, much like their importance in other popular music genres. However, the processing of extreme vocals differs from traditional singing norms. In extreme metal, lyrics are often intentionally indecipherable, allowing the vocals to be mixed at a lower level to highlight the power and heaviness of the instrumental elements (Mynett 2017: 302). Jacob Hansen notes that this approach, wherein the instruments are louder than the vocals, heightens the perceived heaviness of both, reinforcing the overall heaviness of the production:

I wanna see a band playing, really loud, and the vocalist is fighting to shout over and peak over the craziness of the band. You don't want the vocal to sit right on the top and be overly too loud; that's gonna take away the heaviness. You have to feel the loudness of the band. And the mids and the crazy compression on the vocals helps with that.

(Hansen 2019b)

Hansen points out that for a metal production focused on heaviness, the vocals should convey a sense of loudness and exertion, achievable through precise equalization and compression techniques.

As with instrumental processing, vocal production aims to integrate vocals into the mix while enhancing their effectiveness and expressiveness. From a technical perspective, metal vocals typically require extensive processing to manage their wide dynamic range and occasional harsh sibilance. To stand out against the dense guitar textures, metal vocals must be dynamically consistent (achieved through compression) and bright (through equalization) to maintain clarity and convey the emotional intensity of the performance. Distortion is frequently applied to vocals as well to enrich their harmonic spectrum and naturally compress the signal, thereby reducing the dynamic range (Mynett 2016: 84).

In metal production, compression techniques often aim to heighten the aggression and intensity of vocal performances, bringing out the character and attitude of the vocalist, typically with a short release time (Nordström 2014; Larson 2018). This short release time accentuates the finer nuances of the performance, which can otherwise be masked in highly dynamic vocal deliveries (Raskulinecz 2014). While dynamic range is typically essential for musical expressiveness (Gomez and Danuser 2007), in heavy metal production, this principle is often sidelined to achieve a condensed, upfront sound. To this end, vocals are heavily compressed during recording and further processed in the mix with additional compressors and limiters to achieve maximum proximity (Putney 2019; Bown 2018; Wanasek 2016). As Andy Sneap describes:

[T]here's absolutely no dynamics by the time it leaves the computer. Absolutely slamming, it's kind of what you want. That modern sort of sound

is always the vocals that sit there. It's what gives it that closeness, really. With everything that's going up, you hear the singer's hair growing.

(Sneap 2014)

Echoing this approach, Jacob Hansen applies extensive compression and limiting to evoke a sense of aggression and closeness, describing it as if the 'singer spits in your face' (2019b). As with other instruments, producers can either fully compress the entire vocal signal to maximize impact or use parallel processing. Gene 'Machine' Freeman (2018) advocates for parallel compression, as it preserves the essential transients that contribute to an aggressive and punchy vocal presence while benefiting from the body and dynamic control provided by the compression chain. This dual approach allows for both power and clarity, which ensures that vocals remain impactful without losing definition.

Equalization techniques are closely integrated with compression in extreme metal vocal production. Jens Bogren (2014) notes that compression can reduce the need for heavy equalization by enhancing harmonic overtones, often providing a more natural presence than a simple frequency boost. However, compression can also accentuate unwanted elements, such as sibilance, which may require static cuts via equalization or dynamic attenuation with a de-esser (Mynett 2017: 249). Given the diversity of vocal timbres, styles, microphones, and signal chains, each production benefits from a tailored equalization approach. To achieve perceptual heaviness, equalization adjustments across the frequency spectrum can play a pivotal role. For instance boosting low frequencies can enhance the resonance of growled vocals, conveying the resonance associated with the chest cavity (Mynett 2017: 302), while the middle and upper frequencies can amplify the intensity of screamed vocals. Tue Madsen (2017) suggests that adding harshness in the higher frequencies allows vocals to cut through like distorted guitars and enhance their impact. Jacob Hansen (2019b) often emphasizes mid-range frequencies, reducing highs and lows to intensify the vocalist's 'angry' character.

Producers may also apply saturation or distortion to vocals, as Max Morton (2020) finds that using a colouration processor, like a Neve equalizer, strengthens the effect of a mid-range boost. Other producers embrace saturation, distortion, or clipping to add grit, aggression, and thickness (Wanasek 2016; Madsen 2019; Freeman 2018), while simultaneously bringing the vocals forward in the mix and integrating them with the instrumentation (Bown 2018; Russell 2019a; Larson 2018; Nordström 2019a). To add spatial dimension, producers sometimes apply time-based effects like reverb and delay (Russell 2019b). Though these effects are less important for heaviness, they can enhance the perceived size in specific sections, such as the outro in Lorna Shore's 'To the Hellfire' (2021b), and add a final layer of power or size to the vocal sound.

5.6 Automation

The previous considerations have pointed out the complexities of mixing metal music, where producers must adapt to shifting performative features, rhythmic subdivisions, and variations in sonic space. In such cases, dynamic tools like broadband and multiband compressors help manage the dynamic range by adjusting to the signal's level and frequency range. Similarly, side-chaining allows one instrument or vocal to be dynamically influenced by another, creating space or emphasizing impact. However, despite the utility of these dynamic solutions, manual automation of levels and processing parameters remains essential for optimizing both the technical quality and the desired heaviness of a production. This manual adjustment also has creative applications; for instance producers can slightly raise the master fader volume at the beginning of a section to emulate the surge of energy typical of a live band. While this loudness spike is balanced out in mastering, Russ Russell (2019a) contends that the momentary increase in input signal within the compressor intensifies the listener's experience.

Drums, in particular, benefit from manual automation in many metal mixes. Techniques like Russell's approach of amplifying the first hit of new sections on the master buss add excitement while selectively boosting the kick and cymbals on specific notes can enhance the punch of a tightly controlled dynamic range (Putney 2019). Instead of increasing the entire kick track, automating only the level of the kick track or sample with the most sonic weight can amplify power (Mynett 2017: 332). Similarly, toms can be accentuated or repositioned through automation to add impact in specific sections. For a more dramatic effect, Jens Bogren (2018) automates the tom's panorama, placing floor toms on opposite sides of the stereo field for emphasis, even though they are located on the same side in the acoustic setup. Cinematic samples, such as bass drops, explosions, lifters, booms, reverb kicks, shattered glass, guns, and other high-frequency hits, serve a similar purpose by augmenting the recorded drum performance (see Wanasek 2017). Their potential to enhance heaviness through greater sonic weight or energetic impact, which cannot be achieved with the recorded instruments alone, has led to the increasing popularity of cinematic samples. Notable examples include Amaranthe's '365' (2018) and Lorna Shore's 'To the Hellfire' (2021b), produced by Jacob Hansen (2019b) and Josh Schroeder (2022), respectively.

Besides using automation for creative purposes, technical automation is often more necessary in metal than rock music. When songs have sections with and without a double kick, the kick drum's sonic weight benefits from being attenuated to prevent it from overpowering the mix. Possible solutions include lowering the level or applying a higher high-pass filter or (multiband) compression to reduce low-end frequencies more selectively. Logan Mader

(2016), for example, recommends reducing the kick drum's loudness by at least six decibels in fast sections to maintain clarity and control. Mader also frequently uses different sets of kick samples with tailored low-end characteristics for fast and slow sections, thereby optimizing the frequency space available in each context. Other producers such as Jens Bogren (2018) and Josh Schroeder (2022) favour compression and filter automation but often exclude particular hits, like the first hit in a section or musical phrase, to preserve or emphasize expressive accents. This technique, exemplified in Lorna Shore's 'To the Hellfire' (2021b), produced by Schroeder (2022), creates a dynamic and accentuated feel that aligns with the performance's intensity. Moreover, to avoid a 'typewriter' or 'machine gun' effect in fast double-kick passages, Russ Russell (2019a) notes that the level balance between acoustic tracks and samples may also need to be automated. Similar automation is often necessary for the snare drum, especially at fast subdivision speeds, such as during blast beats. In such cases, the snare's level is typically reduced and paired with increased compression to maintain consistency without overpowering the mix (Kohlmannslöhner 2019; Hansen 2019b).

Achieving different aesthetics for various song sections in metal often involves sophisticated automation techniques to heighten climactic moments such as the chorus (see also Mynett 2017: 332). Subtle level boosts to drum shells and cymbals can increase the ratio of percussive to sustained elements and inject energy into key sections. Additionally, the drum buss might be made brighter through equalization or parallel distortion to accentuate transients and enhance performance intensity (Freeman 2018). Increasing the drum room's loudness can add 'smack' (Sneap 2014), while employing parallel compression or distortion can thicken the drum sound for a more powerful effect. The bass also plays a role in these dynamics, often receiving additional distortion or sonic weight through equalization or subsonic generators to create a fuller, denser texture. For the guitars, producers might make the main rhythm tracks louder, brighter, or wider, and additional guitar layers can be faded in for extra perceived size and proximity (Browne 2017; Putney 2019; Russell 2019a). Another effective approach is to introduce guitars with distinct tones for better clarity or sustain, a technique championed by Tue Madsen, who finds that layering guitars with varied tones 'enhances certain points of extra heaviness' (2019). Some producers take a more extreme approach by applying distinctly contrasting sounds to different sections for creative effect rather than technical necessity. For instance Fleshgod Apocalypse's 'The Violation' (2011) features three different snares tailored to specific sections: two for blast beats and one for the backbeat (Morabito 2019). Another example is Asking Alexandria's 'Into the Fire' (2017), where each section has a distinctly different balance between acoustic drums and samples. Additionally, three different room sounds are used to create varying feels: a large drum sound in the intro, tighter drums in the verse, and a moderately

large room sound in the chorus (Larson 2018). Similarly, Will Putney (2019) uses changing room sounds based on section characteristics, as demonstrated in Knocked Loose's 'Mistakes Like Fractures' (2019).

5.7 Mixing 'In Solitude'

As mentioned earlier in this chapter, avoiding masking is one of the foremost challenges in metal production, where dense arrangements often lead to frequency clashes that can undermine clarity and definition. In the case of 'In Solitude',¹ considerable spectral adjustments were essential to prevent excessive overlap, especially due to the high density of down-tuned guitar tones and the fast performance speed in certain sections. Although the guitars primarily occupy the mid-range, important for tonal identity, this mix accentuates the upper mids more than the lower mids. Attenuating the 250 to 500 Hz range revealed the upper mids and created space for low and high-frequency presence. This adjustment carved out room for the snare's weight region and the bass's lower qualities. Additionally, a high-pass filter on the guitars helped tighten the low-end and minimized interference with the kick and bass frequencies. To address the fluctuating low-end of the guitars, multi-band compression was applied to control excess bass in palm-muted notes and chords. For a smoother guitar tone, the high-end was attenuated with a relatively tight bandwidth within the 3.3 kHz region to soften any abrasive qualities and create space for the bass's upper note definition, along with room for cymbals and vocals. The Oeksound Soothe plug-in, a dynamic resonance suppressor, was used to further reduce harsh, abrasive qualities in the rhythm guitars. As the distortion levels provided adequate signal stability, additional compression or limiting on the guitars was deemed unnecessary.

To allow the guitars to dominate the upper-mid frequencies, the bass was heavily attenuated at 650 Hz, echoing a technique famously applied on Metallica's *Black Album* (1991). Distortion was added to the bass's upper mids (800 Hz to 4 kHz) using frequency bracketing, while both individual bass tracks and the bass sum were compressed hard to ensure consistency and alignment within the mix.

For the kick and snare to effectively contribute to the production's heaviness, they needed to be enhanced in a way that allowed them to penetrate the dense wall of sound created by the guitars and bass. Additionally, due to variations in the drum performance, transitioning from straight groove and backbeat parts to fast double kick and blast beats, significant attention was required to ensure dynamic consistency and clarity throughout the mix. A complete replacement of the kick drum and six different tracks of sample reinforcement for the snare addressed these needs, while no samples were used for the toms. While many mix engineers opt for room mics or parallel compression, this mix utilized both, albeit at relatively restricted levels

and without the cymbals or room mics feeding into the parallel compression chain. Three distinct reverbs were applied to the drums to shape depth and dimension: a short ambience (using the Buckram setting within the Relab LX480 plug-in), a plate reverb, and a longer hall reverb. Each reverb feed was high-pass-filtered at 200 Hz before entering the reverb plug-ins. To create a wash of depth and dimension that served as an ambient bed for the mix, greater emphasis was placed on the hall reverb, with this auxiliary return boosted during the song's slower mid-section breakdown.

Despite the vocals being provided with printed compression to maintain a consistent level against the dynamically stable guitars, further compression was necessary to smooth out abrasive areas. This was achieved by applying several surgical cuts alongside the Soothe plug-in and using a relatively subtle de-essing technique. From a spatial processing perspective, greater emphasis was placed on delay rather than reverb to retain vocal intelligibility and clarity; however, stereo widening was employed for the lead vocal to enhance its three-dimensional presence and impact in the mix.

Note

- 1 A mix walkthrough of the research team mix is available in video form at <https://youtu.be/MzklatgG7oQ>

Bibliography

- Bateman, Wayne (1980). *Introduction to Computer Music*. New York, NY: Wiley.
- Berger, Harris M. (1999). *Metal, Rock, and Jazz: Perception and the Phenomenology of Musical Experience*. Hanover, NH: University Press of New England.
- Berger, Harris M. and Fales, Cornelia (2005). 'Heaviness in the Perception of Heavy Metal Guitar Timbres: The Match of Perceptual and Acoustic Features over Time', in *Wired for Sound: Engineering and Technologies in Sonic Cultures*, edited by Paul D. Greene and Thomas Porcello (pp. 181–197). Middletown, CT: Wesleyan University Press.
- Brown, Jake (2009). *Rick Rubin: In the Studio*. Montreal: ECW Press.
- Brown, Jake (2010). *Motörhead in the Studio*. London: John Blake Publishing.
- Czedik-Eysenberg, Isabella; Knauf, Denis and Reuter, Christoph (2017). "‘Hardness’ as a Semantic Audio Descriptor for Music Using Automatic Feature Extraction", in *Informatik 2017*, edited by Maximilian Eibl and Martin Gaedke (pp. 101–110). Bonn: Gesellschaft für Informatik.
- Danielsen, Anne (2006). *Presence and Pleasure: The Funk Grooves of James Brown and Parliament*. Middletown, CT: Wesleyan University Press.
- Dick, Chris (2017). 'Bob Rock on Metallica: "I Didn't Cater to What They Were: I Catered to What They Wanted to Do"'. *Decibel Magazine*. www.decibelmagazine.com/2017/09/18/outlaw-torn-qa-bob-rock. Accessed 8 October 2024.
- Fletcher, Harvey and Munson, Wilden A. (1933). 'Loudness, Its Definition, Measurement and Calculation'. *Journal of the Acoustical Society of America*, 5: 82–108.
- Gomez, Patrick and Danuser, Brigitta (2007). 'Relationships between Musical Structure and Psychophysiological Measures of Emotion'. *Emotion*, 7(2): 377–387.

- Herbst, Jan-Peter (2017a). 'Historical Development, Sound Aesthetics and Production Techniques of the Distorted Electric Guitar in Metal Music'. *Metal Music Studies*, 3(1): 24–46.
- Herbst, Jan-Peter (2017b). 'Influence of Distortion on Guitar Chord Structures: Acoustic Effects and Perceptual Correlates', in *Akustik Und Musikalische Hörwahrnehmung*, edited by Wolfgang Auhagen, Claudia Bullerjahn, and Christoph Louven (pp. 26–47). Göttingen: Hogrefe.
- Herbst, Jan-Peter and Mynett, Mark (2021). 'Nail the Mix: Standardization in Mixing Metal Music'. *Popular Music and Society*, 44(5): 628–649.
- Herbst, Jan-Peter and Mynett, Mark (2023a). "I Just Go with What Feels Right": Variance and Commonality in Metal Music Mixing Practice'. *El Oído Pensante*, 11(1): 4–31.
- Herbst, Jan-Peter and Mynett, Mark (2023b). 'Mapping the Origins of Heaviness between 1970 and 1995: A Historical Overview of Metal Music Production', in *The Cambridge Companion to Metal Music*, edited by Jan-Peter Herbst (pp. 29–42). Cambridge: Cambridge University Press.
- Holland, John H. (2010). *Emergence: From Chaos to Order*. Oxford: Oxford University Press.
- Izhaki, Roey (2013). *Mixing Audio: Concepts, Practices and Tools*. Oxford: Focal Press.
- Johnson, Kevin (2012). 'Getting Heavier: An Interview with Periphery's Adam "Nolly" Getgood'. *No Treble*. www.notreble.com/buzz/2012/12/20/getting-heavier-an-interview-with-peripherys-adam-nolly-getgood. Accessed 8 October 2024.
- Kerr, Dave (2009). 'Metallica's Justice Days Revisited'. *The Skinny*. www.theskinny.co.uk/music/interviews/metallicas-justice-days-revisited. Accessed 8 October 2024.
- Laing, Rob (2016). 'Interview: Metallica's James Hetfield and Kirk Hammett on Their Tonal Evolution, the Art of the Riff and Justice for Lars'. *Music Radar*. www.musicradar.com/news/guitars/metallicas-james-hetfield-and-kirk-hammett-on-their-tonal-evolution-the-art-of-the-riff-and-justice-for-lars-646024. Accessed 8 October 2024.
- Lux, Marian and Herbst, Jan-Peter (2025). 'From Analogue to Algorithm: How Private Production Reshaped Metal Aesthetics'. *Metal Music Studies*, 10(3): 249–274.
- Martinelli, Riccardo (2008). 'Interview: Colin Richardson'. *Maelstrom*, 61. www.maelstromzine.com/ezine/interview_iss61_254.php. Accessed 24 September 2020 [no longer accessible].
- Massy, Sylvia (2016). *Recording Unhinged: Creative & Unconventional Music Recording Techniques*. Milwaukee, WI: Hal Leonard.
- McIver, Joel (2009). *Justice for All: The Truth about Metallica*. London: Omnibus.
- Moylan, William (2007). *The Art of Recording: Understanding and Crafting the Mix*. Amsterdam: Elsevier.
- Mynett, Mark (2016). 'The Distortion Paradox: Analyzing Contemporary Metal Production', in *Global Metal Music and Culture*, edited by Andy R. Brown, Karl Spracklen, Keith Kahn-Harris, and Niall Scott (pp. 68–88). London: Routledge.
- Mynett, Mark (2017). *Metal Music Manual: Producing, Engineering, Mixing, and Mastering Contemporary Heavy Music*. Abingdon: Routledge.
- Mynett, Mark (2019a). 'Defining Contemporary Metal Music: Performance, Sounds and Practices'. *Metal Music Studies*, 5(3): 297–313.
- Mynett, Mark (2019b). 'Heaviness in Three Dimensions: The Use of Sonic Space in Contemporary Metal Music Production', in *Art of Record Production: Creative Practice in the Studio*, edited by Simon Zagorski-Thomas, Katia Isakoff, Sophie Stévançe, and Serge Lacasse (pp. 66–79). Abingdon: Routledge.
- Mynett, Mark (2020). 'Maximum Sonic Impact: (Authenticity/Commerciality) Fidelity-Dualism in Contemporary Metal Music Production', in *The Bloomsbury Handbook*

- of *Music Production*, edited by Simon Zagorski-Thomas and Andrew Bourbon (pp. 293–302). London: Bloomsbury.
- Roach, Jacob (2016). ‘Making the Most of Multiband Compression: A Primer on the Safe Use of a Secret Weapon’. *Sonic Scoop*. <https://sonicscoop.com/making-multiband-compression-primer-safe-use-secret-weapon>. Accessed 8 October 2024.
- Savage, Steve (2014). *Mixing and Mastering in the Box: The Guide to Making Great Mixes and Final Masters on Your Computer*. Oxford: Oxford University Press.
- Schneider, Albrecht (2001). ‘Sound, Pitch, and Scale: From “Tone Measurements” to Sonological Analysis in Ethnomusicology’. *Ethnomusicology*, 45(3): 489–519.
- Sturgis, Joey (n.d.). ‘Compounding Low End Is Killing Your Ability to Mix’. *Joey Sturgis Tones*. <https://joeysturgistones.com/blogs/learn/compounding-low-end-is-killing-your-ability-to-mix>. Accessed 8 October 2024.
- Taylor, Mick (2011). ‘Interview: Metal Production Guru Colin Richardson’. *Music Radar*. www.musicradar.com/news/guitars/interview-metal-production-guru-colin-richardson-400260. Accessed 8 October 2024.
- Thomas, Niall (2015). ‘The Development of Technology and Its Influence on Recorded Heavy Metal Music 1969–2015’. PhD thesis, University of Hull.
- Thomas, Niall and King, Andrew (2019). ‘Production Perspectives of Heavy Metal Record Producers’. *Popular Music*, 38(3): 498–517.
- Tingen, Paul (2012). ‘Inside Track: Recording Evanescence’s What You Want’. *Sound on Sound*. www.soundonsound.com/techniques/inside-track-recording-evanescences-what-you-want. Accessed 8 October 2024.
- Tingen, Paul (2014). ‘Inside Track: Linkin Park’s the Hunting Party’. *Sound on Sound*. www.soundonsound.com/techniques/inside-track-linkin-parks-hunting-party. Accessed 8 October 2024.
- Tingen, Paul (2015). ‘Inside Track: Bring Me the Horizon’. *Sound on Sound*. www.soundonsound.com/techniques/inside-track-bring-me-horizon. Accessed 8 October 2024.
- Vento, Ron (2009). ‘Death & Black Metal: Recording Death and Black Metal’. *Tape Op: The Creative Recording Magazine*, 71: 24–26.
- Williams, Stuart (2015). ‘How to Record Huge Guitars: 27 Secrets Revealed’. *Music Radar*. www.musicradar.com/tuition/guitars/how-to-record-huge-guitars-27-secrets-revealed-618727. Accessed 8 October 2024.
- Yang, Yan (2024). ‘Metal Music Production: Clarity and Cohesion’. PhD thesis, University of Huddersfield.
- Zagorski-Thomas, Simon (2010). ‘Real and Unreal Performances: The Interaction of Recording Technology and Rock Drum Kit Performance’, in *Musical Rhythm in the Age of Digital Reproduction*, edited by Anne Danielsen (pp. 195–212). Farnham: Ashgate.
- Zagorski-Thomas, Simon (2014). *The Musicology of Record Production*. Cambridge: Cambridge University Press.
- Zagorski-Thomas, Simon (2016). ‘Sonic Cartoons’, in *Sound as Popular Culture: A Research Companion*, edited by Jens Gerrit Papenburg and Holger Schulze (pp. 403–410). Cambridge, MA: The MIT Press.
- Zwicker, Eberhard and Fastl, Hugo (2007). *Psychoacoustics: Facts and Models*. Berlin: Springer.

Discography

- Amaranthe (2018). ‘365’, on *Helix*. Spinefarm Records.
- As I Lay Dying (2012). ‘Cauterize’, on *Awakened*. Metal Blade Records.
- Asking Alexandria (2017). ‘Into the Fire’, on *Asking Alexandria*. Sumerian Records.
- At the Gates (2018). ‘The Chasm’, on *To Drink from the Night Itself*. Century Media.

- Behemoth (2009). 'Ov Fire and the Void', on *Evangelion*. Nuclear Blast.
- Behemoth (2018). 'Wolves ov Siberia', on *I Loved You at Your Darkest*. Nuclear Blast.
- Black Sabbath (1971). 'Into the Void', on *Master of Reality*. Vertigo.
- Blessthefall (2018). 'Cutthroat', on *Hard Feelings*. Rise.
- Born of Osiris (2011). 'Ascension', on *The Discovery*. Sumerian Records.
- Cannibal Corpse (1990). *Eaten Back to Life*. Metal Blade Records.
- Children of Bodom (2003). *Hate Crew Deathroll*. Century Media.
- Dyscarnate (2017). 'Iron Strengthens Iron', on *With All Their Might*. Unique Leader Records.
- Emmure (2017). 'Flag of the Beast', on *Look at Yourself*. SharpTone.
- Evanesence (2011). 'What You Want', on *Evanesence*. Wind-up.
- Fleshgod Apocalypse (2011). 'The Violation', on *Agony*. Nuclear Blast.
- Gemini Syndrome (2016). 'Anonymous', on *Memento Mori*. Another Century.
- Gojira (2008). *The Way of All Flesh*. Prosthetic Records.
- Gojira (2021). *Fortitude*. Roadrunner Records.
- Humanity's Last Breath (2019). 'Abyssal Mouth', on *Abyssal*. Unique Leader Records.
- In This Moment (2012). 'Adrenalize', on *Blood*. Century Media.
- Jinjer (2019). 'On the Top', on *Macro*. Napalm Records.
- Knocked Loose (2019). 'Mistakes Like Fractures', on *Mistakes Like Fractures*. Pure Noise Records.
- Linkin Park (2014). *The Hunting Party*. Warner Bros. Records.
- Loathe (2020). 'New Faces in the Dark', on *I Let It in and It Took Everything*. SharpTone.
- Lorna Shore (2021a). . . . *And I Return to Nothingness*. Century Media.
- Lorna Shore (2021b). 'To the Hellfire', on . . . *And I Return to Nothingness*. Century Media.
- Machine Head (2016). *Is There Anybody Out There?*. Nuclear Blast.
- Metallica (1988). . . . *And Justice for All*. Elektra.
- Metallica (1991). *Metallica (Black Album)*. Elektra.
- Motörhead (1993). *Bastards*. ZYX Music.
- Motörhead (1995). *Sacrifice*. Steamhammer.
- Periphery (2016). 'Prayer Position', on *Periphery III: Select Difficulty*. Sumerian Records.
- Soilwork (2005). *Stabbing the Drama*. Nuclear Blast.
- Suicide Silence (2007). 'Unanswered', on *The Cleansing*. Century Media.

Videography

- Bogren, Jens (2018). 'Opeth—Heir Apparent'. *Nail the Mix* 6/2018.
- Bogren, Jens (2019). 'Between the Buried and Me—Millions'. *Nail the Mix* 10/2019.
- Bown, Carl (2018). 'Bullet for My Valentine—over It'. *Nail the Mix* 5/2018.
- Browne, John (2017). 'Monuments—I, the Creator'. *Nail the Mix* 8/2017.
- Churko, Kane (2018). 'Gemini Syndrome—Anonymus'. *Nail the Mix* 7/2018.
- Freeman, Gene (2018). 'Lamb of God—Redneck'. *Nail the Mix* 8/2018.
- Getgood, Adam (2016). 'Periphery—Prayer Position'. *Nail the Mix* 9/2016.
- Hansen, Jacob (2019a). 'Amaranthe—365'. *Nail the Mix* 3/2019.
- Hansen, Jacob (2019b). 'Dyscarnate—Iron Strengthens Iron'. *Nail the Mix* 3/2019.
- Has, Sebastian (2018). 'Behemoth ILYAYD Recording & Production Studio Sessions'. *YouTUBE*. <https://youtu.be/B1s9zgml0g4>. Accessed 8 October 2024.
- King, Jamie (2017). 'The Contortionist—Return to Earth'. *Nail the Mix* 10/2017.
- Kohlmannslehner, Kristian (2019). 'Aborted—Vespertine'. *Nail the Mix* 1/2019.
- Lancaster, Dan (2018). 'Bring Me the Horizon—Doomed'. *Nail the Mix* 3/2018.

- Larson, Taylor (2017). 'Jason Richardson—Fragments'. *Nail the Mix* 1/2017.
- Larson, Taylor (2018). 'Asking Alexandria—into the Fire'. *Nail the Mix* 1/2018.
- Lever, George (2020). 'Loathe—New Faces in the Dark'. *Nail the Mix* 8/2020.
- Levi, Eyal (2016). 'Chelsea Grin—S.H.O.T.'. *Nail the Mix* 6/2016.
- Mader, Logan (2016). 'Gjira—Toxic Garbage Island'. *Nail the Mix* 12/2016.
- Madsen, Tue (2017). 'Meshuggah—MonstroCity'. *Nail the Mix* 3/2017.
- Madsen, Tue (2019). 'Suicide Silence—Unanswered'. *Nail the Mix* 11/2019.
- Morabito, Stefano (2019). 'Fleshgod Apocalypse—the Violation'. *Nail the Mix* 9/2019.
- Morton, Max (2020). 'Jinjer—on the Top'. *Nail the Mix* 7/2020.
- Nordström, Fredrik (2019a). 'Bring Me the Horizon—Chelsea Smile'. *Nail the Mix* 7/2019.
- Nordström, Fredrik (2019b). 'Hammerfall—We Make Sweden Rock'. *Nail the Mix* 7/2019.
- Odeholm, Buster (2020). 'Humanity's Last Breath—Abyssal Mouth'. *Nail the Mix* 2/2020.
- Putney, Will (2019). 'Knocked Loose—Mistakes Like Fractures'. *Nail the Mix* 12/2019.
- Russell, Russ (2019a). 'At the Gates—the Chasm'. *Nail the Mix* 5/2019.
- Russell, Russ (2019b). 'The Haunted—Preachers of Death'. *Nail the Mix* 5/2019.
- Schroeder, Josh (2022). 'Lorna Shore—to the Hellfire'. *Nail the Mix* 1/2022.
- Slovak, Carson and McFarland, Grant (2019). 'Rivers of Nihil—Where Owls Know My Name'. *Nail the Mix* 6/2019.
- Smyth, Tyler (2018). 'Blessthefall—Cutthroat'. *Nail the Mix* 9/2018.
- Sturgis, Joey (2015). 'Vesta Collide—VII'. *Nail the Mix* 12/2015.
- Sturgis, Joey (2016). 'We Came as Romans—Broken Statues'. *Nail the Mix* 7/2016.
- Wade, Andrew (2018). 'Attila—Three 6'. *Nail the Mix* 4/2018.
- Wanasek, Joel (2015). 'Cognizance—the Succession of Flesh'. *Nail the Mix* 11/2015.
- Wanasek, Joel (2016). 'Machine Head—Is There Anybody Out There'. *Nail the Mix* 8/2016.
- Wanasek, Joel (2017). 'Low End Mastery Fast Track'. *Unstoppable Recording Machine*.
- WZRD BLD and Dunne, Jeff (2017). 'Emmure—Flag of the Beast'. *Nail the Mix* 7/2017.

Unpublished Interview Data

- Bauerfeind, Karl (2017). Interview by Jan-Peter Herbst. Hamburg. 156:37 minutes.
- Bergstrand, Daniel (2014). Interview by Mark Mynett. Uppsala. 44:22 minutes.
- Bogren, Jens (2014). Interview by Mark Mynett. Örebro. 45:25 minutes.
- Hyde, Matt (2014). Interview by Mark Mynett. Los Angeles. 75:06 minutes.
- Mader, Logan (2014). Interview by Mark Mynett. Los Angeles. 27:57 minutes.
- Nordström, Fredrik (2014). Interview by Mark Mynett. Gothenburg. 28:45 minutes.
- Raskulinecz, Nick (2014). Interview by Mark Mynett. Nashville. 46:35 minutes.
- Robinson, Ross (2014). Interview by Mark Mynett. Los Angeles. 35:46 minutes.
- Sneap, Andy (2014). Interview by Mark Mynett. Ripley. 50:06 minutes.

6

IN THE PRODUCERS' LAIR

Approaches to Producing Heaviness

This chapter stands as the heart of our book, summing up findings from our research project, 'Heaviness in Metal Music Production'. It highlights the contributions of eight leading metal producers, each tasked with mixing the same song, 'In Solitude'. The chapter provides a comprehensive overview of our research design and insights gathered from the producers' conceptualizations of heaviness; their assessments of the roles played by performance, composition, and production; and their mixing strategies.

6.1 Research Design

6.1.1 *Contributing Producers*

For this research project to succeed, it was essential to attract producers with significant professional standing and strong reputations within the metal music communities. While we prioritized individuals with a proven track record of producing popular albums for well-known bands, we also sought out up-and-coming producers to capture a diverse range of perspectives and mixing approaches. We aimed for geographical diversity, targeting both historical and contemporary centres of metal music, such as the United Kingdom, United States, and Scandinavia (see Kahn-Harris 2007; Weinstein 2011; Herbst 2021). Naturally, practical constraints affected participation, including the producers' willingness to openly share their work processes and compare their approaches with peers; scheduling challenges due to the post-COVID-19 production backlog; and logistical and budgetary limitations when travelling with a team of four, comprising two researchers and two videographers.

In this study, eight producers participated: three from the United Kingdom, three from Sweden, and two from the United States. Their birth years ranged from 1967 to 1992, resulting in an average birth year of 1978 ($SD = 9.4$). On average, the producers had over 20 years of experience, with their first production or technical credits received around 2000 ($SD = 9.0$).

The 'old school', spanning three influential metal regions, includes Mike Exeter (1967, the United Kingdom), mixing engineer for Black Sabbath, Tony Iommi, Heaven & Hell, and Judas Priest; Andrew Scheps (1969, the United States), known for his work with Metallica, Black Sabbath, Apocalyptica, and Bon Jovi; and Fredrik Nordström (1967, Sweden), producer of At the Gates, In Flames, Arch Enemy, Dimmu Borgir, and Dark Tranquillity. Two of the next-generation producers are well-known Jens Bogren (1979, Sweden), associated with Opeth, Arch Enemy, Soilwork, Amon Amarth, and Dave Otero (1981, the United States), whose credits include Archspire, Khemmis, and Allegaeon. The more contemporary producers are represented by Adam 'Nolly' Getgood (1987, the UK), recognized for his work with Periphery, Animals as Leaders, Architects, and SikTh; Josh Middleton (1985, the UK), guitarist and producer for Sylosis and Architects; and Buster Odeholm (1992, Sweden), producer for Humanity's Last Breath, Vildhjarta, Born of Osiris, Oceano, and Hactivist. These professionals collectively provide extensive expertise in contemporary metal music production, covering a wide range of subgenres, historical influences, and both established and modern styles.

Regrettably, we were unable to achieve gender diversity in this sample. This limitation arises not only from the aforementioned constraints but also from the broader underrepresentation of women and non-binary producers, especially at the highest international level (see also Herbst and Mynett 2021a). Overall, the sample reflects a Western-centric history and the current state of hegemonically dominant metal music production and offers insights into production practices that have not been previously explored in such detail. However, the extent to which the findings reflect metal production practices, particularly beyond the Western hemisphere, cannot be determined and, therefore, requires further exploration.

6.1.2 *Producers' Brief*

All producers were contacted through our professional network, prior connections, or contact forms. After explaining the project's objectives, establishing formal terms, and obtaining informed ethical consent, we asked each producer to mix 'In Solitude' in their usual approach to commissioned work. What was against typical industry practice was not providing a rough or reference mix to avoid influencing their approach and sonic goals.

Once a pilot study was conducted, we decided not to attend the mixing process in person. The logistical and financial demands of overserving

on-site would have outweighed any additional insights we could have gained about the producers' decision-making processes. Furthermore, a professional mix usually requires multiple sessions to manage the extensive work and mitigate ear fatigue. Allowing producers to work independently achieved two purposes: 1) yielding an authentic representation of their production style and 2) offering a more practical approach for capturing their unique processes than studying platforms like URM's *Nail the Mix* product.

The producers received the fully edited multi-track of 'In Solitude', which included all instrument tracks. To streamline their workload, strings, brass, and backing vocals/harmonies were rendered as stereo stems, though individual tracks were available upon request. For drums, MIDI tracks and audio blips were supplied for triggering samples on the kick, snare, and toms, alongside both non-edited and waveform-edited versions for the toms. Additionally, drum samples created from the recorded kit and DI tracks for all guitar and bass recordings were included. Producers had the freedom to re-amp or re-record guitar tones or process the DIs through a digital amplifier simulation.

6.1.3 Data Collection

The producer sessions were held in either personal or rented studios. Each session included a semi-structured interview assessing the participants' conceptualization of heaviness and a detailed breakdown of their mixing process for 'In Solitude'. The interview schedule was designed to ensure consistency in content and gather information pertinent to our research objectives. All sessions were video-recorded, capturing both the computer screen and audio from the mixing sessions. Only a small number of producers used external hardware processing, and when they did, they 'printed' this processing before finalizing it in their DAW. The interviews spanned 926 minutes (15 hours, 26 minutes), with approximately 70% of the time dedicated to mixing.

The producers submitted a complete audio bounce of their mix alongside the video-recorded interview data. Although not required, all producers included a mastering chain, as is customary in the genre (Herbst and Mynett 2021a: 637). They also provided rendered stems of the primary instruments (drums, bass, guitars) and vocals. The collection of stems allowed us to compare mixes more accurately, which poses a valuable learning resource for musicians, engineers, and producers in this genre. We decided not to gather DAW projects, which are not overly insightful without access to all relevant software or hardware processing. Moreover, some producers hesitated to share their DAW projects, considering such transparency beyond typical professional practice.

6.1.4 *Data Analysis and Interpretation*

All interviews were transcribed and analysed using the knowledge organization software Citavi. We identified meaningful units and summarized them in key phrases before categorizing these statements. Categories were developed inductively around prevalent themes, with open-ended coding refined iteratively according to established principles of qualitative research (Flick 2010). While the interview schedule loosely centred on key themes from prior research, we remained receptive to unexpected findings that could expand or reshape the understanding of metal music production developed in earlier chapters.

In analysing the producer mixes, we undertook a critical listening analysis (Corey 2017) of both the complete mixes and the isolated stems (original loudness and loudness-matched), drawing primarily on our expertise as (metal) music producers and musicologists. While technical approaches for visualizing audio signals supported the analysis, they proved less insightful than anticipated. Such methods are generally well suited for comparing distinct productions (Herbst 2020); however, they were less effective in identifying the subtler differences between versions of the same material. Our attempts to invert the phase to isolate differences between the two mixes yielded unsatisfactory results. Nonetheless, some frequency-based visualizations were beneficial for comparing spectral content, and virtual sound-stage visualizations (Moylan 2007: 55) facilitated the assessment of the mix's width and depth dimensions. Additional digital plug-ins further assisted in visualizing stereo width, phase, and loudness.

6.2 General Views about Heaviness

6.2.1 *Conceptual Understandings of Heaviness*

A primary goal of our research was to gain insight into the producers' perspectives on heaviness to deepen our conceptual understanding of its musical and associative characteristics and to comprehend their mixing decisions. Without exception, all producers found it challenging to define the term and concept precisely, aligning with Jason Miller's argument that heaviness 'resists exhaustive conceptual articulation' (2021: 80). Miller contends that it is 'surprisingly difficult, if not impossible, to articulate the concept of musical heaviness' because heaviness in metal encompasses 'radically different, sometimes incompatible, musical properties' (ibid.). Instead of a 'more-is-more' approach, heaviness appears to be created through an intricate interplay of qualities and their combinations (see also Mynett 2017: 21).

The producers unanimously agreed that heaviness is an essential quality in the metal genre. As Otero observed, 'if you ask a typical metal songwriter

what they're going for, heavy is probably going to be in the first two or three descriptors'. Bogren provided a similarly representative explanation:

I find it really interesting how heavy is always described as something positive. For almost everyone, at least, usually, when you see a band talking about the new album, it's always heavier than the previous one. Most of the time, if you're into heavy metal music, heavier is always better.

However, Bogren noted considerable variation in interpretations of heaviness, remarking that the term is often used as a proxy for a good sound due to its positive connotations. This observation aligns with Denis Crowdy's argument that sound aesthetics frequently act as a 'proxy for other areas of opinion or value' (2013: 152). Other producers echoed Bogren's perspective. Exeter elaborated that the phenomenon is 'unquantifiable' due to its inherent subjectivity, a view that corresponds with Vojtěch Volák's (2022) philosophical analysis of the phenomenological experience of heaviness. Odeholm differed somewhat from the other producers with his specific, well-defined notion of heaviness that he systematically pursues with his band Humanity's Last Breath. For him, maximizing heaviness is the overriding aesthetic goal while nonetheless agreeing that heaviness is ultimately a subjective feeling. As a metal producer, he strives to conjure that 'heavy feeling', recognizing that his work directly reflects his personal taste in shaping the music.

The changing perception of heaviness is a recurring theme throughout our research. Scheps likened it to a 'moving target', noting that AC/DC's 'Back in Black' (1980), once a pinnacle of heavy sound for him, now feels almost like a pop record—a view also observed in the online discussions (Section 2.4). For Scheps, the essence of heaviness lies not only in the music's sonic progression but also in the novelty and surprise of a first listening experience, creating a fleeting yet powerful sensation. This ever-changing nature of heaviness suggests that it may necessitate continuous transgression (Kahn-Harris 2007) or the inventive fusion of familiar sounds and structures in unexpected ways to maintain this element of surprise (see also Herbst and Mynett 2023b). Importantly, Scheps argued that reaching new levels of surprise does not come at the expense of sound quality, suggesting that heaviness is not a fixed sonic attribute but rather a response to fresh and novel listening experiences, a notion echoed by Bogren's reflections. This changing and subjective nature of heaviness resonates with Volák's proposition, which identifies two central factors influencing its perception: 'the physical objectivity of certain sound qualities and the mental, experience-based subjectivity of the individual' (2022: 54). According to Volák, our past listening experiences profoundly shape how we interpret and perceive heaviness. Otero presented a unique viewpoint, suggesting that the meaning

of 'heavy' is expanding rather than undergoing a fundamental transition. He contended that the original Black Sabbath songs and productions are 'just as heavy now as they were back then', while technological advances have paved the way for new forms of heaviness to emerge. For Otero, the roots of heaviness have 'grown into a tree and perhaps even an orchid of heaviness', with contemporary artists exploring diverse directions that continue to evoke 'that feeling of heaviness'.

In line with individual interpretation and the context of its release or experience, the producers noted that heaviness could manifest in diverse forms (see Berger 1999: 58–63; Miller 2021). This observation, in agreement with the netnographic analysis (Section 2.4), further suggests that heaviness lacks a distinct boundary and often overlaps with other semantic terms. Bogren, for instance, wondered whether a 'brutal' sound is inherently linked to heaviness and ultimately questioned this direct association. Other characteristics mentioned include intensity (see Volák 2022: 59), aggression, density, and low-end, which align with the discussions in earlier chapters. Middleton highlighted two contrasting, though not mutually exclusive, forms of heaviness: one emphasizing intensity and aggression, the other focusing on density and sonic weight. He illustrated these contrasts vividly: 'It's like an abrasive chainsaw to the ear as opposed to a freight train rolling over you'. The first form, which he associates with nu metal acts such as Slipknot and Korn, is marked by emotional intensity and aggression, particularly in vocal and instrumental performance, conveying genuine anger and manifesting through 'grime' and imperfections that make the expression feel 'more real and visceral and abrasive'. In contrast, the second form represents the wall-of-sound approach common in death metal, where 'everything's heavy. But sometimes, it's not captured by the intensity of the band like Slipknot, where it just sounds like they are genuinely angry'. While these productions achieve weight, thickness, and density through technological advances and techniques like quantization and layering, for Middleton, they evoke a 'crushing' sensation more than a bodily urge to move, as seen in the first form of heaviness.

Speaking specifically about black metal, Getgood drew a similar distinction, defining two types of heaviness as related to low and high fidelity.

I never got into that music [black metal] and felt emotionally connected to it, which is, I think, where that [black metal's] heaviness comes from because it certainly isn't coming from the sonics. If we're using my definition of heaviness, which involves this broad range, especially the low frequencies, those overwhelming body sensations. When you hear black metal, it's much narrower sounding; it's lo-fi, so it doesn't give me the feeling of heaviness, but it can give me a whole other range of emotions. And I certainly understand that in trying to talk about bleakness and nihilism, harshness is appropriate. It shouldn't sound glossy and nice if you're

trying to talk about the most nihilistic and sadistic elements of the world; it's a bit weird to present it really hi-fi.

Getgood argued that, besides the sonic heaviness he associates with high-fidelity productions, there is also emotional heaviness, a concept previously identified in the netnographic analysis (Section 2.4). Emotional heaviness often originates from the lyrics but can be intensified by a complementary production aesthetic, which may embrace low-fidelity and abrasive qualities. Odeholm concurred, referencing *Everywhere at the End of Time* (2016) by English avant-garde electronic artist The Caretaker (Leyland Kirby), a six-album series poignantly illustrating the progression of Alzheimer's disease through decaying loops of sampled ballroom music. This sonic depiction of dementia through deteriorating audio is

heavy, emotionally. It really affects you. After you listen to it, you really get that sense of losing your contact with the world, basically. And that's so heavy, I don't want to listen to it. I don't want to hear it because I don't feel good when I listen to it.

From Odeholm's experience, not all heaviness evokes a positive feeling. Unlike the often exaggerated and sometimes comedic depictions of violence and gore typically found in death metal-inspired metal genres, which are paired with a sonically heavy aesthetic, serious themes such as dementia, and their sonic portrayal through a 'heavy' aesthetic, can be perceived in a different light. As an intense emotional expression that can become overwhelming, heaviness in metal perhaps requires an element of playfulness or irony to maintain a more positive reception.

Aside from the lo/hi-fi discussion, Exeter raised a related point by drawing parallels with narrative storytelling in film. He suggested that sonic storytelling can similarly be applied in music by guiding the listener through an emotional journey marked by dynamic shifts, contrasts, and development in both songwriting and production (see also Herbst and Mynett 2023b). Variations in intensity and contrasting sensations within a track seem to enhance, if not essentialize, the listener's perception of heaviness (see also Miller 2021: 76–77).

Whether in thin-sounding and abrasive or polished and crushing forms, the producers concur that heaviness can take on multiple manifestations (see Miller 2021; Volák 2022). Middleton described this variation as 'different ways of being killed in a horror film'. However, nearly all the producers interviewed believe that metal is the heaviest when the music is slow, low, and dense. Still, there may be producers and artists from other metal sub-genres, as well as individual listeners, who have varied perspectives on what defines heaviness.

6.2.2 *The Role of Performance and Expression for Heaviness*

We previously posited that production merely enhances what has been recorded, which emphasizes the importance of high-quality performances as the cornerstone of an effective production. Accordingly, all the producers interviewed unanimously agreed that a good mix depends on well-executed recordings. Middleton discussed this interdependence, indicating that many listeners—especially non-musicians—find it challenging to differentiate between performance quality and sound quality. He noted that a high-quality mix can highlight flaws in weaker performances, concurring with Bogren's experience. In referencing classic Scandinavian black and death metal from the 1990s (see Ekeröth 2008; Johannesson and Klingberg 2018), Bogren explained that remixing these records with modern production could reveal the limited technical proficiency present in some performances (see Reyes 2013), potentially reducing the perceived heaviness. Conversely, both producers agreed that strong performances support more natural production styles, which likely elevates the music's quality without compromising its heaviness.

On the topic of perfection, the producers demonstrated varied perspectives. Flawless performances were often seen as uninspired and emotionally flat, a sentiment most vividly conveyed by Exeter, who values performative imperfections and dynamic variability. Exeter argued that a 'constant wall of perfection' is likely to lack emotional impact, especially if essential aspects of heaviness, such as sonic size, are compromised. Overly edited performances would tend to restrict stereo width and require producers to artificially widen it at the expense of a clear stereo image. Middleton agreed, highlighting the risk of over-edited guitars introducing phase issues. Nordström added that slight discrepancies between channels create a sense of size and dimension, emphasizing that 'if everything is super tight, super synced, it's not going to be heavy. You need to have some errors in there. Human feel'. Bogren shared this view, critiquing what he termed 'Pro Tools metal' for its tendency towards excessive editing. Though many bands may have benefitted from this polished aesthetic, Bogren argued that they might have been equally or even more successful with a more natural approach, which he believes could enhance heaviness. However, he did not specify how this might be achieved. Not only Bogren but also many of the producers interviewed by Niall Thomas (2015) believe that the essence of songwriting would outweigh the pursuit of technological perfection.

Nevertheless, the producers, particularly from the newer generation, emphasized that tight ensemble synchronization was essential for conveying heaviness because it contributes to clarity and presence and maintains consistency in the mix (see Mynett 2019a: 300). Ideally, these precise performances should be captured during recording, minimizing reliance on editing

and quantization. As Middleton remarked, ‘You can overdo the guitars; you can over-edit them. I always chase perfection. But to limit; I know when it just sounds fake’. Odeholm, however, took a different stance on synchronization, regarding ultimate synchronization through editing as the bedrock of sonic weight, rhythmic impact, and punch—qualities he prioritizes above all. Such impact would be achieved by sample-accurate phase alignment across all instruments to fully optimize the low-end, which cannot be accomplished with even the tightest but unedited performances. Conversely, Otero emphasized guiding principles to be the band’s aesthetic and ‘what the music is calling for’. While most contemporary bands achieve their heaviness at least partly from hyper-edited precision, he argued that genuine human expression in performance creates a stronger connection with listeners by showcasing emotions and individuals behind the music.

Just as low and high fidelity produce distinct forms of heaviness, there may also be two approaches to achieving rhythmic precision. Getgood noted that when instruments are not perfectly synchronized, this

generates a different kind of element. If you think of a huge army of people, they’re not 100% in sync. This is all very imaginative. But there are plenty of huge sounds we encounter in nature and in life that are not this incredibly kind of single punch, single wall-of-sound kind of aspects. And I guess the performance somehow needs to invoke one of those things, or maybe multiple at the same time; chucking heavy string arrangements on top of a more basic rock band thing, maybe is layering a couple of different feelings of heaviness.

In his reflection, Getgood pinpoints the two opposing poles discussed by the other producers. While tightly synchronized performances enhance punch, conducive to heaviness, slight micro-rhythmic deviations can increase perceived size, adding a different dimension to heaviness.

Beyond ensemble rhythmic synchronization, the expressive gestures on individual instruments were also highlighted, consistent with discussions in earlier chapters. Nordström noted that even low-fidelity productions can convey heaviness if the performative gestures are forceful and powerful (Walther-Hansen 2020: 105–107; Section 2.1). He pointed to Slayer’s *Reign in Blood* (1986) as an example of a production that ‘does not sound good sound-wise’ and lacks tight ensemble synchronization but still conveys an intense, aggressive energy that results in a heavy impression. Bogren supported this view, stating, ‘Heaviness doesn’t necessarily have to be about sound at all. I guess you can emphasize heaviness with the help of sound’, concurring with Nordström’s view on heaviness being a musical expression rather than merely a matter of sound. Scheps reinforced these perspectives, adding that pop punk

band Weezer, despite their genre, can sound heavy due to the qualities of their performance.

6.2.3 *Composition and Arrangement*

In line with previous observations (Chapters 2 and 3) regarding the role of composition, all producers stressed the role of songwriting and arrangement in achieving a sense of heaviness. Bogren, in particular, placed the highest value on composition and arrangement, seeing production as secondary in comparison:

Production has way less to the perception of heaviness than people might give it credit for. My perspective is that you could get a heavy song, a heavily written song, and you could shape it in a hundred different ways. And it could still be as heavy. Going this way could be perceived as more heavy by some people. This tells me how little the production actually means compared to how important the song is, the expression, the performance.

According to Bogren, bands seeking to maximize their heaviness should begin by selecting their heaviest compositions for an album. Enhancing their structural and performative qualities requires a production aesthetic that aligns closely with the specific demands of each song. Bogren believes an album's success and popularity largely depend on compositional quality rather than particular sound characteristics, as expressive songs can be produced effectively in various ways. Once again, Odeholm holds a slightly different perspective. While he acknowledged the importance of songwriting elements such as tuning, speed, and groove, he views songwriting primarily as a vehicle for achieving a production aesthetic, a stance that contrasts with Bogren's perspective. He elaborated:

I definitely tailor my writing to complement the production. That's why all of my songs are like 90 to 100 bpm, so super slow to make everything breathe, so you can hear all the sense of space in the sense of size, and also using like negative space a lot, like silence, to make the impact super hard. That's extremely important, like the silence part, especially in my riffs and production, and kind of tailoring it so that everything gets its place. Maybe there's a riff where the kick kind of comes in by itself, and after the kick hits, the riff and the bass come in. So, like the kind of trade-off and yeah, kind of just trying to make it as effective as possible to the production.

Upon closer examination, it becomes evident that Odeholm does not consider songwriting secondary. Instead, he integrates songwriting and production into a unified process to achieve optimal results. As previously discussed, while production, composition, and performance are theoretically distinct, they must be aligned for maximum impact. Approaching musical work with this integrated perspective, as Odeholm does, proves particularly advantageous in a genre focused on amplifying a specific aesthetic such as heaviness.

In alignment with earlier observations and supporting research (see Herbst and Mynett 2023b; Miller 2021), the producers stressed the role of musical progression and contrast in fostering a perception of heaviness. Exeter noted that metal, unlike other genres, employs extended and intricate song structures, which provides more opportunities to create dynamic and emotional ebbs and flows. He went on to liken progressive metal to epic films, highlighting its ability to engage listeners in an immersive experience:

The 10-hour-plus thing of *Lord of the Rings*, you take that change in emotive storytelling and narrative. By the end of the third movie, you're at this point where it has got so dark and heavy that you just want this thing to end because it's painful. And that's the heaviness and the emotional response to what's been shown to you. You know, you're living this story with the characters. And I think music can do that.

For Exeter, sonic storytelling (see also Harden 2019) is a considerable part of heaviness, as the extended structure of metal songs provides time to set up and foreshadow musical moments. Production techniques can enhance this narrative progression, particularly when integrated with thoughtful arrangement choices. Exeter illustrated this by describing how adding octave pedals to guitars or a sub-bass synthesizer to the bass can facilitate transitions between heavier and lighter sections, thereby heightening the dynamic or sonic impact. Similarly, Middleton emphasized the importance of introducing riffs in a way that maximizes their impact:

The way riffs are introduced really adds to the heaviness. You can't just expect an amazing riff to be perceived as amazing as you might think it is if you haven't introduced it in a way that it's gonna be like. . . . It's like 'Enter Sandman' (Metallica 1991a); just the whole intro to the song is a build-up. And then when the riff finally comes in, especially when you see them live, you've got a big pirate explosion. It's like, 'Oh, there's the riff'. Whereas if the song just started with the riff and it just comes out of nowhere, it's not going to feel the same.

Variations in tempo and rhythmic feel were also identified as important strategies for enhancing heaviness, allowing for dynamic shifts between sonic weight and energy. Exeter explained:

I think any of these descriptions come from a comparison point of view. So, the whole yin and the yang of the universe, etc., is heavy, as defined by what precedes it and what comes after it. For me, one of the greatest emotional changes in a heavy piece of music is 'Children of the Grave' (Black Sabbath 1971), where it goes from the shuffle leading into the middle section, where it just gets so heavy and big. And it goes into the tritone. And that's the juxtaposition. It's like how it goes from light to dark. And whatever brings that emotional resonance to the heaviness, that majesty; just like with classical stuff, you've got emotive heaviness, you've got big heaviness and an orchestra. But you can also have the space. And something just does; after this long period of quiet space, you can just have something that takes you to a different place, and that can be heavy. So, I think it's just how you emotionally react to it.

Other producers also highlighted the emotional response to heaviness, driven primarily by composition and arrangement choices. Getgood explained that, from a production point of view, heaviness can be effectively intensified during dynamic peaks by allowing the music to become overpowering, momentarily loosening control and sacrificing clarity to amplify the 'overwhelming sensation' of the music. However, he stressed that a controlled dynamic build-up is essential to maximize the impact of these 'massive epic bits' through moments of uncontrolled overwhelm. Scheps supported this view, noting that compositional development, especially when it involves elements of surprise, is important for shaping heaviness. According to Scheps, heaviness benefits from surprise; it is impactful by 'mak[ing] things heavier than people would expect'.

When discussing heaviness, several producers referenced specific compositional elements. Consistent with many scholarly perspectives (Pillsbury 2006: 10; Kennedy 2017: 88–89; Smialek 2015: 171), slow tempos were closely associated with heaviness, while faster tempos were more often linked to energy and aggression. Although these qualities can intersect with heaviness (Section 2.4), as Miller (2021: 79) highlights, they are not synonymous. Consequently, Scheps, Exeter, and Bogren pointed to the half-time breakdown in 'In Solitude' as the song's heaviest moment: 'I love the half-time part of this. That's, to me, when the track just drops and gets really heavy because, again, you have the room in the mix' (Scheps). Middleton and Otero drew parallels to breakdowns in EDM, describing them as intense moments that are similarly prominent in metal. For Odeholm, slowness is the prerequisite

for achieving maximum sonic weight, allowing for the fullest expression of heaviness:

Impact and heaviness have a lot to do with the low-end. If you're doing slower music, it'll have more time for you to actually hear those low frequencies, and they can ring. If you play really fast, I feel like you're really losing heaviness. It's not necessarily bad, it's just like this is not heavier; it's just faster. And if you want to be faster, that's fine. But you have to control the low-end to be able to have these really fast parts, of course. But if you're talking about being as heavy as possible, then slower is definitely the way to go.

As noted in previous discussions (Sections 2.3 and 2.4), the producers reinforced the significance of slowness or slowing-down as being essential to heaviness. However, some, like Otero, argued that speed alone does not determine heaviness, and any tempo could achieve this effect. For Otero, heaviness has 'more to do with setting up the moments rather than their individual speed. They're kind of just different forms of that same emotion', whether it is the grinding weight of a doom band or the apex of an aggressive song, where an intense blast beat marks the track's 'heavy moment'.

Scheps was the only producer to explicitly address musical harmony, suggesting that it plays a secondary role when it comes to the perception of heaviness (from an engineer's perspective). He argued that minor chords tend to feel heavier than major chords (Berger 1999: 58; Kahn-Harris 2007: 31; Walser 1993: 46), a view consistent with the Western music tradition that associates major chords with joy and minor chords with sadness, though this may vary in other musical cultures (see Herbst 2019a). Scheps noted that power chords, particularly when spread across octaves, can create an even heavier effect. He explained that power chords would surpass minor chords in heaviness because they leave the chord's emotional quality open to interpretation: 'If you leave out the third entirely, that can be even heavier because you aren't even defining it; you're sort of leaving someone in space to realize: well, it's not happy, it must be super heavy'. Nonetheless, Scheps stressed that these harmonic perceptions remain context-dependent, as simply using power or minor chords does not automatically yield a heavy impression.

Overall, nearly all producers but Odeholm and, to a degree, Otero observed a notable discrepancy in prioritizing production over composition in contemporary metal music. Many bands and producers utilize advancing technological affordances to push the limits of performance virtuosity and adopt extreme production aesthetics (see Wallmark 2018). Lorna Shore's 'To the Hellfire' (2021), analysed in detail elsewhere (Herbst and Mynett 2023b), is an apt example. Exeter reminisced about an earlier era when

bands would perform works-in-progress live to gauge audience reactions. However, according to Exeter and Bogren, a modern production requires arranging with mixing in mind, allowing for issues to be addressed at source and enhancing musical expression. Often, this approach means simplifying layers or eliminating extraneous tracks that bands would otherwise add, given the ease of layering in digital production. For Exeter, perhaps the most traditionalist among the group, the goal is to be able to 'broom-handle' the mix, achieving most of the sonic balance during arrangement and recording, with minimal mixing needed (see Chapters 3–5). In this approach, all faders are set to zero. However, as Bogren explained, contemporary metal genres rarely allow for such a static mix:

For most metal, and how it also mostly differs from rock because rock also has distorted guitars, but usually, they won't have as fast and intense drumming. Usually, they have a drum piece and a playing that sounds good on its own. Whilst metal usually would have fast passages where the snare doesn't sound good. And the kick drums are so fast, you either take the whole low-end if you want a full, rich kick, or you make them really thin, so there's some more space for the guitars. And maybe there's this important palm muting riff going at the same time that is more important than the kick drums, and then you would have to constantly compromise and find ways and also automate through the mix. Like in this section, I need the kicks to be thinner because I really need that bass line to come through. On this section, it's slow; it's like half-time, the space, okay, the kick sounds like a joke when they come from the previous part, then I need to rework the kick drums into being longer, having more space, and at the same time, make that transition sound natural, so it doesn't sound like it's a new drummer coming in.

From all these assertions, it can be concluded that contemporary metal demands an integrated approach to arranging and mixing (see also Herbst and Mynett 2021b, 2023a), a perspective unanimously endorsed by the producers.

6.2.4 Production Parameters

The producers' explanations of the sonic dimension of heaviness revolve around two central themes: distortion and sonic weight. Regarding the former, Scheps argued that distortion is a universal feature of heavy music and expression, drawing parallels with classical music, where particular bowing techniques on string instruments create a rosin-heavy sound reminiscent of distortion (see Guettler 2011). Getgood and Bogren similarly referenced

strings played ‘in a distorted way’ and highlighted the tonal similarities between low brass instruments and distorted guitars, emphasizing the noisiness that contributes to their heavy sound.

In contemporary (metal) production, distortion is utilized to create density in the mid-range and produce a wall of sound, as Scheps noted. Exeter expanded on this, explaining how distortion enhances perceived size through analogue emulations that introduce non-linearity into both the right and left stereo channels, thereby widening the mix naturally (Mynett 2017: 299). By incorporating analogue techniques into digital production, Exeter further argued that adding gentle saturation—by four to six units—increases an instrument’s perceived loudness without resorting to compression (see also Mynett 2019b: 68). Middleton and other contemporary producers adopt extreme distortion techniques such as clipping to amplify perceived loudness and density, adding an element of aggression. Middleton cited an example where clipping extends the sustain of a snare while retaining a pronounced attack. He also noted that clipping and saturating, particularly of drums, are more prevalent in modern metalcore and hardcore-oriented genres than in traditional metal styles.

As anticipated, and consistent with previous observations, all producers emphasized the role of sonic weight in achieving heaviness, primarily due to the physical response it evokes, such as ‘those overwhelming body sensations’ (Getgood) and ‘your whole body is shivering like animals. That’s what’s heavy’ (Nordström). Nordström compared metal to symphonic orchestras with ‘a lot of heavy instruments’, noting that they share similar frequency spectra. In terms of instrumentation, the producers highlighted the centrality of the guitar, a view supported by metal scholarship (Berger and Fales 2005; Herbst 2017; Mynett 2016). Scheps emphasized the impact of palm-muted playing on heaviness, as it enhances the low-end (see Mynett 2019a: 306–307), with the bass primarily functioning as a complementary instrument that doubles the guitar lines. Bogren concurred:

If you asked me, Jens, tell me one element that is heaviness in metal, then I would say palm mutes because that way, you press the hand against the strings and then hit the strings, and he creates this low sound, and you use it rhythmically. You use it percussively. And you bring forth this low-end boost; it creates a lot of issues while mixing. But that’s what all the riffing is all about

Scheps observed that, unlike in rock, drums (and bass) in metal typically do not carry the low-end; rather, the kick emphasizes precision. Although most other producers did not directly comment on this topic, their focus on down-tuning emphasized the guitar’s central role in producing heaviness (Herbst

2017; Mynett 2019a: 308; Wallmark 2018: 70–71). Bogren highlighted the historical significance of Entombed, who down-tuned their guitars in the early 1990s, inspiring other influential bands like Carcass (see Herbst and Mynett 2023c). For Nordström, down-tuning the guitar is the paramount factor in creating heaviness in metal.

Again, as the youngest and most modern producer, Odeholm offered a slightly different perspective. While he agreed that tuning down the guitar and bass is essential to achieve the low frequencies that metal requires, he saw the potential for other instruments or sound sources beyond a metal band's core instrumentation, such as electronic instruments or industrial audio samples, to contribute to sonic weight. To control the low-end in his productions, Odeholm adheres to a 'low-end hierarchy' in which, unlike Scheps' approach, the kick takes precedence, followed by the bass, diverging from the typical focus in metal on the guitar:

On the latest Humanity's Last Breath record, *Ashen* (2023), I was trying to cram in as much low-end as possible on all of the instruments, which is super hard when it's so down-tuned, and all the instruments are fighting amongst each other in the same frequency range, which is hard to get that clarity. So that was super hard. And, on top of that, having sub-heavy synths and other types of production that's also interfering. So, I had to come up with a bunch of techniques to kind of make a low-end hierarchy somehow. The kick is going to be number one. And maybe bass is number two, guitars number three, and blah, blah, blah. It's like there's a hierarchy to that, where all of the low-end instruments kind of interact in a way to get that clarity.

Odeholm explained that the kick must be prioritized because it propels the rhythm and drives the song with its rich attack, a quality that neither the guitar nor bass can contribute. He likened the guitar and bass to a 'carpet of low-end', with their 'droning notes' giving a backdrop punctuated by the kick, which supplies the essential drive and rhythmic foundation.

Regarding sonic weight, size, and the power of sound, two producers drew upon associations with heavy machinery and large objects (see Hannan 2018) to explain the concept of heaviness. Nordström remarked that when instrument sounds blend into one cohesive unit, it resembles 'one big tank going forward'. Getgood expanded on this imagery, drawing comparisons to the power conveyed in Pyotr Ilyich Tchaikovsky's 1882 concert overture 'The Year 1812, Solemn Overture, Op. 49' (1996), an association also shared by Exeter. The piece evokes the might of Russia's successful defence against Napoleon's invasion in 1812, using cannons to create a rumbling, powerful effect, a quality that influenced Teutonic metal's sense of heaviness in the

1980s and 1990s (see Herbst 2021; Herbst and Bauerfeind 2021). In a more contemporary sense, Getgood highlighted Meshuggah as the sonic equivalent of the Terminator, describing their ‘mechanical, kind of soulless, machinery robotic way, the unstoppable force of heaviness. For me, that is the root of heaviness’. He elaborated further:

My theory is that heavy is a very literal description. I’m not talking about emotionally heavy; I’m talking about massive objects, the sound of massive objects. You think of things like huge machinery, like massive ships, or foghorns or massive animals, that kind of guttural grunty kind of heavy stomping character, you know, industrial, kind of mechanical or military; these sounds that we encounter or natural disaster type things, earthquakes, volcanoes, and thunderstorms and lightning. All these things are what, for me, are the root of what we experience as heavy, like our association with these massive things that are much bigger than us and kind of dwarf us when we hear them and overwhelm us with their power.

For Getgood, the perception of heaviness is an embodied response to low-frequency and sonically dense sounds that physically move the listener’s body, evoking sensations of being both overwhelmed and excited (see also Wallmark 2018). Achieving this effect requires musical performances that exhibit exceptional synchronization and mechanical precision:

Something that gives me a sense of heaviness is tightness in performance, at least in the modern sense of this more mechanical, industrial-type, military-esque, war-like heaviness. It’s about all of the things hitting at the same time and generating this kind of oneness of the sound. So, talking about the bass, you know, when you’ve got a distorted bass guitar, which is really adding huge amounts of richness to that lower end. And combining with the guitars in this way makes it sound like one massive floor-to-ceiling sound, punctuated so that every attack is hit with a kick drum, and you’ve got this punch of the snare as well. It’s like the sum of all those parts together gives me that sensation of a huge object, you know, the heavy aspect.

The impression of heavy machinery can be enhanced with production elements beyond conventional instruments. Getgood highlighted using loops from sample packs like Native Instruments Kontakt to introduce industrial characteristics, density, and size (see also Herbst 2021). He noted that these are ‘supporting sounds; they can be synthetic. They could be strings; they could be more percussive elements. But all those things, layered up, can add

to heaviness' (Getgood). Otero also advocated for synthesizers to fill gaps and stabilize the low-end. The popularity of sub-drops, inspired by EDM and hip-hop, in commercial metal was noted by Nordström, Exeter, and Odeholm as an effective means of intensifying sonic weight and as 'a way of increasing heaviness' (Nordström). Odeholm remarked that sub-drops contribute 'that extra low-end "oomph" to a part really helps with the heaviness, for sure'.

Odeholm holds a similar view as Getgood about the importance of tight synchronization, though he grounded his explanation more in the physics of sound than in metaphorical associations. Central to his understanding and perception of heaviness is a physical sensation he described as 'impact', achieved when

certain frequencies hit in a certain way, when everything is in phase with each other, and nothing is taking away from the other instrument. . . . You can get that fist in your ear, basically, from everything just impacting at the same time.

Such impact, he argued, could only be produced through meticulous editing because

all the transients have to be at the same point, like the guitar, bass, and kick drum have to hit exactly at the same time and be in phase, which is like samples of timing difference. So, to get that impact, it has to be edited, basically.

Odeholm's editing process exceeds mere performative synchronization; he inspects waveforms to fine-tune the phase relationships among audio tracks, ensuring maximum impact and sonic weight. Unlike standard engineering practices, which primarily focus on phase within single instruments (e.g. multiple microphones on a guitar amplifier or snare drum), Odeholm's approach involves manipulating the phase relationships across all instruments occupying the bass range. Not only does this strategy maximize dynamic punch, but it also optimizes the frequency domain to deliver the fullest possible low-end response.

Due to this emphasis on low-end impact, vocals are of minimal importance for Odeholm; in fact, he considers them as potentially diminishing the sense of heaviness:

I'm not a huge vocal guy, even though I make music that has vocals on it. For me, it's more like, 'Okay, how are we going to put vocals on this?' Trying to weave it in in a way that it doesn't disrupt the heaviness. I mean, of course, like maybe in a heavier part or a breakdown; if you do a scream on top of that, they can come across as more heavy. But I personally don't

necessarily think so. I mean, we [Humanity's Last Breath] are a band, we have a vocalist, and we want to play live and have a vocalist. And that's the reason we put vocals on the music, but with the technical nature of our music, and the dense production, it's not easy to put vocals on top of everything. It's more like a challenge to not make it less heavy.

Odeholm's statement, while mainly focused on his own music, also resonates within modern extreme metal genres, where the technical demands of the music and production often leave little room for vocals. In those contexts, vocals may detract from the essential sonic elements that contribute to heaviness, as they draw focus and occupy space needed for other sound sources.

When asked about the impact of technological advancements on metal and heaviness, all producers except Odeholm concurred that, while it enables pushing boundaries, technology does not fundamentally drive musical progress—a sentiment echoed by previous producers interviewed by Thomas (2015). Exeter, one of the most conservative producers, believes that technology benefits production but does not enhance the core of songs or performances. However, he expressed uncertainty about how future innovations might shape metal production (see Wallmark 2018; Section 2.4). Bogren agreed, elaborating on the complex relationship between technology, performance, and songwriting:

Technology has probably affected the actual sound more than the musical style. But then, musical styles have developed as technology has developed in a way that people realize that, 'Oh, we can do this super fast, super complex stuff because now it's actually possible to do that'. And that has built on each other. I know bands that never would be able to play the songs. They have to spend half a year learning the songs after the studio session. And so, technology has definitely had an impact on actual songwriting that way. But that's just by accident, I suppose. I believe that if technology had not moved into computers and you were still recording onto tape, for example, you would probably still try to make really fast and complex albums. But I guess we would never have reached this level of how pristine and detailed productions that we have today. But I don't necessarily think that's a good thing.

Scheps shared this perspective, arguing that musical development is determined by changing tastes, with technology adapting in response to create new opportunities for musical exploration. Nordström similarly referenced Metallica's *Black Album* (1991b) as an example, noting how producer Bob Rock expanded on the innovative production techniques of Metallica's

previous producer, Flemming Rasmussen, to achieve the immense kick drum sound through sampling, layering, and re-amping—a production that significantly influenced subsequent metal production (see Herbst and Mynett 2023c).

For Odeholm, advancements in digital music production actively inspire his creative process, with production techniques facilitating musical progress in extreme and progressive metal genres such as deathcore and 'thall':

If you write music with that type of production, and this super detailed and super compressed sound, you can get new, unique forms of music. Instead of making your not-so-heavy riff sound heavier with the production, you can actually use the production to go even further. Like all the 'thall'-type bands, just like this new wave of down-tuned technical music, I feel like they're combining the right elements. They have the clean guitars with a lot of reverb that kind of has that emotion to it. And, at the same time, you have the super down-tuned, super ignorant, almost atonal guitars on top of that. So, you have these two things working with and against each other. And that kind of gives me the entire emotional palette I want to hear at the same time.

While the other producers disapproved of overproduction, for Odeholm, it was a defining aspect of his work and a way to elevate the music's impact. He explained that the typical sound of a metal band felt uninspiring to him, prompting his approach to 'maximize everything to make it sound new, or make it sound different, or make it compete with maybe electronic styles that have that full frequency range'. This approach enhanced sonic detail in all instrument sounds and other sound sources 'on every level', thus offering a method for advancing music through production. Odeholm strongly believes music is first and foremost 'a sound', crafted through musical structures but ultimately designed to create a unique sonic experience. Therefore, technological advances that introduce new possibilities for shaping sound would benefit the ongoing development of metal.

Most producers agreed that technological advancements have enabled engineers to overcome long-standing challenges, continuously expanding the possibilities within electronics and acoustics. Getgood noted that contemporary productions now offer an unprecedented level of punch along with a rich, balanced frequency spectrum that avoids both harshness and muddiness. The enhanced functionality of DAWs and third-party plugins—such as intelligent EQ tools like Oeksound Soothe (a dynamic resonance suppressor) and Soundtheory Gullfoss (an adaptive audio EQ)—alongside advancements in amplifier simulation, drum sampling, and other innovations have elevated production quality. Consequently, many traditional trade-offs in

metal production, such as balancing clarity with cohesion or maintaining low-end weight and high-frequency detail, have either been minimized or become more manageable through technological innovations and engineers' evolving skill in utilizing them to achieve their artistic goals.

Overall, all producers acknowledged that heaviness is not unique to metal (see Volák 2022: 55); it can also manifest across other genres as long as the musical expression conveys a sense of weight or intensity. Unsurprisingly, classical music was highlighted the most frequently due to its close relationship with rock music (Covach 1997: 3–31; Melançon and Carpenter 2015; Walser 1993: 57–107); both genres exhibit similar frequency curves, distorted timbres, dynamic contrasts, emotional depth, atmosphere, scale, and powerful arrangements and performances. But other genres were also noted: 'heavy country music' (Bogren); hip-hop with its distorted 808 basses and sonic weight (Scheps); EDM for its drops (Exeter, Getgood) and 'punishing bass' (Otero); dubstep with its frequency-rich distorted textures (Odeholm); punk with its intense performances (Middleton); and modern jazz with 'screeching, ear-piercing sounds' delivered in a chaotic manner (Middleton). Reflecting on the versatility of heaviness, Middleton remarked, 'Heaviness can take on so many different forms'.

6.3 Mixing 'In Solitude'

In the following sections, we will analyse the producers' mixes of 'In Solitude', drawing on the final stereo bounces, individual stems, and supplementary materials, including interviews, screen recordings, and screenshots.¹ After addressing the broader challenges of mixing metal and the specific complexities posed by 'In Solitude', as identified by the producers, we will examine their mixing approaches through thematic categories rather than a strictly instrument-by-instrument analysis. This thematic approach facilitates a more holistic understanding and aligns with the producers' perspective that instruments, vocals, and other elements are rarely processed in complete isolation. Crucially, this analysis does not aim to document every engineering decision or serve as a comprehensive guide to mixing metal or 'In Solitude'. For more detailed guidance, we refer readers to Mark Mynett's *Metal Music Manual* (2017) and related articles from the research project addressing recording and mixing standards (Herbst and Mynett 2021a, 2021b, 2023a). Full interviews are available as videos in the online appendix and as written transcripts in Volume 2, *Learn from the Masters* (Herbst and Mynett 2025).

6.3.1 Challenges of Mixing Metal and 'In Solitude'

Most producers highlighted significant challenges in mixing metal music, many of which became evident during their engineering of 'In Solitude'. In

line with the deliberations stated in Chapter 5, these challenges centre around managing sonic space and achieving a high-quality, hyperreal sound that elevates the raw performance into something larger than life.

One underlying issue is that, in its raw form, metal often sounds chaotic and unrefined, necessitating skilled engineering to render the music both intelligible and powerful. Bogren emphasized the unique difficulties of the genre (see also Herbst and Mynett 2023a), drawing contrasts with other genres. While orchestras and singer-songwriters blend well in live settings, metal often sounds disorganized and unpolished without technological intervention. This discrepancy partly arises because metal musicians prioritize executing riffs and maintaining rhythmic intensity over achieving sonic cohesion or balanced dynamics, which are tasks frequently delegated to the engineer or producer. As a result, metal engineers are unusually central to shaping the final sound, often drastically transforming raw recordings to meet the polished expectations that stem from musicians' familiarity with studio albums (Thomas and King 2019; Herbst and Mynett 2021a). Due to this creative influence, engineers in metal are key artistic collaborators, chosen as much for their distinct sonic style as for their technical expertise.

Limited sonic space within a metal mix is the second significant challenge highlighted by nearly all producers. The 'wall-of-guitar' effect, created by heavily distorted guitars, often dominates and masks other elements (Mynett 2016). Middleton noted that it is typical for musicians to expect their instrument to stand out, encouraging a 'loudest wins' mindset that seldom benefits the overall band sound:

The most common challenge is that in heavy music, everything has to be the loudest thing in the mix. And as a guitarist, I like loud guitars, but the moment you feel like your kick and the snare is not loud enough. . . . I mean, it's the same thing. You just want everything as loud as possible.

Achieving a balanced mix that allows each instrument its necessary space and function requires meticulous refinement. Otero emphasized that each element must be able to 'punch through' the mix, making carving out space for every instrument and vocal layer an essential and challenging process. This complexity was stressed in several interviews, with Scheps openly discussing his challenge to allocate space for each instrument in 'In Solitude':

On this mix, it was the same thing. I was struggling with, 'Oh, I can't hear the bass. I can't hear the bass. Well, let me turn up the distortion'. And that's fine. But I still can't hear the bass, and then you mute the bass. And it's like, oh, right, yeah, I can hear the bass, no problem. It just doesn't separate as much. Again, I think one of the problems with what I usually

do is my mixes are very dense, and there isn't a lot of room, which means there isn't space around things, which means that the entire mix is taking up more space where what I really wanted was for the guitars to take up more space. And for me, because of the way I mix, it was really difficult. I never really even got there. I don't feel like I managed to give enough room for the guitars to be as important as they're supposed to be. Instead, they're a bit louder, but they're not necessarily as full-frequency as I'd like because I can't leave the drums that clean. It just bugs me that I can't do it. The distortion on a drum kit starts filling things up that you don't want it to fill up.

Scheps pinpoints a core challenge in metal production: the wall-of-sound effect created by guitars, which often masks other instruments and limits their audibility (Mynett 2016). Even producers well-versed in contemporary approaches to dense, low-end-heavy metal production expressed similar concerns. Bogren elaborated on the compromises necessary to prevent any single instrument from overpowering the others while preserving the cohesive wall effect that is integral to the genre's impact:

The biggest technical challenge is space. And that is dictated by rhythm guitars. That's one of these things that you don't have in any other genre. And that's pretty interesting because I've been doing this for almost 30 years now. And I started out working with all kinds of different genres. So, I have some ability, I guess, with whatever song, whatever style it would be. And it's so easy every time you get something in that doesn't have distorted guitars. . . . It's just all this space, the sound field, everything is open, and you can actually dial things in, and everything works. Whilst the typical metal song, you could work on the drums, you have a nicely recorded drum kit in a room, and you listen to the room mics, 'Oh, that's nice'. And then you listen to the snare, 'Pretty good, let's add some treble'. And this is so nice. And then you add the distorted guitars that are, by design, filling up the whole frequency space because they are completely compressed from the tubes distorting, and everything is gone. It's like those drums that sounded so natural, so vivid, and gloomy, just sound like popcorn in there; it's like completely gone.

So that's when you have to start making the compromises, or you have to work and try to defeat those guitars in a way. And at the same time, the guitarist is such an important element in at least 95% of metal in terms of the riffs and everything. At the same time, all the details in the drums are equally important. So, you have to start to make these compromises, start to maybe compress harder than you would actually think you want, especially when you solo-listen to things, and basically start to create more

even, more focused harmonics to be able to help cut through those guitars. And you have to start compromising everywhere; I would say a metal mix is one big compromise in order to make it work. The most important thing that goes with all mixing, but especially here, is that if you start to isolate things too much, it's not going to work; you would have to always have those guitars in there. Or you will be lost in terms of, yeah, you can work five hours on creating a drum sound, add the guitarist, and everything is gone. That's like my standard thing. When I start mixing, I always start with the guitars, at least to some extent, even though maybe I build a mix from the percussive side. If I don't have the guitars in there already, I'm going to be lost. If I would sum it up, the big challenge is the lack of space. That's the big challenge when mixing metal.

This perspective was widely shared among producers. Exeter, for example, highlighted the importance of spectral and dynamic processing to ensure that the kick and snare maintain their punch within the dense wall of guitars. Regarding punch, guitars primarily mask the mid and higher frequencies, while the low-end introduces additional challenges, consistent with established literature on metal mixing (Mynett 2017). Odeholm, who prioritizes low-end impact through his approach to low-end hierarchy, discussed the inherent trade-offs involved. He shapes the sound of each instrument in isolation according to specific expectations but acknowledges inevitable concessions that must be made once all elements interact. Like several of the previously quoted producers, Odeholm described metal as uniquely challenging compared to other genres:

Mixing metal is one of the most complex, if not the most complex, genres because of the aggressiveness and the loudness and fitting of all these elements; there are always so many elements at the same time. Like, a pop song is constructed in a way where you don't really have to mix because they're producing the tracks so that the vocal is front and centre, and all the production is going to be around that. In metal, it's like everything at the same time, all the time. So, that's the main challenge. It is hard to get this clarity and all the elements heard.

Odeholm noted that adjusting guitar and bass tunings can help mitigate some of these issues. While distortion-related problems were not entirely resolved, higher tunings closer to standard—specifically, what he referred to as drop C and above—effectively addressed many challenges associated with the frequency puzzle. He explained that 'everything just kind of falls into place because it's already occupying the frequency ranges that it's meant to occupy'.

Tuning typically remains consistent across a metal song or album. Hence, producers can fix frequency-space issues for one track and then apply the processing chain, with minor adjustments, to other songs on the same record (Herbst and Mynett 2021a). For this efficiency, many producers invest considerable time in refining a single song to create a processing template for the entire album. However, a template does not always work with songs featuring contrasting sections that vary in subdivision speed, drum patterns, instrumentation, and timbre, a problem that Nordström, Bogren, and Exeter highlighted. Nordström described ‘In Solitude’ as ‘really tricky to mix’, especially when there were transitions between standard sections and the slower breakdown. Similarly, Bogren remarked,

There are some blast beats, with really fast kicks and everything. And then it’s a little bit of a challenge to marry that with this slow part of the song that is halftime and really heavy and to make that sound coherent and good.

To address these shifts, many producers applied dynamic processing and automation or processed distinct song sections separately, using settings tailored to each part (for the AABA form, see Section 3.2). Approaches varied: Scheps, Nordström, and Odeholm sought setups that worked effectively across all sections and used moderate-to-minimal amounts of automation. Similarly, while leaning heavily on automation, Exeter stressed the importance of finding settings that function consistently across sections to avoid ‘chasing the tail’ of adjusting parameters for each part:

I think it was just getting my head down and solving the problems. For me, you can get so far finding sounds, and then you’ve got to commit to actually moving faders around. You’ve got to look at and go, ‘I really like that; oh, no, we got to the next section that doesn’t work. Oh shit, can I find a compromise means like compression and EQ?’ And it’s like, no, what you can do is actually create the sections that work together. So, you work globally; you step back from the forest, you create your balances, and you just chip away at all the problems. It’s not actually that much more complex than any other mix. It’s the amount of time it takes to go through those stages, and you’re not just doing a pass and then going, ‘Right, that’s done’. You’re going back, and you’re going, ‘Well, that’s now affected that, and now I need to dive in and affect the balance on those two guitars because for this section, I brought the strings up or the horns, and I need to focus the guitar over there because that’s taking that energy range against that’. . . . [Y]ou have to go on the journey. Otherwise, you don’t know in context what’s happening before and after. . . . It’s always about taking the time to allow your brain to get used to what’s going on

to then understand what you need to do next. . . . Stepping back and going macro to micro. . . . It's a challenging mix, but it's just a set of creative decisions to make.

Like Bogren, Otero approached 'In Solitude' by dividing the song into its two supersections, adding reverb and adjusting the drum tones in the breakdown to give it more weight. However, he noted that, in his perception, 'In Solitude' was devoid of drastically different sections that would have required entirely distinct processing. Reflecting on his approach to the breakdown, he explained:

I split it up into two sections, which would be the beginning and the end of the song, which have a consistent feel, and then that section in the middle with a lot of orchestration, that's like the curveball thrown in. Luckily, they're not so divergent that they require completely different mixes or completely different tones. But it's something you're going to want to keep in mind; the middle section gets a little slower and churnier and weightier. So, I know I'm going to want drum tones that can carry that weight and that can have a bit of length to them. I also like automating in some additional reverb for that section to give it some more space and to feel a little more grand because that's the feel that it has already. And my approach to mixing is, 'Okay, let's listen to the arrangement. How does that make me feel?' What choice is making the mix to embellish those emotions? You're there to enhance what the song already is. Mixing is just a lipstick-on-the-pig situation, so you want to take what's there and release it for an audience.

The low-end required particular attention in contrasting sections, not only the kick, bass, and guitars but also the reverb or room ambience that filled the space to create a sense of size, including the snare. Scheeps noted difficulties specifically posed by fast sections featuring blast beats, which limited the snare's processing and tonal flexibility:

It's tough because, in most of those blast beats, you need the snare to have enough top-end to be heard with the click of the kick. You can't make it heavy, that sort of 220 Hz thing that you'd bring up on a Neve to make the snare fat because it's going way too fast for that.

Some producers downplayed the challenges of these genre-specific complexities (see also Herbst and Mynett 2023a: 14). Instead, they focused on practical strategies to streamline the mixing process. For example Getgood described his approach as treating metal like a rock band, with

additional metal elements layered on top: ‘I’ve arrived at a place where I like to think about it pretty simply; it’s just like mixing the rock band and putting the other stuff on top’. Getgood believes that many mix challenges stem from arrangement issues rather than the genre itself, highlighting the importance of pre-production in creating heaviness, as discussed in Chapter 3. He explained that the core skill in mixing is listening, supported by an understanding of the genre and its specific demands, such as handling the uneven low-end of riffs that combine palm-muted and non-palm-muted playing. While listening, Getgood prioritizes ‘reducing distractions’, removing unpleasant or ineffective elements through corrective processing. To maintain objectivity, he starts by referencing other mixes early on and consistently throughout the process rather than waiting until the mastering stage. He emphasized that avoiding overly technical thinking during mixing is necessary, likening his approach to ‘error-checking’ while listening. Exeter echoed the importance of pre-production and thoughtful recording. When involved in tracking, he records additional takes with varied tones, articulations, and arrangements, providing flexibility for adjustments during mixing. This music-based solution is often more effective than simply relying on post-recording processing.

Both Getgood and Exeter stressed automation and dynamic processing as essential tools for overcoming mixing challenges. Exeter, in particular, viewed automation as a solution to many problems:

I wouldn’t even say they’re compromises. It’s just a case of not being lazy. From a mixing point of view, it’s about automating anything that is in the way. If that is blocking that, then move it out of the way or change the frequencies or do something that separates them, even if it’s only for a couple of notes, whatever it takes, because that’s one of the benefits of technology: we can automate everything. Absolutely everything. So why shouldn’t we?

Similarly, Getgood frequently employed automation alongside dynamic and interactive processing techniques, such as side-chaining, to ensure that each instrument maintained its own space and remained consistently audible (Herbst and Mynett 2021a).

Most producers relied on dynamic and intelligent processors like Soothe or Gullfoss, which reduced the need for automation, as Nordström pointed out. He also mentioned that he had initially intended to use automation but ultimately refrained from doing so to prevent unintended effects on adjacent sections. Likewise, Middleton considered automation unnecessary in his mix of ‘In Solitude’, yet admitted that it could be helpful in long or extremely fast double-kick sections. When automation was required, Middleton used

it to attenuate the kick's bottom-end during faster sections, thereby avoiding excessive low-end build-up. This method was an alternative to using a multi-band compressor, which was employed to control the kick's low-end in Lorna Shore's 'To the Hellfire' (Herbst and Mynett 2023b: 205–206).

In sum, the diversity of strategies illustrates that while best practices exist (Mynett 2017; Thomas 2015), no single approach universally applies to metal production (Herbst and Mynett 2021a, 2021b). Each mix requires an adaptive strategy that balances genre-specific challenges, technological tools, and the producer's creative judgement. This flexibility highlights the complexity and artistry intrinsic to metal production. For producers like Getgood, this adaptability centres on preserving the artist's vision rather than imposing his own sonic signature. Getgood stressed a tailored approach, particularly during the recording phase, where he customizes methods to align with the artist's sound without pre-emptively embedding a specific mixing style. Mixing, however, necessitates contextual adjustments, as different source tones demand adaptive processing. Bogren echoed this perspective, expressing his aspiration for a reliable template while acknowledging that each band's individuality and aesthetic preferences often render such templates impractical (Herbst and Mynett 2021a, 2023a). Otero similarly emphasized the importance of adaptability and advocated for a responsive workflow rather than rigid principles. While he refines his methods over time, he avoids adhering strictly to templates, allowing each track to guide its own production process:

A workflow would be more appropriate. I wouldn't say I start from a template because I think that can hinder the process and stagnate me as a mixer. I let myself be free to discover new tricks rather than sticking with the tried and true so I don't stay stagnant. But I definitely do have a workflow as far as grouping and a signal path method that I mostly stick to, and it just changes when necessary. Drums go to individual groups, then to a drum buss, and then to the master buss so that they'll have the signal flow that works for me.

Otero's workflow relies heavily on several hardware processors, particularly analogue compressors, which he consistently uses to maintain signal flow and recall settings across projects. This setup supports a top-down mixing approach (see Herbst and Mynett 2021a: 637), with him listening to all instruments collectively rather than in isolation to ensure that the mix's overall cohesion takes precedence over isolated adjustments or tweaks. Other producers, including Bogren, echoed this holistic perspective, deliberately avoiding the soloing of individual instruments such as bass and focusing instead on how elements interact within the mix. Bogren remarked he would not even know how each instrument sounded in isolation. Most producers

interviewed described listening as the process of finding out what does not work within the context of the mix and then adjusting specific attributes to carve out space or improve performance. After resolving such issues, they moved on to enhancing the sounds beyond their acoustic characteristics by employing techniques such as drum sample reinforcement.

At the other end of the spectrum were Scheps and Odeholm, albeit for somewhat different reasons. Scheps utilizes a standard routing and processing template designed to streamline his workflow and align it with his personal style, prioritizing efficiency. Even though his template is available through platforms such as *PureMix*² and *Mix with the Masters*,³ Scheps hardly elaborated on its specifics. But what became clear from discussing individual mixing decisions was his preference for approaches that achieve his sonic vision with minimal effort. Odeholm also focused on efficiency but was driven by a different motivation. Alongside using a routing template for instruments, vocals, groups, and the master buss to enhance workflow efficiency, he emphasized tone-matching equalization as a hallmark of his mixing style. Matching tones to his previous productions allows Odeholm to achieve constant tonal qualities and recreate his preferred frequency responses. Notwithstanding that he could create these tones from scratch, he still prefers the efficiency of placing them in the right ballpark before making contextual adjustments within the individual mix. This balance of efficiency and consistency reflects a pragmatic yet stylistically cohesive approach that demonstrates his commitment to a distinct sonic identity. Odeholm's perspective contrasts with that of producers like Getgood and Bogren, who aim to foreground the artist's vision without imposing their own stylistic imprint. As Odeholm explained:

More tone-matching. I've found my sound, and I just want all my mixes to have the same quality and the same general vibe to it. And that's one of the ways I get there to make sure that this bass sound is competing with the other stuff because I don't want a client coming to me like, 'Oh, I listened to your other mix, but when you mix my stuff, it sounded way different'. It will sound different because it's a different source, a different song, a different tuning, a different guitar, and a different player. This is just a way to make sure that the instruments are producing the frequencies that I want and that they are the same as my other stuff.

Odeholm made an important distinction: while aiming to preserve his sonic signature across projects as a form of quality control, tone-matching still permits individualization. In fact, it requires adaptation, as each sound source and its position in the mix are unique.

Metal bears distinct mixing challenges that set it apart from other genres. The main difficulty is achieving a clear, powerful, and spatially balanced

wall of sound, necessitating complex solutions. That became evident in the mix of 'In Solitude', where producers needed to apply diverse strategies to enhance sonic and performative impact, exemplifying the varied and detailed approaches required in metal mixing.

6.3.2 *Enhanced Qualities and Hyperreal Processing*

Metal's characteristic hyperreal aesthetic arises from the desire to amplify expressive and sonic qualities both in the music and in its recorded performance, an aim that becomes especially pronounced during the mixing stage (see Chapter 5). This pursuit of enhancement comes at the risk of crossing into overproduction, a pitfall several interviewed producers actively strive to avoid. We propose a spectrum (Figure 6.1) illustrating the producers' varying inclinations towards crafting either a natural sound—resembling a live performance with pronounced human expression—or a hyperreal, controlled, and heavily produced mix. As will become evident, the producers employed similar tools and techniques to achieve markedly different results, which demonstrates their agency in utilizing technology to meet their creative goals and ideals. Notably, while some producers, such as Scheps and Bogren, applied extensive and sophisticated processing, they did so to serve the performance and ensure that it honoured the artist's intent and functioned effectively within metal's dense textures. Achieving this balance often required as much effort as maximizing impact for a hyperreal sonic vision.

Among the more naturalistic producers is Exeter, who chose not to compress the kick and snare, noting that compression would not improve the outcome.⁴ His bass processing was even more minimalist, involving no EQ or compression; instead, its tone was shaped solely through automation applied to the overall bass signal and its two amplifier layers. Scheps concurred with Exeter's approach, opting to process the bass without compression. Regarding the processing of bass and other elements, it was generally

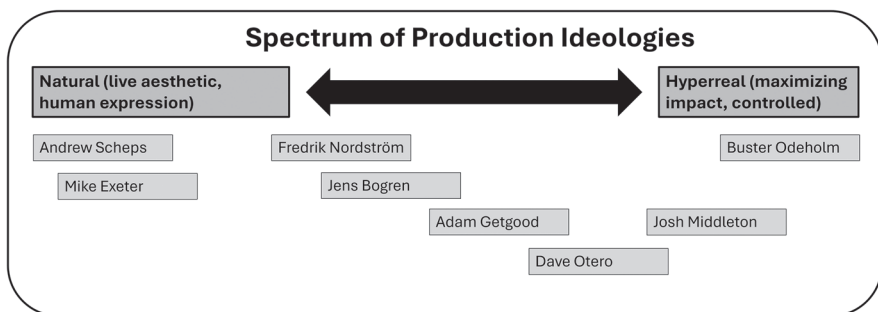


FIGURE 6.1 Producers' ideologies between natural and hyperreal sounding mixes.

the older generation of producers—Exeter, Scheps, and Nordström—who exercised the greatest restraint in processing bass and other elements. Bogren, positioned between the natural and hyperreal approaches, similarly sought to limit processing, invoking the established principle of shaping sound at the source. As some of the provided bass tracks were already compressed, he applied additional compression sparingly, only when considered beneficial.

Despite differing attitudes towards processing, many metal engineers mix through master buss processing, working on a metaphorically hyperreal sonic canvas (Herbst and Mynett 2021a: 637). ‘In Solitude’ was no exception, and although the extent of their processing varied, all producers but Middleton mixed through some form of mastering chain. For instance Exeter employed only a single master buss compressor, whereas Bogren, Otero, and Odeholm incorporated more elaborate setups involving outboard hardware. Exeter used his master buss compressor early in the process, as it informed his monitoring of loudness and dynamic range, enabling him to preserve the peaks and troughs created through detailed automation. By contrast, most other producers relied on complete mastering chains to guide their mixing decisions. Nordström explained that introducing harmonic distortion during processing impacts both spectral and dynamic balance. Hence, it is advantageous to implement such processing early on because it facilitates accurate instrument-level adjustments. Polished audio during the mixing phase not only was more satisfying for the producers but also allowed them to compare their work-in-progress with released productions, a significant benefit emphasized by Bogren, Otero, and Odeholm.

6.3.2.1 *Drum Samples*

One factor distinguishing modern metal productions from older ones, and metal mixes from rock mixes, is the liberal use of drum samples to enhance drum sounds. In an earlier study, only 6% of 50 analysed metal mixes were found not to integrate any samples at all (Herbst and Mynett 2021a: 638). This practice ranges from subtle reinforcement to more overt sonic effects (Williams 2015). Metal production manuals, such as Mynett’s (2017: 104–106), recommend creating samples from the acoustic kit used in the same session to ensure dynamic and tonal consistency throughout the mix. Interestingly, none of the eight producers interviewed adopted this approach. Bogren explained his reasoning:

I usually try to work with the real stuff as much as possible. And for anything that I want to add samples to, then it usually means that I need something else from the sound. So, then, it doesn’t make full sense to sample from the session, right? It has happened, and it depends, of course. Maybe it’s just a situation where it really needs to stay that sound or the

organic, real sound and you just need a little bit more consistency or fix some bleed issue. In that case, I would do it. But most of the time, I would add something else.

Instead, the producers layered samples from various kits to add characteristics such as attack, click, or sonic weight that were missing from the original acoustic recording. Otero, for example, tailors his approach to the drummer's preferences, for instance, accommodating a higher-pitched snare for better stick rebound to facilitate fast playing. However, as he prefers a weightier snare sound, he would layer in an additional sample to add low-end heft (see also Herbst and Mynett 2021a: 639). Interestingly, most producers avoided using samples from previous projects, relying instead on commercial sample libraries, a choice likely driven by convenience. Otero appreciates the efficiency of working with 'finished sounds', which allows him to 'mix a little faster' by providing a reliable sonic reference. Efficiency is also a priority for Odeholm; he used the same kick sample across multiple projects for years, including the mix of 'In Solitude', maintaining a consistent sonic signature. This practice aligns with findings on emerging metal engineers (Herbst and Mynett 2021a: 639).

Regarding kick samples, Bogren explained his selection process and the specific roles that each sample plays:

These are actually more sample layers, like the amount of them is more than I usually would use; I usually try to limit myself to a maximum of two [kick samples]. But here, for some reason, there was some other stuff that I needed. I've added one kick here for consistency, multi-sampled. It's supposed to sound as good as possible. This is also actually a performance of two different kick drums. . . . So that doesn't take away too much from the original performance there. It's just the one kick. And then I have something else, which is more like a wet, dry-sounding thing for support. And this is a little bit more of an obnoxious-sounding sample, kind of where you put a coin on the beater. And this is also one of these larger-than-life kinds of things that I just blend in there.

Bogren ultimately used four kick samples (Table 6.1). However, these were meant to complement the acoustic sound rather than replace it, resulting in one of the most natural-sounding kicks among the producers. For Bogren, the quality of the samples matters more than their quantity. Nordström achieved a similar organic sound but with one kick sample that he mixed more prominently. In contrast, Getgood employed a sample that introduced a foundational tonal shift, featuring lower tuning, minimal muffling, and greater 'slap' around the 3 kHz range. This approach created a distinct tonal quality not present in the original recording yet remained believable within the hyperreal

aesthetic of contemporary metal. Odeholm adopted yet another strategy, separating the kick drum's role by using a one-shot sample for consistent low-end while retaining the acoustic kick for dynamic and timbral variation in the higher frequencies:

I feel like I whittle it down to one or two or one more dynamic, real-sounding kick sample or kick. And then, like a one-shot with just one perfect, fully mixed, really nice kick drum. And I blend those together to get the dynamics and the variation from the real one [acoustic kick] and the consistency [from the sample]. Usually, most of the low-end will be a one-shot because that's super consistent. And your ear doesn't recognize the fakeness in low-end. If the low-end is super robotic, but the high-end might be more dynamic and real, then you're still going to register it as a real drum or have enough dynamics to not react to like a super robotic one-shot. . . . I usually want to use the high-end of the acoustic kick because that's where I want that variation of the high-end. But I want the consistency of the low-end from the one-shot.

These varied approaches among the producers to blending kick samples had one goal in common: creating a unified, consistent kick sound throughout the track. One exception was Exeter, who used automation to tailor the balance of acoustic and sampled kick tracks in the different song sections. With this strategy, he achieved specific sonic qualities by cutting through or complementing the guitars and bass, depending on the section's density and arrangement. He noted, 'none of this makes any sense in solo', emphasizing the importance of contextualizing the kick within the full mix. Bogren echoed this approach when discussing his snare sampling for 'In Solitude':

When I have reached the point where this is how good I can get the snare into the mix, then I would start to add some support to it. And that's usually another smorgasbord that might sound weird on its own because it's there for different reasons, but I try to have something that sounds pretty natural and ringy and airy, and that can sound good on fills. . . . I like it when it sounds ringy, a little beefy, snappy. . . . Here, I probably use a little bit more for the beef; I have also distorted the crack. It just adds like a beefy crack and a little ring. And then there is another one here, which is just for that modern metal consistency kind of thing. And then there is an obnoxious one that I sometimes use. That is just to compensate for what I feel I lose when I get it into the mix and add all these rhythm guitars and whatnot to bring back a little bit of that sensation. And these things could go up and down depending on the parts. . . . And then I usually

have some sort of little crack sample. These are my spikes; it's like one of these DDrum microphones that are recorded that I usually try to have in as well, just to add a little bit of spike. I would say that if I had to use only two things in addition to my real snare, then I would say this is the most important one. And the next important one is a pure ambient sample with the spike and the ambience added to the real snare. I could work with that. The others are more for tonal shaping.

Some producers also utilized tom samples to either reinforce the acoustic recordings or fully replace them (see Table 6.1). Reinforcement ensured tonal

TABLE 6.1 Overview of drum sample use per producer.

	0	1	2	3	4	5	6	7
Kick								
Bogren					×			
Exeter							×	
Getgood					×			
Middleton			×					
Nordström		×						
Odeholm		×						
Otero						×		
Scheps	×							
Snare								
Bogren								×
Exeter		×						
Getgood		×						
Middleton			×					
Nordström		×						
Odeholm		×						
Otero							×	
Scheps	×							
Toms								
Bogren	×							
Exeter								
Getgood	×							
Middleton		×						
Nordström		×						
Odeholm		×						
Otero	×							
Scheps	×							

Note: Some producers, especially Middleton, have pre-mixed and bounced samples so that their number is understated. The exact number of Exeter's snare samples is unknown, but there are at least two.

cohesion by matching the pitch of the samples to the original recordings while enhancing characteristics such as stick attack and low-end weight. Middleton and Exeter opted to replace the toms entirely, albeit for different reasons: Middleton sought a specific tonal quality, whereas Exeter prioritized improved clarity and consistency during fast fills. He further adjusted the samples carefully to avoid a mechanical feel, explaining:

As good a drummer as he is and as good a recording as it is, there are sections where things don't feature; they don't speak quite well enough in the mix. I probably spent about half a day trying to make the toms work, and in the end, I just went to use the triggers and into Superior Drummer, designed a drum kit that worked, went through all the toms, and tweaked the MIDI. Because there were certain times when it felt like it wasn't natural; it was a little bit stiff on it. I started putting in a little bit of groove in the dynamics.

Similarly, Nordström reinforced the acoustic toms with samples to highlight finer details in the fills. Odeholm also employed what he described as 'super fake-sounding samples' to enhance the toms' impact, compensating for the natural loss of power caused by the high performance speed during certain fills. Across the board, samples were seen as essential for bolstering the perceived strength and precision of fast tom patterns, ensuring that they retained their presence and definition within the mix.

Interesting generational differences arose in the producers' approaches to enhancing drum sounds with samples. While the older generation, up to and including Bogren, focused on subtly reinforcing the acoustic originals, younger producers like Getgood also adhered to this more restrained methodology. By contrast, some newer-generation producers, particularly Odeholm and Middleton, favoured far greater alterations. Those adopting a moderate approach emphasized the importance of retaining a natural tone and human feel, which are especially pertinent to achieving a sense of heaviness. Bogren explained:

I know a lot of metal producers that would just go 100% sample on the kick. Personally, I don't like it. I try to use as much of the original as possible because, again, heaviness is in the expression; I don't want to destroy the expression. And if I do these sample things, then I try as much as I can to adapt to the original performance, so it becomes an extension of the performance rather than flattening it out.

Bogren highlighted the need to engage with the recorded tracks to preserve their expressive qualities (see also Herbst and Mynett 2021b). Similarly,

Nordström, who leaned more heavily on samples than Bogren on a relative level, emphasized the virtue of restraint, widely avoiding the 'machine-gunning' effect that typically stems from overly triggered drums with their monotonous tones and dynamics. This restraint is convincingly audible in his mix. For Nordström, preserving the authenticity of the acoustic performance was pivotal; samples served merely as an enhancement, particularly in blast beats, helping to avoid the typewriter effect. Positioned between the older and newer generations, Otero agreed with Nordström, adopting a similar philosophy for processing kick drums in contemporary technical death metal, where consistency and punch are paramount. Although Otero frequently employs a larger array of samples, he views them as complementary, ensuring that the natural dynamics and tonal variation in the acoustic tracks remain intact. As he explained, these 'additional tracks' merely serve to 'augment what I want out of that main track'. The result is a powerful, hyperreal kick sound that, however, does not seem artificial within the conventions of contemporary extreme metal genres.

Among the newer generation inclined towards a less natural approach, Odeholm embodies this aesthetic most distinctly. Relating particularly to his own bands, he described that his integrated songwriting and production process would begin with fully programmed drums,⁵ aiming for recorded live performances to emulate this programmed quality. As he explained, he 'want[s] the real drums to sound as close to that as possible', often blending samples used in the demo with live drum recordings to create a 'meeting of two worlds': the consistency and heaviness of the demo samples with the dynamics of live drumming. This approach transforms the sound of programmed drums, once a practical necessity for emerging artists and engineers (see Lux and Herbst 2024), into Odeholm's sonic ideal, which he strives to replicate even in professional productions. For 'In Solitude', he blended the acoustic kick at a lower level and used only a sample for the snare, completely omitting the original snare sound. This strategy produced a highly effective and prominent sound in the mix, though it is arguably less cohesive than the kick in Bogren's or Nordström's mixes. Middleton shares Odeholm's preference, frequently replacing drums entirely in many of his mixes, including in 'In Solitude'. Although Middleton prefers working with acoustic tracks, his aesthetic goals often led him to rely heavily on samples, producing a similarly hyperreal drum sound:

I ended up sampling everything else for the main mix in terms of what I was looking for. It's a lot easier for me to get what I'm after using samples. . . . If I can, I'll use samples from the kit. It's something that I've tried to do, and in my head, it should work. I don't know why I've never had as much success with it as it should have in my head. But I'll take really hard snare samples from a session. I would have triggered the snare with all the hard

hits and then spliced in to be natural, but I found that I was not doing that for the consistency of the tone of the snare. I'm treating a real snare track like a real snare track. But they are not shy with using triggers. And especially today with like Slate Trigger and multi-samples that if you pay attention to detail on fast snare rolls, and you might have to edit a certain hit on the audio to trigger like a louder or softer hit, that you can lean on samples a bit more and still have a natural feel. . . . I like to try and use samples from the kit and as much real mics as possible, but when it comes to samples, I would always rather use one as opposed to blending them, and I would create my own blends of either one-shot samples or multi-samples. . . . I've got about six or seven good hits from a kick drum from a session. If I want to make a sample of that and I want another sample blended in, then I'll make the samples with the blend that I like, so I'm not dealing with loads of different tracks. And especially when you're doing a record, I don't mix in the same session. I'd rather have fewer layers of samples in that regard. And I like to pre-make samples.

Middleton adopted a similar approach for 'In Solitude' by replacing all acoustic drum recordings with samples. He then modified these samples to align with the original drum sounds. The pitch of the kick, snare, and tom samples was adjusted to match the recorded performances. Compatibility with the overhead and room tracks was ensured by carefully calibrating the snare's ring and sustain. As a result, he achieved a cohesive and natural blend despite the complete replacement.

Scheps stood out as the producer who refrained entirely from using samples. Not elaborating on this choice may suggest that samples do not play a significant role in his workflow. Unlike the other producers, his primary focus is on rock rather than metal music, making it likely that he is less accustomed to using drum samples.

None of the producers employed alternative methods beyond sampling to shape the drum sound, particularly in its low-end. Techniques such as synthesized sub-bass reinforcement for the kick drum (Mynett 2017: 329) were not utilized. However, some producers did incorporate sub-kick recordings, although no additional methods were used to extend the kick's low-end weight.

The producers' varied approaches to drum sampling highlight the delicate balance between achieving consistency and preserving the authentic dynamics of the acoustic kit. While some relied heavily on samples to shape the drum sound, others focused on reinforcing the natural sound of the original recordings to introduce subtle enhancements only when necessary. This spectrum of strategies highlights a generational divide: older, more traditional producers showed a propensity for naturalism and expressive authenticity,

whereas newer-generation producers like Odeholm and Middleton embraced samples to achieve precision, weight, and consistency, even at the expense of acoustic realism. Ultimately, the producers' choices were guided by their sonic objectives and the aesthetic demands of the genre that reflect an in-depth understanding of how sampling can enhance the power and precision central to metal production.

6.3.2.2 *Guitar Re-Amping and Layering*

Consistent with the previously outlined importance of achieving sound at the source (see also Herbst and Mynett 2021b; Mynett 2017), several producers chose not to work exclusively with the provided guitar tones but instead focused on recreating tones from scratch. The session offered four main setups: 1. Peavey Mk. I 5150, 2. Peavey 6505, 3. EVH 5150 III Stealth, 4. Mesa Boogie Mk. V Kemper profile, paired with an oversized Mesa Rectifier cabinet loaded with V30 speakers. This setup was recorded with microphone combinations that included the Shure SM57 and Sennheiser MD421. Only Scheps and Exeter, being the most traditional producers, relied solely on these original recordings. Others pursued customization by re-amping the guitars through an analogue chain or digital amplifier simulations. Bogren exemplified the sound-at-source principle, explaining his rationale for re-amping two of the four tracks:

I always do that because these guitars are going to be there all the time and dictating the frequency response. If I get a sound delivered that I'm not fully happy with, I will just never stop mixing those guitars. I usually prefer crafting my own guitar sound specific to the album. And when I'm happy with that, I leave it; I don't process it much more. . . . Or if I get four guitars like I did here, I try to re-amp guitars one and two and use whatever I got. Even if I think it sounds bad, I could still use guitars three and four in addition. That way, I would also not end up creating too similar sounds for every album that I do. So that way, every album that I mix gets some unique trademark that was brought in. . . . I did keep guitars three and four. . . . I actually decided to re-amp with the 5150 and the Stealth version of the EVH 5150 version three. So, I used the same kind of amps that I got [provided with], just that it's through my own cabinet, my own mic chain, and my own frequency space. . . . Guitars three and four may sound a little boxy and small, but I think that it definitely gives character to them. And I think all together it sounds better than just listening to one and two.

Both pairs of guitars were intended to complement one another in tone: one with a scooped sound and ample low-end and the other with a mid-focused

sound for definition and tonal character. Bogren's emphasis on achieving a sculpted sound at the source reduced the need for extensive processing during mixing, effectively 'printing' many tonal characteristics during tracking. Nordström even produced two mixes: one using the original guitar recordings and another re-amped with his preferred setup, combining a Peavey 5150 and an Engl Savage for a complementary character, resulting in a tighter, more focused tone. Otero chose a similar analogue approach, re-amping the Peavey 5150 base tone with the Peavey 6534 model. Adding two Mesa Boogie tracks produced complementary qualities: a sharper, mid-forward primary tone from the Peavey, supported by the Mesa's slower, softer saturation.

In contrast, all newer-generation producers—Getgood, Middleton, and Odeholm—favoured digital amplifier simulations. Both Getgood and Middleton retained the Peavey 5150 sound while aiming for greater tightness and weight. Getgood achieved this by using a Peavey 6505+ paired with an oversized Mesa Boogie cabinet, while Middleton used his signature version of the original 5150. Their choices reflected efficiency and confidence that these setups would deliver the desired tones. Getgood articulated his commitment to the sound-at-source principle, stating that 'guitar EQ should just be about a more controlled version of the raw sound. The raw sound, maybe, can be a little bit bigger than you need, but it should have all of the character that you want'. Odeholm, meanwhile, used Neural DSP's Archetype Gojira to align with his aesthetic goals, adding a unique layer to his approach. Notably, while all producers incorporated overdrive pedals to tighten amplifier response in both setups, analogue and digital, Odeholm applied overdrive in parallel at 40% to preserve low-end weight. This strategy maintained tightness without sacrificing heaviness. But, generally, the choice between a physical or digital amplifier no longer affects audio quality, as was the case with less advanced amplifier simulations, indicating that either option can lead to a high-quality guitar tone (Herbst, Reuter, and Czedik-Eysenberg 2018; Herbst 2019b).

Nearly all producers opted for quad-tracked guitars, but Odeholm used a three-guitar setup to blend guitar and bass into a cohesive 'meta-instrument' (Herbst and Mynett 2022: 646), a technique discussed further later. The quad-tracking layering technique blended tonal characteristics across tracks to craft a dense sound. Many producers noted their preference for working with the provided tracks and reducing layers only when their clients requested it. Generally, the specific benefits of quad-tracking were widely valued. Middleton appreciated it for achieving a chorus-like sound reminiscent of early influences from Colin Richardson and Andy Sneap (see also Herbst and Mynett 2021b: 151). Bogren highlighted more practical advantages, noting that quad-tracking helps 'even out quirks in performances' while creating a 'heavier sound' (Mynett 2017: 135–136). He prefers quad-tracking, especially for slower songs, to enhance guitar sound with the added density

and weight and to smooth over minor performance inconsistencies. For 'In Solitude', performance accuracy was not a concern; Bogren's choice to quad-track aimed instead to enhance heaviness and fill sonic space, compensating for the lack of lead guitars providing additional intervals, chord inversions, or melodic elements (see also Herbst and Mynett 2021b: 151).

The diverse approaches to guitar layering among producers demonstrate a balance between traditional practices and modern adaptations, with each producer tailoring their workflow to meet specific aesthetic objectives. Some relied on the provided tones for authenticity and efficiency, while others prioritized re-amping or digital simulations for a greater control and customization. These choices reflect a shared commitment to the sound-at-source principle, ensuring that the guitar tone is integrated cohesively within the mix while amplifying the genre's characteristic power and heaviness.

6.3.2.3 *Bass Layers*

Producers' approaches to bass layering varied, often aligning with generational preferences. Scheps, Exeter, and Nordström each employed a straightforward two-track setup. Scheps combined a clean DI with an amplifier recording, noting the challenge of maintaining optimal phase correlation even with this minimal configuration. Exeter used Ampeg and SkarBassOne amplifiers, finding that the pre-processed signals required no additional EQ or compression. Although belonging to the younger generation, Middleton adopted an approach similar to Scheps, pairing a clean DI with a Parallax amplifier plug-in. This setup allowed him to compress the low-end while distorting the mid-range and high frequencies independently, offering precise control over the bass tone while maintaining efficiency. Otero also favoured a more compact setup, relying on the Parallax amplifier simulation, particularly the Sennheiser E906 microphone emulation, to achieve his ideal bass tone directly at the source. For Otero, Parallax was a go-to solution that provided the 'grindy' saturated sound he preferred while allowing targeted distortion across frequency bands without requiring additional layers.

Most other producers favoured richer, multi-layered approaches (Mynett 2017: 143–154), often employing four or five tracks. Bogren, who utilized four layers, offered detailed insights into the rationale behind his setup:

I thought the tracks that I got sounded really good on the bass department. What I have done is base it around this amp classic. I guess that's an SVT Ampeg. And that sounded really good. I have used some of this Dark Glass plugin. And for distortion, I think that pedal is very popular. I think it may work better as an addition than the main sound because it can create some weirdness in terms of the tonal information; some notes get a little lost. . . . Mostly the Ampeg, and then I have the Dark Glass, which

just adds a little bit of gnarl here. And the Skar . . . In the end, it was just a different phase relationship that didn't do any good to the tonal stability of the bass, so I got rid of it. . . . [T]his Bass Knob, the STD classic . . . it's almost only this one. And then there is the Dark Glass, it's almost nothing. . . . And the Skar, same thing there. It just adds to the lowest octave a little bit in a nice way. Again, I think I started off with that one a little louder as well. And then, as it progressed, I realized that the best thing was to have it like that. And then I have the STD for this one. If I had used the STD on its own, I would not have used much EQ at all. But here, since I wanted to use it as an addition to this one, I had to get rid of some of the low-end. You can see that I've been really into putting down the different tonal points that I thought were not complimenting the other one.

Bogren began by evaluating the tonal quality of each bass track and constructing a foundational amplifier layer to provide a solid low-end weight. Aiming for a more complex texture, he layered subtle distortion, enriching the tone without overpowering the core sound. He then refined the layers by reducing overlapping low-end frequencies, which prevented clashes; ensured clarity; and resulted in a balanced, rounded, and clear bass tone where each component contributed subtly to the final mix.

Getgood, a professional bassist, used five complementary layers: the DI and four provided tracks that he left unprocessed, each contributing a distinct tonal element. The Dark Glass track added 'grind' to the mid-range, while the SkarBass track introduced a scooped, distorted quality. To anchor the low-end, Getgood heavily compressed the DI, which he noted provided a unique 'round, flat low-end' unachievable with other processed layers.

Odeholm, known for his distinct approach, embraced a philosophy of creating bass tones entirely from scratch: 'I'm too proud to use other people's tones. I just feel like I want to create it from the ground up. And the way I create stuff goes hand in hand with my philosophy on everything'. His setup featured three busses derived from the clean DI. The first established the low-end foundation, incorporating significant sub-bass content through a bandpass filter around 80 Hz. The second, named 'grit', added character through distortion, and the third duplicated this grit track with a stereo cabinet to create a wider stereo impression, a technique further discussed in Section 6.3.3 on 'meta-instruments'.

The diversity of approaches reflects each producer's aesthetic and technical priorities in bass layering. Some prioritized minimal processing to maintain tonal clarity and phase coherence, while others employed multi-layered techniques with distortion, sub-bass reinforcement, and stereo imaging to create a more complex sound. These choices illustrate the balance between crafting a hyperreal, distinct bass tone and integrating it cohesively within the

mix. These methods demonstrate individual philosophies and the broader stylistic objectives of contemporary metal production, where a powerful, deep, yet clear low-end is essential for enhancing the music's perceived heaviness and weight.

6.3.2.4 *Punch*

A powerful metal production typically relies on punch as the element that most effectively conveys the energy of performance (Mynett 2017: 21). The producers rarely discussed punch explicitly, yet their processing techniques often revealed strategies to enhance this quality. While punch is most commonly associated with drums, it can also be evident in guitar and bass tones (Mynett 2016: 78–79).

Employing drum samples is one straightforward method for enhancing punch (Herbst and Mynett 2023c: 31–32). As previously noted, complementary samples are often layered with acoustic drum tones to reinforce specific attributes, including punch. However, producers also utilize other techniques, such as wave-shaping through noise gates and dynamic compression (Herbst and Mynett 2021a: 639–640, 2023a: 20–21). Exeter, for instance, considers gates essential for achieving punch in recorded kick drums, remarking that without them, 'it's not punching'. Odeholm similarly emphasized the importance of compression for creating a punchy kick sound, describing it as 'steroids' for the drum, as it can enhance attack transients and contribute to the processed, hyperreal aesthetic he aims for.

Parallel compression, a form of 'upward compression' that elevates quieter elements in the signal rather than reducing louder peaks (Izhaki 2013: 259–260), was frequently highlighted for its ability to enhance punch by preserving the natural attack transients of the unprocessed drums while blending in the characteristics of the compressed track. Scheps likened the effect of parallel compression to infusing energy into the performance, comparing it to a drummer 'leaning forward'. Nordström echoed this sentiment, appreciating parallel compression for the extra punch it added to snare and tom tracks. Pursuing another goal, Bogren used it on kick drums to ensure they did not dominate other drum elements during fast double-bass sections. However, despite using parallel compression, producers still tend to apply direct compression to the drums, allowing them to blend the characteristic features to the desired degree.

Limiting, a more drastic form of dynamic range control, was also widely used. Odeholm appreciated its ability to produce a tighter, more controlled sound. Getgood relied on limiting to maintain a consistent temporal envelope across sections with varying speeds of subdivision, especially during intense blast beat sections and the slow breakdown. Compression was generally seen as indispensable for making the more natural-sounding snare tracks

punchier. Several producers also used transient designers to shape drum elements for enhanced punch. Odeholm took an unconventional approach by applying transient design to guitars, adding attack to ‘choppy’ riffs through automation.

Frequency modification also proved effective in enhancing punch, with Getgood noting that the upper frequencies added ‘a bit of extra snap’ (see also Fenton and Lee 2019). Preserving drum intelligibility required more intense modifications through harmonic distortion, especially in parallel processing. Scheps extensively employed this approach, while Getgood used (multiband) saturation to distort higher frequencies, which helped reduce cymbal bleed, retain punchy ‘click’ transients, and add an aggressive tone.

Reverb, typically associated with softening transients, was also employed to enhance punch. When used in parallel on snare and tom tracks, reverb created an ‘explosive’ quality (Otero), provided ‘extra smack’ (Exeter), or delivered a sharp ‘snap’ (Otero). Pre-delay settings proved particularly effective because they offset the reverb from the initial attack. Automation was another method for adding punch. Odeholm utilized level and distortion automation to emphasize the beginning of specific sections or riffs, creating a ‘little push’ to ‘hit hard and impact’.

Punch was found to be an implicit yet central quality in each producer’s approach, realized through layered techniques that intensified attack and energy within the mix. Using techniques such as parallel compression, transient design, harmonic distortion, and selective reverb, each producer struck a balance between weight, power, and clarity. Enhanced transients and frequency modifications on drums and guitars allowed them to process the instruments so that punch contributed to the overall heaviness and impact of the mix.

6.3.2.5 *Colour, Texture, and Effects*

Processing for enhanced qualities is not limited to punch but encompasses nuanced texture, tonal refocusing, and signal enlargement through effects. To achieve these outcomes, producers used tools similar to those associated with punch but adapted their application. Parallel compression, typically linked with punch, was especially valued for its effectiveness in enriching texture. Scheps, for instance, emphasized that its main advantage lies in shaping the ‘envelope of the sounds’ (see also Izhaki 2013: 263–264). He employed extensive parallel compression to introduce harmonic distortion, effectively lengthening drum sounds. His setup included three parallel compressors on the drums: one to accentuate transients and snare detail and two for colour and tonal enhancement. Otero adopted a comparable approach, dividing his drum tracks into parallel busses with distinct tonal focuses—‘snap’, ‘weight’, and ‘air’—which he controlled individually via faders. For Otero, parallel

compression acted as a 'processor for a sound' rather than being tied to a specific instrument, enabling him to automate shifts in tonal colour across sections, particularly during the slower breakdown. Odeholm similarly used parallel processing but organized it into distinct tonal categories: sustain, attack, and distortion. This separation allowed him to isolate and emphasize specific aspects of the drum texture. In contrast, Exeter avoided parallel compression entirely, citing concerns over phase issues caused by latency in digital systems. This diversity of approaches illustrates how producers utilized parallel processing as a versatile tool. They used it not only for punch but also to shape and enhance the texture of the broader sonic palette of metal production.

Distortion was found as another popular tool for enhancing texture, introducing expressive qualities and compensating for the effects of close-miking. Distortion techniques also contributed to creating a more authentic drum sound by simulating the resonance of drums in a live room setting (Herbst and Mynett 2021a: 640). For example Getgood described how distorting the top snare microphone could add a natural ambience, making it sound closer to a room recording while preserving its attack and adding energy and aggression. Similarly, Odeholm noted that applying distortion to the snare enhanced its low-end weight and softened its high-end, effectively 'beefing up' thin-sounding signals without sacrificing transients.

Modulation and spatial effects were also seen as integral to adding depth and detail. Exeter applied a great amount of reverb to the drums, which, although largely masked by the guitars, infused the mix with an underlying sense of liveliness. He noted that the drums sounded flat and lifeless without reverb. Additionally, Exeter incorporated 'door slam' samples on specific snare hits, automating them in less dense sections to fill out the space and create a greater sense of size. Scheps employed a similar approach, adding reverb to the kick drum during sparse sections, such as the introduction, to enhance its weight, depth, and presence.

Overall, in 'In Solitude', each producer's approach to enhancement creates a spectrum from subtle reinforcement to distinctly hyperreal aesthetics. Producers like Exeter and Scheps leaned towards naturalism, favouring minimal processing to preserve the authenticity of the original recordings. Conversely, Odeholm, Middleton, and Getgood embraced a heightened reality, amplifying clarity, power, and sonic weight. Through techniques such as layering, parallel compression, harmonic distortion, and the strategic use of drum samples, each producer highlighted specific qualities, whether for improving punch, texture, or detail. These varied methods highlight that enhancement in metal production is not a one-size-fits-all concept; instead, it exists on a continuum. Each choice reflects a careful balance between raw energy and precisely sculpted intensity, contributing to the unique sonic identity of the final mix.

6.3.3 *Spatial Staging and Size*

The spatial staging and perceived size of a mix are essential for producing metal music that feels immersive, intense, and heavy due to conveying dimensions of depth, width, proximity, and loudness (Mynett 2019b, 2020, 2022). Through the application of techniques such as incorporating drum room tracks, reverb, and strategic layering, producers can manipulate these spatial dimensions to influence listener perception. Each element, from the positioning of drums and bass to the breadth of guitar tracks, contributes to a soundstage that situates instruments at varying depths and widths, enhancing the overall sense of sonic massiveness that is essential for conveying heaviness (Hannan 2018: 444). This approach accommodates a spectrum of staging styles, from hyper-real scale to the authentic representation of a live performance, depending on the production’s goals and the expressive demands of the composition. In this section, we will analyse and visualize producers’ spatial strategies using William Moylan’s (2007: 50) soundstage model (Figure 6.2), which illustrates the width and depth dimensions of the soundstage in relation to the listener.

Another concept explored here is the ‘meta-instrument’, with which producers blend instruments, such as bass and guitar, to create the illusion of a singular, larger-than-life entity. By carefully balancing spatial elements, they can craft either a hyperreal, in-your-face sound or a live-feel aesthetic. This approach allows producers to align their mix with the sonic and expressive goals of both traditional and contemporary metal music.

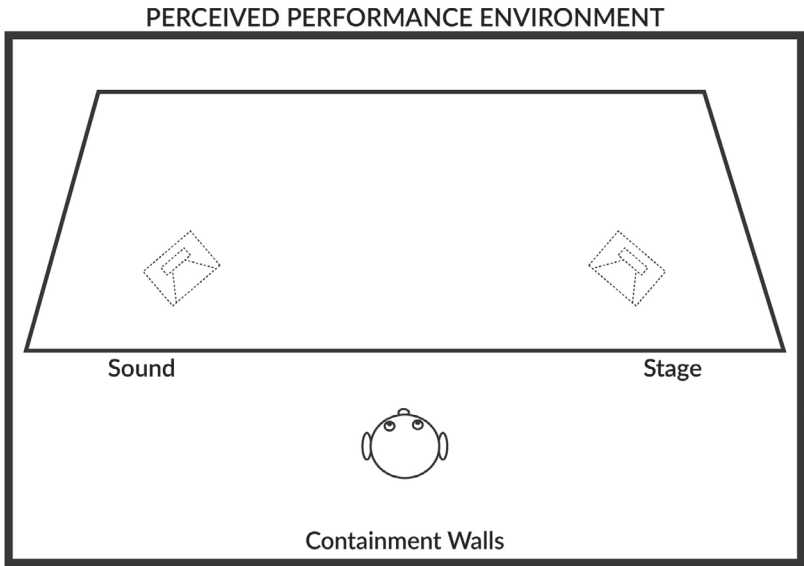


FIGURE 6.2 Soundstage template, adapted from Moylan (2007: 50).

6.3.3.1 Depth

In metal production, depth is a multidimensional attribute shaped by loudness, brightness, and spatial effects such as reverb and delay. These elements enable producers to construct a virtual soundstage that ranges from hyperreal proximity to more natural spatial staging, reflecting broader aesthetic choices within the genre. Some producers, such as Scheps and Exeter, favour realism to emulate the sound of a live band, while others, including Odeholm and Middleton, adopt a hyperreal, in-your-face approach that amplifies the genre's aggressive and imposing character (see Figure 6.1).

Loudness acts as a foundational tool for shaping depth. It is often used to place quieter elements towards the back of the mix to establish layered spatial dimensions (Herbst 2014: 75–77). Scheps, for instance, uses level strategically to position backing vocals deep within the soundstage, as if emanating from the rear of a live stage. Figure 6.3 visualizes this arrangement, with dotted lines representing the subtle presence of the backing vocals. By contrast, the bass guitar and snare drum are positioned prominently in the foreground alongside the lead vocals to create a clear focal point. Additional spatial processing like panning shifts elements such as guitars and synth pads to the sides of the soundstage, while the kick and cymbals are relatively subdued. This approach contrasts with Odeholm's mix (Figure 6.5), where the kick drum occupies a strikingly forward position, which reinforces his hyperreal aesthetic of proximity and impact.

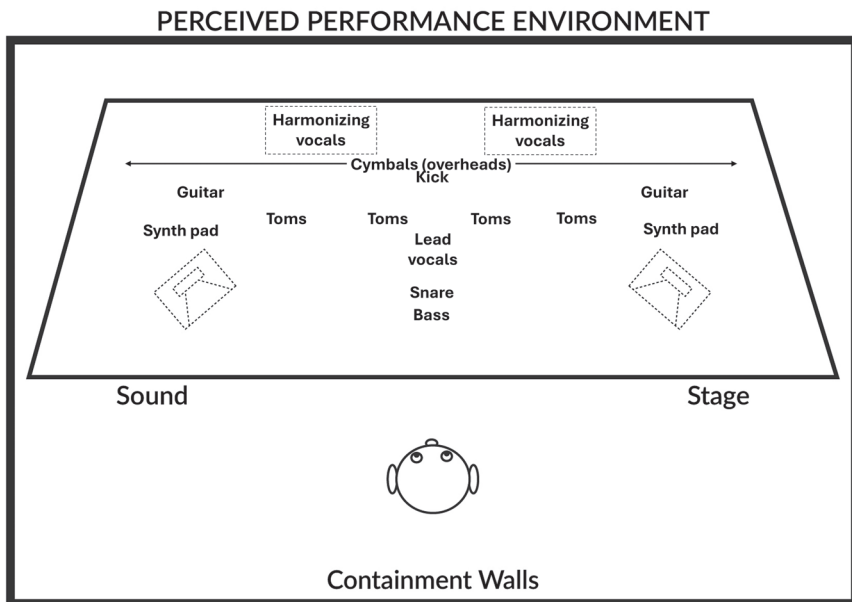


FIGURE 6.3 A spatial representation of sound distribution in Scheps' mix.

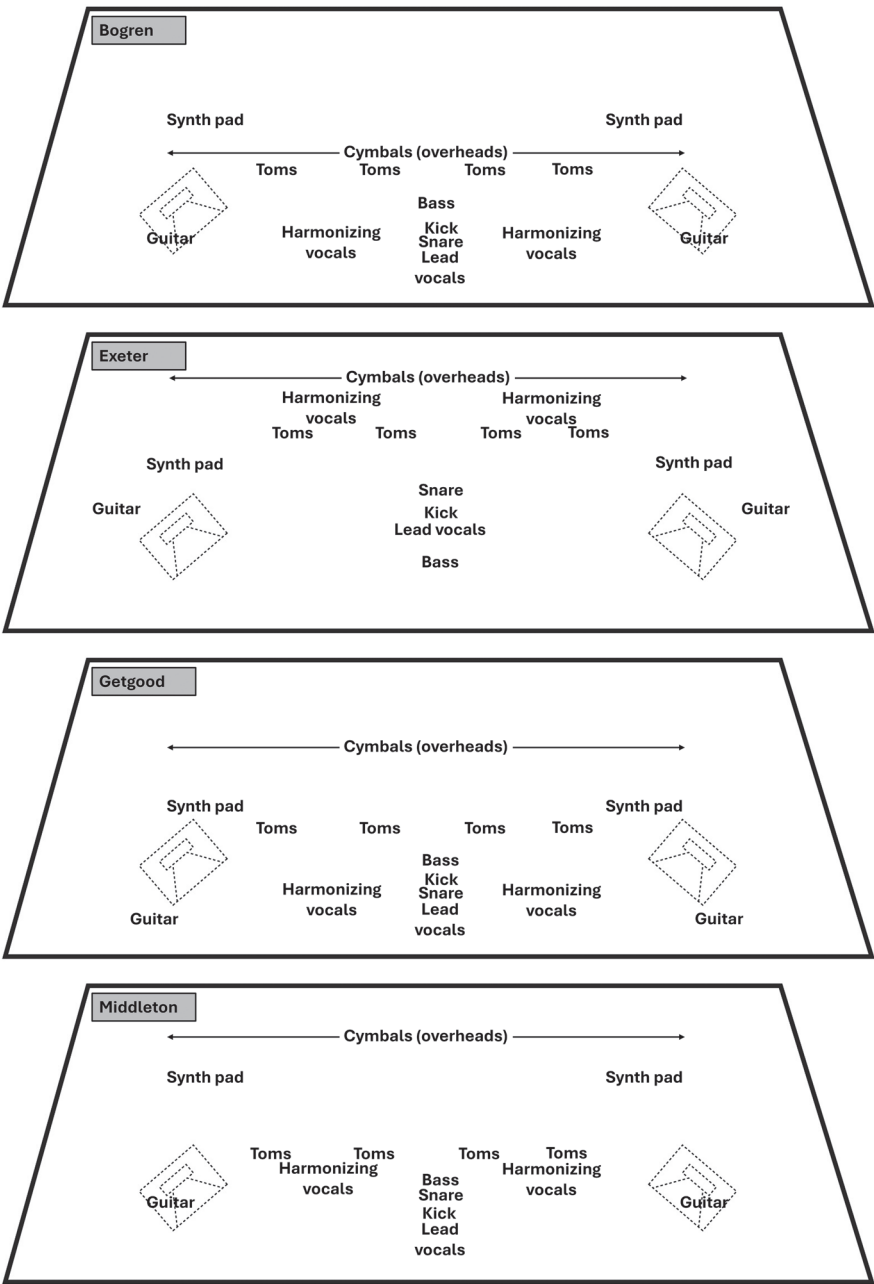


FIGURE 6.4 Soundstage visualization of the mixes of Bogren, Exeter, Getgood, and Middleton.

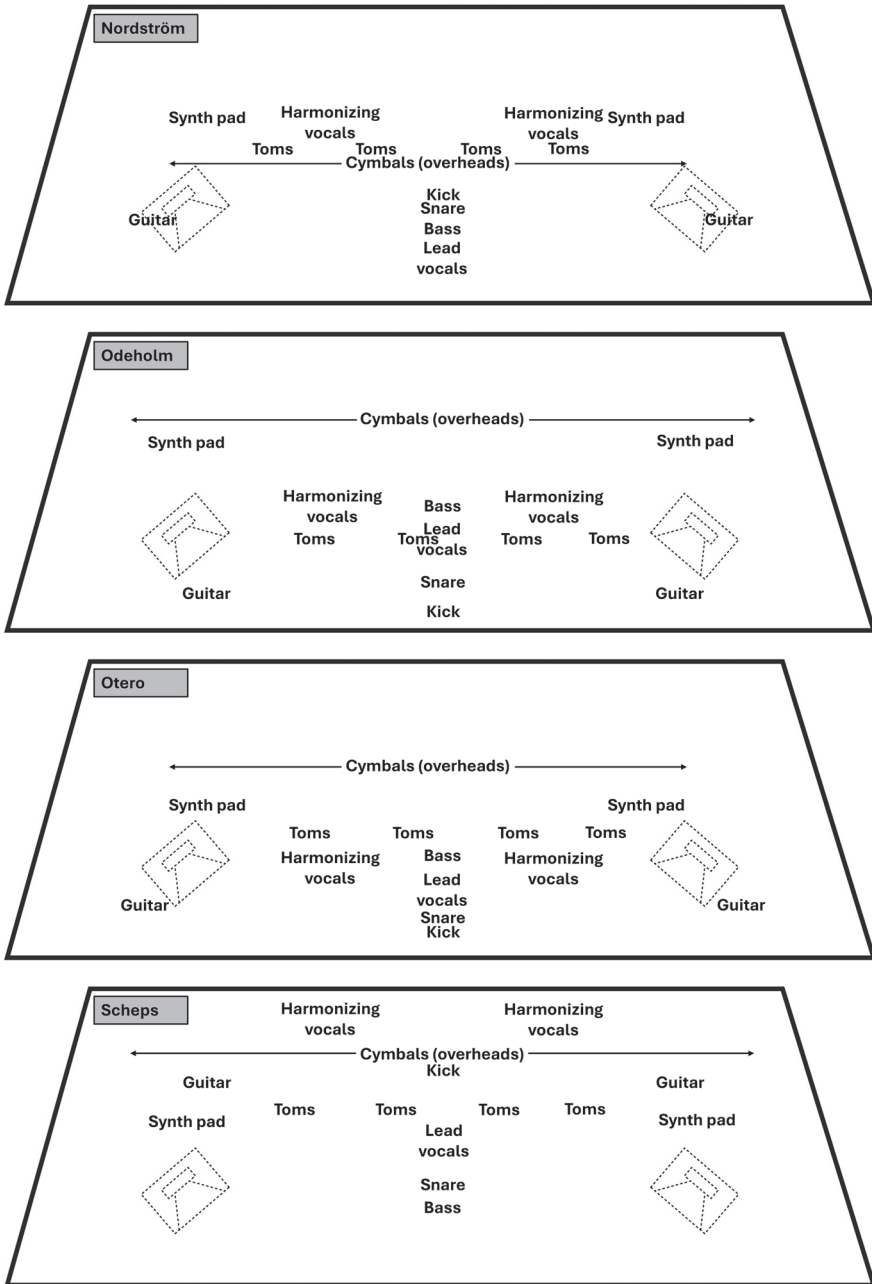


FIGURE 6.5 Soundstage visualization of the mixes of Nordström, Odeholm, Otero, and Scheps.

Besides loudness, another relevant factor is brightness due to its role in enhancing dimensionality and influencing perceived proximity (Zagorski-Thomas 2012: 141). High frequencies are intuitively associated with closeness, shaped by environmentally learnt auditory cues (Zagorski-Thomas 2014; Walther-Hansen 2020). Producers like Odeholm harness this principle to construct hyperreal proximity by emphasizing high-frequency details that naturally dissipate over distance (Schubert and Wolfe 2006). His objective of ‘maximizing every detail on every level’ involves amplifying these frequencies to heighten clarity and proximity. Odeholm’s guitar tones are distinctly bright and relatively light in the low-end, allowing the kick and bass to carry the primary weight of the mix, in line with his low-end hierarchy. To contrast this effect, Otero balances brightness with substantial low-end to create tight, palm-muted guitar notes that add punch and directness. Middleton achieves a similar effect by focusing on low-end clarity while avoiding excessive brightness or ‘fizz’. Nordström lends the guitars more low-end weight but retains enough brightness to ensure clarity and directness. In contrast, Scheps maintains a distinct percussive tone without tipping into hyperreality, which results in guitars that feel less close compared to other mixes. These tonal variations reflect each producer’s aesthetic priorities, with some emphasizing sonic weight and density, while others focus on definition and punch tailored to specific riffs and arrangements.

Brightness interacts closely with distortion, which inherently enhances it by amplifying the entire frequency spectrum, adding harmonic complexity and enriching timbre (Herbst 2016). In Odeholm’s mix, multiple layers of distortion—including saturation, overdrive, and clipping—are applied to nearly every element, creating a dense and direct hyperreal texture, where guitars and percussion seem to leap forward with heightened brightness and proximity. His guitar tone is exceptionally bright and aggressive due to the high distortion levels. This brightness extends beyond the guitar to other elements, demonstrated in his kick drum with its distinct ‘clickiness’, a hallmark of hyperreal sound that cannot be achieved in a purely acoustic setting. Such clickiness is often enhanced by modifications to the instrument itself, such as using plastic beaters or click pads, alongside processing techniques like EQ, compression, and distortion. These methods produce a clarity and articulation of unnatural precision. Hyperreal kicks in the mixes by Odeholm, Otero, and Getgood appear to leap out of the soundstage, creating a pronounced sense of immediacy (Figures 6.4 and 6.5). This hyperreal aesthetic contrasts with Scheps’ approach, which uses parallel distortion to retain transient clarity and punch while preserving a live feel. Scheps’ method subtly sharpens transients and maintains a wider dynamic range, emulating the authenticity of live performances. In contrast, Odeholm’s approach prioritizes an autographic ideal (Gracyk 1996: 31–36) that privileges the recorded version, replicating it in live settings through studio-derived sounds.

Besides loudness and brightness, reverb is integral to establishing the depth dimension of a mix, with distinct approaches to reverb usage influencing the spatial feel of different mixes. In metal production, it is common to apply reverb to vocals and drums, while rhythm guitars and bass are typically kept dry to preserve a direct, clear, and punchy sound (Mynett 2017: 316). Producers favouring a dry, upfront drum sound—especially for shells—often applied reverb selectively to cymbals. This technique enhances the perceived proximity of the kick and snare while creating a sense of distance around the cymbals, opening up the middle and higher frequency ranges for other instruments and vocals. Some of the driest drum mixes were crafted by Getgood, Odeholm, and Middleton, with Middleton's drum sound relying exclusively on samples for the shells. Odeholm's mix achieves an exceptionally hyperreal effect through close-sounding, larger-than-life shells and cymbals, mixed at lower relative levels with attenuated high frequencies. This approach allows both Odeholm's drum shells and guitar wall to dominate the foreground by delivering an intense and highly immediate sonic impact. At the opposite end of the spectrum, Scheps positions his entire drum kit behind the guitar wall, with only the snare occupying a foreground position. In Otero and Exeter's mixes, drum shells are foregrounded, while cymbals are recessed through different combinations of low level, reverb, and darker tonal adjustments. A more natural drum sound is evident in the mixes of Bogren and Nordström, who maintain a balanced loudness ratio between shells and cymbals to ensure cohesive proximity. Despite this natural balance, their mixes still reflect a layer of hyperreality typical of modern metal production, contrasting with Scheps' more rock-oriented drum sound. These varied reverb applications and spatial placements illustrate the producers' diverse approaches to depth and proximity, which contribute to each mix's distinct aesthetic.

Spatial effects such as reverb and delay further enhance depth by creating a sense of dimensionality within the soundstage. Zagorski-Thomas (2010) describes this practice as 'functional staging' in which elements are positioned within an idealized acoustic space suited to the genre's performance settings. For instance in rock production, reverb and delay are often added to high-frequency elements to evoke the acoustics of large venues, while bass frequencies are kept dry to preserve rhythmic clarity and low-end punch. This selective use of spatial effects creates a 'sonic cartoon' (Zagorski-Thomas 2014: 49–69), an exaggerated yet effective representation of the performance space. This approach enhances acoustics beneficial to the mix while minimizing those that detract, balancing musical and social functions.

In metal production, the functional staging approach is often pushed further, prioritizing proximity and impact over mere spatial separation. Producers like Odeholm and Middleton favour a dry mix to bring sounds as close to the listener as possible (Mynett 2017: 307–325). Odeholm's style exemplifies this approach: his mix eschews ambient effects and relies on extreme

loudness and brightness to create a hyper-immediate experience. This ‘sonic sledgehammer’ aesthetic minimizes the perceptual distance between the listener and the soundstage—what Moylan describes as the ‘stage-to-listener distance’ (2007: 52). While this distance typically defines the front edge of the soundstage and intimacy in recordings, metal production leverages it to create a more forceful and visceral connection. Odeholm’s mix embodies such intensity that it gives listeners the impression that the sounds are leaping directly at them, a hallmark of hyperrealist production, though rarely executed to the extreme degree seen in Odeholm’s work (Figures 6.4 and 6.5).

Hyperreality, as illustrated in Odeholm’s mix, transforms production into an exaggerated version of reality. Enhanced brightness, loudness, and proximity amplify the tangible power and intensity of the sound. This approach aligns with the concept of sonic cartoons, where elements such as size, low-end weight, and punch are magnified to heighten impact while other characteristics are minimized. Although the hyperreal aesthetic appeals to some for its clarity and impact, it may feel artificial to those who favour a more organic sound. As a result, contemporary metal producers exhibit diverse stylistic approaches. Odeholm, Middleton, Getgood, and Otero lean into hyperrealism, crafting exaggerated and intensely immediate mixes. By contrast, Scheps and Exeter favour a naturalistic aesthetic, while Bogren and Nordström strike a balance between these extremes (Figure 6.1).

* * *

To understand how production techniques influence proximity and depth, it is essential to consider the roles of loudness and dynamic range in mastering. Both parameters directly affect the perceived closeness of sounds within the mix, which shapes the listener’s spatial experience of depth and proximity. Increasing loudness through techniques such as compression and limiting reduces the dynamic range, which emphasizes proximity by flattening the sound and minimizing the impact of short-term peaks. This approach can create a consistent sense of closeness throughout the track by reducing the contrast between quieter and louder elements.

We facilitated controlled comparisons between mixes by applying loudness normalization, using Scheps’ relatively quiet and uncompressed mix as a reference. Measured in LUFS (Loudness Units Relative to Full Scale), this normalization process balances perceived loudness across tracks while accounting for frequency distribution characteristics, such as brightness levels (Mynett 2017: 369–377). Streaming platforms like Spotify employ similar techniques to maintain uniform playback levels, mitigating the effects of the ‘loudness wars’ that have influenced metal production practices (Smialek 2016: 117–120). Scheps’ mix measures –10.4 LUFS, while the louder, more hyperreal mixes from producers like Middleton (–7.6 LUFS), Otero (–7.5

LUFS), and Odeholm (−5.6 LUFS) approach the digital clipping threshold. Although the loudness war has diminished somewhat with the adoption of loudness standards on streaming platforms, achieving sufficient loudness remains relevant. Otero highlighted this necessity, explaining, ‘You don’t want it to be much quieter than its mix peers’. However, he also stressed that it is not just about loudness but also about creating a hyperreal sense of loudness as a hallmark of contemporary metal production.

Hot mixes like Odeholm’s are marked by extreme dynamic range compression. This approach enhances the perception of proximity but significantly reduces dynamic range, limiting the impact of short-term peaks or transients on the signal and potentially diminishing punch (Fenton and Lee 2019). Applying heavy compression, limiting, and saturation trades timbral individuality in favour of a dense, uniform loudness that reinforces an in-your-face closeness (Herbst 2016: 115–142). This trade-off exemplifies the need to balance hyperreal proximity with dynamic variation, the former often prioritized in contemporary metal.

Waveform diagrams (Figure 6.6) illustrate these differences in dynamic range across mixes. Brighter portions represent perceived loudness and average levels, while darker portions highlight short-term peaks or transients such as percussive hits. Scheps’ mix displays clear spikes, reflecting dynamic variation. His preference for avoiding direct compression in favour of parallel compression and distortion preserves a live feel and maintains a wider dynamic range. In contrast, Odeholm’s heavily compressed signal, colloquially referred to as a ‘sausage’, attenuates most transients and creates a near-constant dynamic level throughout the track. His signal approaches the dynamic ranges typical of EDM (3–6 dB), contrasting with Scheps’ mix,

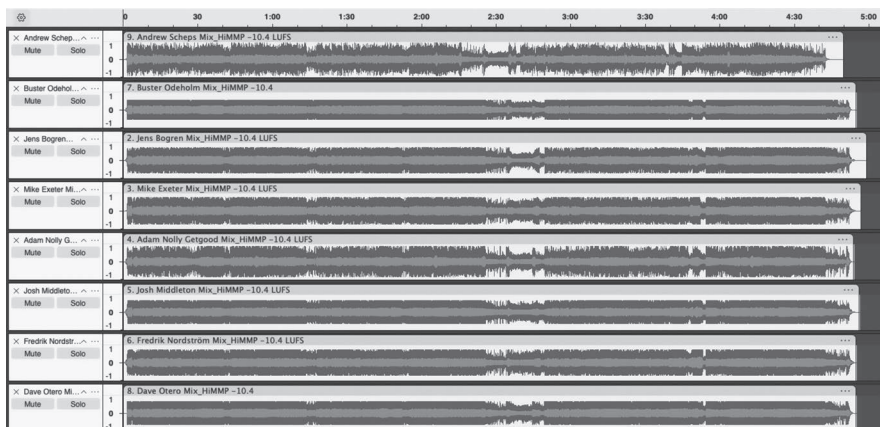


FIGURE 6.6 Waveforms of the final mixes. Brighter colour represents average loudness; darker colour represents peaks.

which retains a range of 8–10 dB, more typical of rock standards (Antares 2024).

Various forms of distortion, ranging from gentle saturation to extreme clipping, were powerful tools for enhancing perceived loudness and directness. Getgood noted that tape emulation saturation could ‘bring things a bit more forwards’ and reinforce the low-end—a sentiment echoed by Otero. Clipping was particularly favoured by Bogren and Middleton, who considered it to be the most effective way to preserve the snare in the mix; conventional compression can easily compromise it. Unsurprisingly, Odeholm employed the most extreme approach to distortion at the mastering stage. In addition to distortion applied at the track and buss levels (excluding vocals), he used two (outboard) distortion units on the entire mix. These distortion processors had several effects: adding glue and sustain, controlling transients, brightening the signal, increasing low-end weight, and enhancing power and proximity. Specifically regarding the kick, Odeholm highlighted that distortion lent the tone ‘more authority’.

For some producers, however, loudness is secondary to preserving dynamic range and live authenticity. Scheps and Exeter, for instance, prioritize liveness over sheer loudness, opting for subtle compression and limiting their use of drum samples and triggers. Similarly, Bogren, who values dynamic range, employed an Solid State Logic compressor on the master buss that is ‘just barely moving the needle’, particularly during intense sections with double-kick drums. He emphasized that ‘it doesn’t sound good if you go too much’, aiming to maintain clarity and weight without over-compression. His approach contrasts that of hyperrealist producers such as Odeholm, Middleton, Getgood, and Otero, who embrace digital manipulation to convey augmented impact that exceeds what is possible in a traditional studio or live setting. For these producers, techniques like limiting and clipping on specific elements, whether broadband, multiband, or in parallel, create the density and competitive loudness that modern metal requires. Odeholm, for example, strives to maximize sonic weight to a level comparable to electronic genres, achieving a sound that ‘has that full frequency range’.

These diverse approaches highlight differing philosophies within metal production, ranging from an ‘authentic’ emphasis on live-feel mixing to a bold embrace of hyperreal aesthetics. Each approach reflects a unique vision of how metal’s performance and sonic impact should be represented, whether through preserving organic dynamics or enhancing aggression using advanced processing techniques.

6.3.3.2 *Stereo Width*

In metal production, width is essential for creating a wide stereo image, with producers universally valuing wide panning to enhance the perceived size of

the soundstage. As guitars are central to metal's sonic identity, the guitar mix width often defines the entire soundstage. Accordingly, nearly all producers fully panned most or even all their guitar tracks to establish an ultra-wide stereo field, following general metal engineering conventions (Mynett 2017: 205). For Exeter, fully wide panning was an 'unwritten rule', a sentiment that Bogren, Getgood, Odeholm, and Otero echoed. Bogren remarked, 'I try not to be too subtle when it comes to panning because if you start to overthink the panning too much, you will end up with a mix that feels a little narrower', highlighting his preference for wide panning to avoid compromising width. In contrast, Middleton and Nordström employed a more nuanced approach by narrowing the panning of half of the guitar tracks. Nordström, for instance, panned his darker guitar pair at 80%, slightly narrowing these layers to increase perceived width while maintaining focus. He described this approach as 'doing them a little bit more mono . . . maybe a little bit more focused'. Similarly, Middleton panned his secondary guitar pair at 89% and reduced their level by 8 decibels compared to the fully panned primary tracks. With varying tonal characteristics in pairs, using different cabinet and speaker combinations, Middleton added to the texture's density while supporting the overall width. Narrowing one pair of guitars can produce a slightly more 'spacious, three-dimensional guitar sound' (Mynett 2017: 205).

Several producers also utilized psychoacoustic processing to widen the stereo field beyond conventional panning. Scheps, Odeholm, and Getgood all employed stereo-widening tools to position guitars beyond what traditional panning permits, ensuring that they did not interfere with other elements, particularly the drum overheads positioned at the edges of the soundstage. This technique maximizes the guitar sound in size and proximity while preserving the drum's clarity, thereby expanding the stereo field and enhancing the spatial depth of the mix. However, it carries the potential drawback of phase issues, which can compromise mono compatibility.

A typical method for enhancing width in metal production is recording distinct guitar tones for the left and right channels. Some bands, such as At the Gates on *At War with Reality* (2014), use identical tones on both sides, while others, like Lamb of God on their self-titled album *Lamb of God* (2020), vary tones between channels to create a wider stereo impression. However, none of the producers in this project employed fundamentally different guitar tones for each channel. Exeter and Scheps instead focused on enhancing width by applying different EQ settings to the left and right channels. It is unclear whether this choice aimed primarily to increase the width or reflected a live fidelity-driven approach, typical of traditional heavy metal, where each guitarist's tone defines one side of the stereo field (Mynett 2017: 137–138). However, with aesthetic priorities shifting more and more towards rhythmic precision, this approach has become less common in metal recordings over the past decade (Mynett 2019a). The challenge of achieving tight

synchronization has increasingly led to a single player recording all rhythm guitar parts, which reduces the individuality and tonal distinctions between channels.

The impact of these panning and widening techniques is illustrated in Figure 6.7, which displays the discussed producers' guitar sub-mix stereo field and the distribution of energy across the stereo spectrum at a specific time point. In this visualization, higher frequencies are positioned at the top, with the stereo position mapped horizontally. The guitar signal appears as a bright cloud, showing darker shades representing the range of stereo distribution over 1 second, while a bright cloud line indicates the average distribution over milliseconds. A brighter dashed line/curve highlights whether the energy distribution of the guitar signals is skewed to one side or is symmetrical. In Exeter's and Scheps' mixes, asymmetrical brightness resulting from their distinct EQ choices for the channels on the left and right side shifts the balance towards the left and right speakers, respectively. This asymmetrical brightness contrasts with Getgood's and Middleton's guitar mixes, which rely on psychoacoustic widening and regular panning techniques to create a more symmetrical stereo image. Despite these differences, Exeter's and Scheps' approach of applying different EQ treatments to each channel achieves a comparably wide stereo field, suggesting that a more traditional, naturalistic method can match the sense of width created through newer hyperreal production techniques.

Maximum width in metal production is typically achieved by focusing on higher frequencies, which are easier to localize directionally than lower frequencies (see Mynett 2017: 203–208). Consequently, most producers—including Middleton, Exeter, Getgood, and Nordström—opted for monophonic or predominantly mono bass signals across the frequency spectrum.

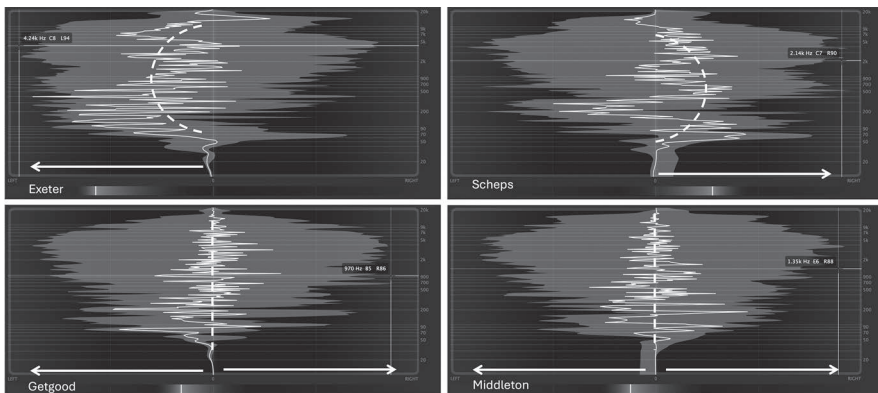


FIGURE 6.7 A comparison of panning symmetries. The dashed lines and curves show overall trends.

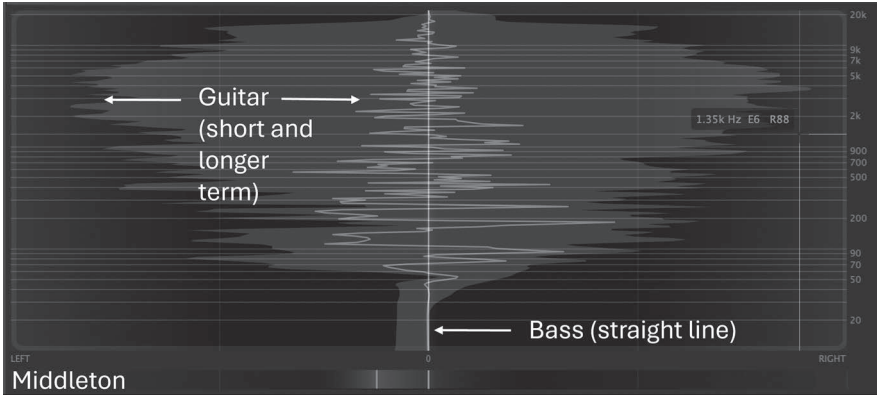


FIGURE 6.8 An overlay of guitar and bass panning symmetries; mix by Middleton.

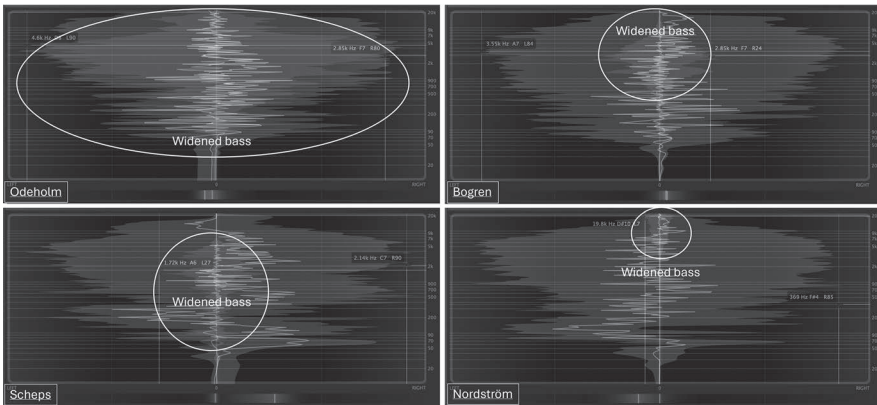


FIGURE 6.9 A comparison of guitar and bass panning symmetries.

For instance Middleton had an entirely mono bass signal, as illustrated in Figure 6.8. Here, Middleton's bass appears as a near-straight line in the centre of the soundstage, contrasting with the more dispersed darker clouds in Figure 6.9. In this latter figure, Odeholm and Bogren employ the widest bass signals, followed by Scheps and Nordström, whose bass signals only widen at the highest frequencies. A more detailed exploration of these differences, particularly concerning the concept of a 'meta-instrument', is provided in the next section.

In Odeholm's mix, a stereo bass signal was created by duplicating and modifying a monophonic bass track. By routing this signal through a stereo amplifier cabinet typically used for guitars, Odeholm achieved a widened bass sound. As shown in Figure 6.9, his bass stereo image closely aligns with the guitars, except for being less distorted and bright—attributes not readily

visible in the figure but noticeable upon listening. With a similar chorus effect applied in parallel with the main signal, Bogren widened the bass sound subtly. Scheps and Nordström also presented stereo bass signals; however, as neither explicitly mentioned widening techniques, these effects may result from processing algorithms within their audio tools.

Drums are another essential component in establishing width, with all producers panning overheads fully wide, consistent with guidance from metal engineering manuals (Mynett 2017: 206). This practice reinforces the boundaries of the soundstage and maximizes perceived width. Otero explained that spot microphones for the hi-hat and ride are panned inward, requiring clear separation between the overhead and spot tracks to maintain clarity. Odeholm, prioritizing hyperrealism, not only panned his overheads at 100% but also applied stereo widening to make the drums ‘super wide’. Room tracks, however, received varied treatment. Getgood and Middleton omitted room tracks entirely, citing aesthetic preferences and favouring the overheads as their primary spatial reference. Others, such as Scheps, panned room tracks more narrowly at 80%, not to conserve space or size but to reduce abrasiveness. Despite their modern approach to room tracks, both Getgood and Middleton adopted a conservative strategy for toms, panning them at moderate widths to align with their acoustic positions and achieve a natural expression. Middleton, for instance, limited tom panning to 45% to maintain realism. By contrast, a traditional producer like Scheps fully panned the toms to support the mix’s spatial spread.

Vocals also benefitted from stereo-widening techniques in most mixes. Middleton used the chorus component of a spreader to achieve a thickening effect, while Exeter widened the backing vocals to carve out space for the lead vocal. Otero employed an automated double-tracking processor, which enhanced the vocals’ perceived size and contributed to a more cohesive and immersive sound across the vocal layers.

6.3.3.3 Cohesion

A production’s sense of cohesion depends on how well the various elements tonally blend to occupy a shared spatial environment to create a unified auditory impression (Yang 2024). For drums, cohesion can evoke either the natural sound of a kit played by a live drummer or the drum machine’s precise and isolated qualities. Achieving cohesion involves presenting drum components—kick, snare, hi-hat, toms, and cymbals—in a manner that feels integrated within the overall mix. A traditional rock production prioritizes cohesion to emulate the balance of a live performance space (Pattie 2007). For example classic rock albums such as AC/DC’s *Back in Black* (1980) prominently balance cymbals to reflect their natural loudness in live settings. In contrast, contemporary metal production often emphasizes hyperreal

proximity, focusing on high-impact drum shells—frequently utilizing ‘clean’ samples—while reducing the presence of cymbals to avoid the abrasiveness of high frequencies under heavy processing (Herbst and Mynett 2021a: 639).

Cohesion is inherently shaped by the interaction of all elements involved in the mix, making its assessment ineffective in isolation. For instance the tonal characteristics of guitars influence the perceived depth and cohesion of the cymbals, kick, snare, and toms. This interconnectedness is important for producers seeking an organic sound. However, not all producers prioritize natural cohesion. Odeholm, for instance, maximized the individual sonic impact of each instrument, favouring a hyperreal aesthetic over holistic cohesion. In contrast, Scheps employed detailed processing techniques to achieve a more natural result and align with a rock-inspired aesthetic.

Although impacting the entire mix, producers most often discussed cohesion in the context of drums due to their complexity and layered nature, sometimes involving up to 40 microphone signals alongside numerous samples (Herbst and Mynett 2021b: 146–147). Mixing metal drums requires balancing impact and cohesion across a vast frequency spectrum, from the deep 30 Hz tones of a 24-inch kick drum to the 20 kHz shimmer of cymbals. Successfully integrating these frequencies requires the consideration of each element’s tonal qualities, its position in the stereo field, and its role within the broader context of the mix.

Room tracks held a central role for several producers (see also Yang 2024: 138–146), aligning with established engineering practices in popular music genres. Exeter highlighted that the room track ‘envelops the rest of the kit’ and enhances the snare’s tone to provide a cohesive foundation. Nordström noted that room tracks add depth to slower compositions but can overcrowd faster sections, requiring a drier, more separated approach to preserve drum clarity. For ‘In Solitude’, Nordström selected the room tracks and compressed them considerably to add heaviness, using de-essing to mitigate the cymbals’ abrasive qualities exacerbated by compression. Otero employed a similar approach, using (parallel) compression and distortion to ‘crush’ the room tracks, followed by intelligent processors to manage the resulting harshness. Like Exeter, Otero applied bandpass filtering to the room tracks, focusing on the ambient tone of the drum shells while keeping the kick and cymbals at low levels, as other tracks provided these elements.

Odeholm’s approach mirrored these methods but incorporated a unique touch: he used a transient designer in parallel to lengthen the drum sound, minimizing the cymbals’ prominence compared to standard compression. Unlike Exeter and Otero, Odeholm prioritized reinforcing the kick and snare within the room tracks to enhance their spatial perception when blended with spot microphones and samples. In contrast, some contemporary producers deprioritized room tracks and opted for alternative methods to achieve snare decay and ambience. Getgood and Middleton, for instance, excluded nearly

all recorded room tracks and instead used ambient snare samples and reverb effects to simulate room ambience. But while Middleton retained a subtle level of the room track for its ‘vibe’, Getgood omitted it entirely, citing its detrimental effect on the snare’s tone. He favoured the controlled, ambient character of sampled snares.

The room tracks aside, producers employed various dynamic processors and wave-shaping techniques to enhance cohesion and prevent a fragmented drum sound. Scheps relied on parallel compression to create a ‘glue’ effect across the drum mix (Yang 2024: 172–176), taking the risk of introducing masking problems due to added density—a challenge similarly managed by Getgood and Otero. Transient designers and limiters were also widely used to integrate toms into the drum mix. Middleton applied transient designers for more sustain in the toms while moderating overly aggressive attack transients. Likewise, Getgood automated transient design settings based on the intensity of fills, reducing attack on softer hits and enhancing sustain for more forceful strikes. Limiters were employed to control levels and smooth out the envelope further to add cohesive length to the tom sound (Yang 2024: 128–134).

Producers strongly emphasized saturation and distortion to enhance cohesion across the drum kit, using these techniques to shape the envelope and unify the overall drum sound. Scheps considered distortion essential for preventing the kit from sounding fragmented. By lengthening the drum sounds, especially the snare, distortion filled the sonic space between shorter kick hits and created a sustained snare tone that bridged these intervals. To achieve this effect, Scheps employed both direct and parallel distortion, which extended the drum sounds with enhanced mid-range frequencies, adding density and coherence across the kit. Middleton and Otero also focused on lengthening the snare’s body to provide a rounded and cohesive sound. Whereas Middleton used clipping to extend the snare, enriching its body without overly accentuating its attack, others like Getgood and Odeholm directed distortion effects towards the overheads to achieve a ‘washy’ sound that strengthened a dense and cohesive drum mix. Otero explained that while EQ could make sounds feel disconnected, distortion acted as a glue, reintegrating the elements and restoring a natural quality:

If you’re doing a lot of EQ, which I usually do, the sound can sound a bit disconnected from what it used to be, and distorting it brings it back. It glues it all together again and makes it a cohesive sound rather than this weird EQ’d version.

Otero enhanced cohesion further by employing console emulation to introduce gentle harmonic saturation across individual tracks and busses. This saturation added spectral complexity and density to the mix, resulting in

what he described as a ‘crunchy, squishy mix; it feels like it’s wrapped around you like they were in the heyday’, illustrating how distortion added warmth and cohesion for a more immersive drum sound.

In addition to wave-shaping techniques, reverb played a central role in enhancing cohesion by blending various sounds into a cohesive acoustic environment (Yang 2024: 138–146). Drier reverb settings produced an immediate, in-your-face effect, while more pronounced reverb subtly pushed elements further back in the mix, softening their presence. Most producers applied reverb primarily to drums, aiming to unify the kit and integrate lead and backing vocals within the mix. Approaches to reverb varied widely. Some producers, such as Getgood, Middleton, Otero, and Odeholm, used a single processor for specific elements like the snare and toms. Others, like Bogren, employed multiple reverbs, tailoring four distinct processors to achieve varying textures across the kit. While producers like Getgood and Middleton focused reverb exclusively on the snare and toms, Odeholm and Otero included the kick for a cohesive drum room. Odeholm elaborated:

Having long room sounds or room samples might be a bit distracting sometimes; I just want this to have a little bit of that tail because it’s not super loud if you listen to the drum mix, and I mute and unmute. But it has that tail at the end of the transients. It just gives it a bit more glue. And if there are maybe weird cuts or edits, this might smooth over that a little bit as well.

Exeter concurred on the importance of reverb for cohesion, stating that ‘the moment you take it away, it all jumps forward too much’, highlighting how reverb helps to naturally situate elements within the mix. The producers took varying approaches, with some also routing the kick into the reverb channels to enhance cohesion, albeit at the cost of clarity, while others, like Middleton and Bogren, preferred ambient kick samples for cohesion. Yet, these samples were used selectively rather than throughout the song, particularly during the lead-in and breakdown, because these provided more sonic space. Bogren’s goal in these sections was to create a greater ‘sense of space’. Similarly, Scheps avoided samples but automated reverb during key moments, such as the intro and breakdown, to give these sparser sections a fuller, room-filling quality.

Reverb was far more commonly and prominently applied to the snare than the kick, primarily to add length and depth, often serving functions akin to wave-shaping. Middleton highlighted the benefit of triggering room samples specifically for snare hits, mainly when using snare samples. He explained:

If you get the consistency of the room mic sound, it can balance out the inconsistency of the close mic. And it doesn’t obviously sound as

sample-heavy because it's like an ambience that you're sampling as opposed to a close mic, which is really obvious to hear the fakeness.

Even when relying on snare samples, Middleton typically blends in a room mic sample to create a more natural-sounding space around the snare, helping it integrate effectively within the mix. For Odeholm, however, ambient snare samples were less about cohesion and more about achieving impact and size. He remarked:

Some samples are meant to create a sense of space. . . . And I feel like in heavy production, you need that sense of impact, the sense of size. And the sense of space adds to that size perspective. As you said, the long reverbs sound like you're in space or a huge room or like a mountain range that's echoing.

Odeholm further explained that ambient snare samples help to widen the snare sound, which he augmented with subtle psychoacoustic widening. Despite the risk of phase issues, he embraced this technique to create an intentionally hyper-wide effect that reinforced his hyperreal production style.

Cohesion in metal drum production is also influenced by spectrum and loudness balance. While few producers explicitly addressed this aspect, closely aligned brightness levels across drum shells can enhance cohesion: a dark, punchy kick pairs naturally with similar-sounding toms, while a bright, clicky kick complements bright toms. Although the snare's wired nature makes it inherently distinct, tonal consistency with the kick and toms supports a cohesive sound. For example Bogren carefully matched the brightness of his kick and snare, achieving a cohesive tonal blend. Exeter's mix demonstrates less cohesion, with a low-end-focused kick that contrasts with a higher, quieter snare. Odeholm's drum mix, characterized by its hyperreal aesthetic, prioritizes impact over cohesion, with each kit element optimized for punch rather than a unified sound. Otero's mix stands out for its emphasis on air frequencies (notably in the 10–13 kHz range), giving his cymbals an open, spacious quality, unlike the denser high-end treatment in Exeter's and Scheps' mixes. The post-chorus transition into the second verse (1:05–1:14) provides valuable insight into cohesion. In this section, Bogren, Getgood, Nordström, and Otero achieve high cohesion by closely aligning the tonal qualities of their kick and toms. Although Odeholm's extensive sample replacement reduces overall cohesion, his mix retains a sense of unity. Conversely, Exeter's disparate sample replacements and Scheps' varied reverb settings on the toms and kick show the lowest cohesion, with both approaches creating a more fragmented drum sound. Otero's drier toms, distinct in character, add a unique texture that sets his mix apart from the others.

The loudness balance between drum shells and cymbals further highlights divergent production philosophies. Otero and Odeholm emphasized drum shells, isolating them from the cymbals to increase clarity and punch, which can reduce overall cohesion. Likewise, Middleton's mix adopts a compartmentalized approach: the kick and snare are prominent and forward, while the toms and cymbals feel spatially detached, almost 'next door'. This separation seems popular among newer-school producers who prefer distinct element isolation over integrated cohesion. In contrast, Bogren and Getgood achieve a more unified sound by balancing shells and cymbals, creating the impression of a cohesive drum kit within a realistic room space while still delivering the hyperreal impact, typical of metal. Bogren's mix exemplifies this balance by smoothly blending drums, bass, guitars, and vocals into an effective, cohesive arrangement that adheres to metal conventions while delivering a believable wall of sound. Scheps, Exeter, and Middleton take another route with a more segmented approach. In Scheps' mix, the snare is placed forward while the kick is recessed, evoking an unamplified live setting where the kick is naturally less prominent. His toms also lack integration, sounding as though they would originate from a different space. Exeter's mix lacks cohesion, too, caused by a dominant kick, subdued snare, quiet cymbals, and a bass that, while pronounced in the sub-bass range, feels slightly separate from the mid-range-focused guitars.

These contrasting approaches reflect broader production philosophies. Some producers favour a hyperreal, separated, and clear sound, while others prioritize a live-like authenticity based on cohesion. Bogren's mix stands out for its cohesive integration of sonic weight and clarity, enhancing the musical composition while preserving a unified performance that aligns with contemporary metal aesthetics.

6.3.3.4 *Crafting Meta-Instruments*

Revisiting the discussion of stereo width in guitar and bass shows a striking contrast between traditional live-fidelity approaches and contemporary hyperreal aesthetics. Traditional metal production often emphasizes the separation between instruments, enabling each musician's performance to be distinctly perceived and ensuring that their individual identity is preserved within the mix. By contrast, hyperreal approaches generally take one of two possible forms: maximizing separation for greater clarity—particularly suited to fast subdivisions—or blending elements into a cohesive, overwhelming impact or wall of sound. The latter approach is most commonly observed with guitar and bass, where the two often integrate into a singular, forceful entity. This technique is exemplified in Getgood's description, which closely aligns with Odeholm's emphasis on low-frequency impact:

It's about all of the things hitting at the same time and generating this oneness of the sound. So, talking about the bass, when you've got a distorted

bass guitar, it really adds huge amounts of richness to that lower end. Combining with the guitars in this way makes it sound like one massive floor-to-ceiling sound, punctuated so that every attack is hit with a kick drum, and you’ve got this punch of the snare as well. It’s like the sum of all those parts together gives me, if I think about it, that sensation of a huge object, the heavy aspect.

Both Getgood and Odeholm allude to the concept of a ‘meta-instrument’, where guitar, bass, and, occasionally, even kick and snare coalesce into a singular, larger-than-life sound source. Their ambition in this regard culminates in a hyperreal, almost inhumanly massive auditory presence (Herbst and Mynett 2022: 646). The meta-instrument prioritizes a monolithic sound over the distinction of individual instruments, focusing on collective impact.

Odeholm’s method of timbral blending exemplifies this approach. His meta-instrument unifies instrumental sound sources through both frequency and stereo position overlap. A comparison of Figures 6.10 (Odeholm) and 6.11 (Exeter) illustrates this distinction in the frequency domain. For the

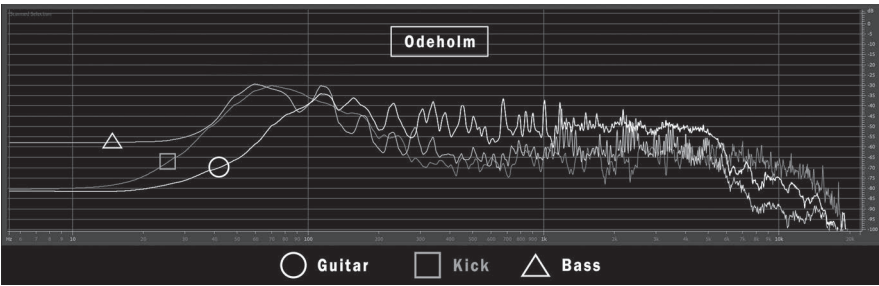


FIGURE 6.10 Kick, bass, guitar spectra (Odeholm, loudness-normalized).

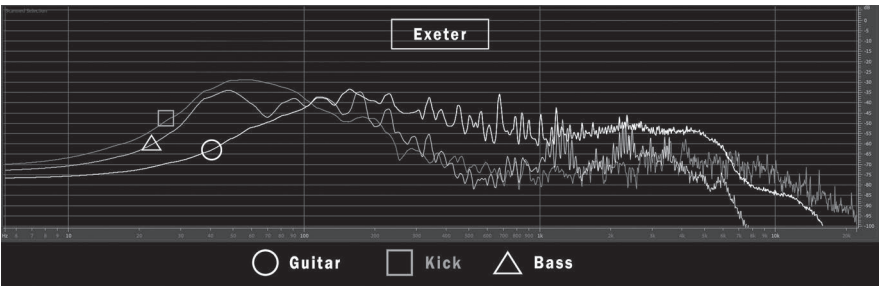


FIGURE 6.11 Kick, bass, guitar spectra (Exeter, loudness-normalized).

stereo domain, we refer to the previous analysis of stereo width. Exeter's mix maintains separation between the guitar and bass, with the guitar's frequency contour remaining relatively consistent while the bass dips through the mid-frequency range before peaking around 1–2.5 kHz. Contrasting Exeter's mix, Odeholm's guitar and bass show almost complete uniformity, lacking pronounced dips or peaks. Such frequency overlap reinforces the combined sound and gives the impression that the instruments function as a unified entity. In a similar vein, Odeholm's kick drum overlaps, further contributing to the meta-instrument effect. As previously noted, his guitar and bass share the same amplifier, loudspeaker, and distortion treatment, creating a cohesive and coherent auditory entity.

The shared amplifier and speaker configuration significantly influences—that is reduces—stereo separation, a setup central to Odeholm's second technique for crafting the meta-instrument. Odeholm initially applied a method similar to Bogren's, using a parallel chorus effect to transform the bass from a mono signal into a stereo sound. With a meanwhile modified approach, he exaggerates the stereo effect. As illustrated in Figure 6.9, the bass signal now extends almost to the edges of the stereo field, closely mirroring the width of the guitar signal. In contrast, Bogren's bass remains more centred, though not as narrow as Nordström's. Odeholm explained that this stereo spread, combined with added distortion on the bass track, enables him to 'marry' the bass and guitars, making them function as 'one unit' that maximizes cohesion and impact. While Nordström also employs bass distortion, he pursues a slightly different aim: to 'bring heaviness to the guitars', reflecting an alternative interpretation of the meta-instrument concept. As we found, Otero is open to modern processing techniques, but when it comes to widening the bass, he expressed reservations mainly due to his concern about introducing phase issues.

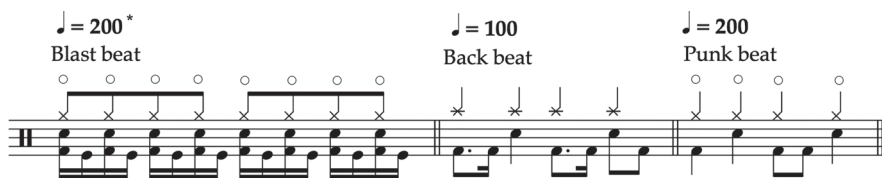
A distinctive element of Odeholm's approach is a third, centrally panned guitar, further reinforcing the meta-instrument concept.⁶ In contrast to conventional setups, Odeholm shifts the bass away from the stereo centre and places the third guitar in its stead. This spatial cross-merging creates a unified entity where the guitars and bass combine into one massive sound, a technique so deliberate that Odeholm stands alone in adopting a three-guitar configuration. This blend of shared frequencies, overlapping stereo positions, and a centrally placed guitar produces a sound aptly described as a 'sonic sledgehammer'.

Conversely, Scheps and Exeter distinctly separated, both vertically (frequency) and horizontally (stereo positioning), the bass and guitar. Scheps' mix maintains this separation through a less-distorted bass, allowing melodies and articulations, particularly in higher-register fills, to remain prominent. Exeter took another approach with an added sub-bass and a strong bass presence, which he combined with distinct timbral contrasts between

the bass and guitar. Bogren's mix separates these elements but with less emphasis on distinct frequency zones. Nordström adopted a middle ground, blending some elements while retaining functional separation. He summarized the role of bass in metal with an enigmatic remark: 'Bass in metal music is not an important instrument, but it is, at the same time, super important. But it's not important if it is audible'. Nordström's comment highlights a dual role for the bass in metal production: when functioning as an extension of the guitar's lower frequencies, the bass is essential for impact ('super important'), but as a standalone, audible instrument, its prominence is less critical. His mix leans towards an impactful blend aligned with the meta-instrument concept. While Nordström did not articulate this philosophy as explicitly as Odeholm or Getgood, he emphasized his overarching goal: 'get the band to sound like one unit. It's just like this should be like one big tank going forward'.

Ultimately, most producers, including Getgood, Odeholm, and Nordström, sought to blend guitars, bass, and drums (particularly the kick, snare, and toms) into a cohesive whole. Only Scheps and Exeter favoured greater instrumental separation. This convergence into a meta-instrument reflects a core characteristic of contemporary metal production, where collective impact and hyperreal scale have become defining aesthetic priorities.

A final consideration regarding timbral separation versus blending lies in drum production, which demonstrates how engineering choices impact genre-specific idioms within metal, either obscuring or emphasizing them. The blast beat, a hallmark of extreme metal drumming, exists in various forms but generally aims to convey energy and aggression (Hagen 2011: 186). These dense and intricate rhythms, particularly at high speeds within heavily layered arrangements, challenge producers to achieve sonic clarity. Among the drum patterns shown in Figure 6.12, both the blast beat and the beat we term 'punk beat' make it difficult to achieve a clear, intelligible sound. These unique challenges become evident towards the song's end (from 3:54), where differences between mixes reveal varying degrees of tonal separation, such as the distinction between kick and snare, and differing strategies for expressing musical intensity.



*Tempo indications reflect the felt pulse as determined by snare pacing.

FIGURE 6.12 Drumbeat types heard throughout 'In Solitude'.

The mixes demonstrate considerable differences in approach. For example Scheps' drum mix employs an aesthetic sometimes called 'machine-gunning', where the kick and/or snare of the blast beat merge into a consistent, robotic sound. While kick drums typically accommodate intensive signal processing, snares require more careful treatment to preserve a 'human' feel. Scheps' approach results in a relatively mechanical snare tone that deviates from an acoustic sound despite him being the only producer in this study who does not use drum samples. Additionally, the relative tonal uniformity between the kick and snare here risks diminishing the dramatic impact of the blast beat during this climactic section of the song. Exeter, whom we associate with Scheps' more rock-inspired and natural production paradigm, surprisingly adopted an opposite approach by accentuating the kick (alongside the bass guitar) while ensuring that the snare retained its distinct identity, capturing the energy of the performance through audible and separate double kicks and snare hits.

Another surprise was that the more contemporary, hyperrealism-oriented producers were most successful in preserving the human feel of the drum kit in this section. Otero and Bogen's mixes stand out for balanced performance authenticity—a realistic portrayal of live drumming that sacrifices some sonic clarity—with maximum impact, emphasizing rhythmic precision and tight synchronization. Odeholm's mix exemplifies the opposite with his hyperreal approach, focusing on achieving maximum impact that transcends the sound of a live band. His production intentionally creates a hyperreal quality that surpasses live performance, aiming for a larger-than-life auditory experience. However, this approach is controversial within metal communities, which represent diverse subgenres with varying aesthetic values, some prioritizing authenticity over hyperrealism.

The discussion of blending versus separation, whether in kick/bass/guitar or kick/snare combinations, demonstrates that both strategies are valid, depending on the instruments' roles (e.g. soloist vs. rhythm section) and the compositional context (e.g. chorus vs. intro). Within the framework of natural and hyperreal production paradigms, a producer's alignment with one approach often correlates with their experience in specific rock or metal subgenres. For instance Scheps openly acknowledged his limited familiarity with extreme metal styles, attributing this to a less idiomatic and potentially less impactful approach to the blast beat. By contrast, as an expert in technical death metal, where blast beats and rhythmically dense guitar riffs are integral, Otero engineered blast beats with a deep stylistic understanding that captured their full intensity and precision.

6.3.4 *Sonic Weight, Low-End Management, and Clarity*

One of the primary challenges in metal mixing is managing sonic density, particularly in the low-end (Mynett 2017: 15–16). As in other genres, clarity is essential for distinguishing individual instruments; however, metal

engineers must manage an especially dense spectrum, necessitating rigid low-end control while balancing high-end clarity without introducing harshness (Herbst and Mynett 2023a: 11–14). Producers were surprisingly reticent when discussing their respective low-end and high-end management strategies. Scheps, for example, was notably candid about his lack of low-end management: ‘I don’t. I mean, does it feel right? No. Is it feeling right now? Oh, that’s good’. This statement suggests that producers rely on tacit knowledge (Schmidt Horning 2004) and experiential intuition rather than strict technical guidelines. Nevertheless, the interviews gave valuable insights into the producers’ varied approaches.

6.3.4.1 *Foundations of Sonic Weight*

Nordström highlighted the importance of a strong bass performance as the foundation for a powerful low-end, a perspective shared by other producers. However, Odeholm stood out by taking additional measures, such as editing the drum tracks to rhythmically align the impact of the drum, bass, and guitar hits. As previously discussed, he was also the only producer to adjust the phase relationships between these instruments to enhance low-end weight and clarity.

Odeholm’s approach to low-end management begins with the kick drum as the foundational element, adjusting the levels of the bass and guitar relative to it. He explained, ‘What I usually do is listen to the bass without the sub and the guitars. . . . I turn the grit up till I hear it . . . and bring that down in level. Then I bring the entire level up again’. By isolating the bass and addressing specific frequency ranges—mids, lows, or high mids—Odeholm achieves a balanced low-end that blends well with the kick. He stressed the importance of a hierarchical approach to level-setting: ‘Tinkering with the low-end at the same time as the guitars doesn’t make sense because this is going to affect the kick’. To refine low-end cohesion further, Odeholm employed SoundRadix Pi, a phase-interactions mixer, to align the phase relationships between the kick, bass, and guitar. This tool allowed him to maintain low-end clarity and phase relationships even as rhythms and notes shifted dynamically. He elaborated:

There’s so much happening between these instruments. And to make sure everything is in phase, regardless of what notes the guitarist is playing or what rhythm the kick is playing . . . , the phase relationship is going to be different for each part of each riff. So, if I use this, I can make sure that the bass is aligned with the kick. . . . I use it on the guitar as well. And I also use it on effects tracks, such as sub-drops or impact sounds. . . . It just makes sure that the kick, bass, guitar, and the low-end of those are not competing with each other but adding to each other instead.

Selectively engaging Pi's low-frequency mode, Odeholm enhanced the low-end components, allowing the bass, kick, and guitar to reinforce and complement one another, thereby forming a unified sonic foundation.

Although not as elaborate as Odeholm's multi-instrument strategy, other producers also acknowledged the importance of phase alignment for managing the low-end across layers of a single instrument (see also Mynett 2017: 173–176). Otero and Scheps highlighted how phase adjustments could enhance a solid bass level and kick clarity. Scheps, for instance, described challenges in maintaining a consistent bass presence, stating, 'It would be there and then would disappear'. As the bass often doubles the guitars, he stressed, 'You've got to have the low-end in the bass because it's going to lend itself to the guitars and extend them down'. Phase inversion provided a solution: 'I flipped the phase on this . . . and all of a sudden, the mid-range wasn't as cool, but the low-end just happened'. This adjustment stabilized the bass's low-end, which was particularly important in cases where an intermittent kick rhythm prevented it from consistently carrying the low-end weight. Scheps explained, 'Because of how busy the kick was, it can't drive the low-end', emphasizing the bass guitar's role in maintaining low-end stability without resorting to side-chain compression, which he generally avoids.

Otero similarly prioritized phase alignment to achieve a cohesive bass sound, noting, 'I've auto-aligned all of my bass tracks just to make sure those play nice together', ensuring that phase coherence across bass layers was essential to prevent inconsistencies that could weaken the low-end. Additionally, Otero emphasized the importance of phase alignment in kick drum processing: 'Anytime you're doing processing to these two different sources on the same instrument, you've got to be aware of phase, specifically on some of the kick drum, because the low-end is where you hear that phase the most'. He also aligned the phase between his kick microphones and samples, which often differ in tone, to ensure a consistent and solid low-end.

6.3.4.2 *Kick Processing*

The kick drum was central to low-end management strategies for all producers, regardless of whether or not they explicitly conceptualized it as such. Apart from Scheps, every producer supplemented the acoustic kick with samples to fill out the frequency spectrum (see Section 6.3.2). However, the number of samples did not necessarily correlate with low-end weight due to the effect of phase interactions. Some mixes with only one additional sample produced the deepest-sounding kicks, particularly those by Odeholm and Exeter, contrasting Bogren's approach of using four samples that primarily enhanced the kick's complex sonic texture rather than its low-end depth.

Ensuring low-end consistency was especially essential in songs and sections with varying speeds of subdivision. Otero explained that samples help maintain a consistent low-end:

In a dense metal mix with a wall of guitar and bass and vocals and other elements, consistency isn't always there with only the natural kick. So, use a sample to, like, okay, let's give me some consistent fundamental low-end, some consistent attack.

For Getgood, limiting was another key technique for ensuring consistency in natural kicks. This sentiment was echoed by other producers who used SoundRadix Drum Leveler, a downward compressor based on beat detection, to control dynamics while preserving tonal identity (see Mynett 2017: 217–219). Getgood described such tools as ‘a really important part of not needing to use samples’. Otero also relied heavily on dynamic processors, as did Odeholm, who noted: ‘It’s eliminating some of the dynamics I don’t want. It’s also making the kick a lot shorter, and it’s removing some of the bleed from the cymbals’.

From a frequency perspective, Exeter emphasized the importance of ensuring sufficient low-end presence in both the kick and bass to avoid the ‘type-writer effect’ often heard in double-kick sections. He positioned the bass spectrally below the kick, likely to mitigate the low-end impact of the double kick on the overall mix. Nordström and Middleton adopted the opposite approach, placing the kick below the bass. For Nordström, this decision was motivated by a desire to assign distinct frequency ranges to each instrument, ensuring complementary coverage—a technique referred to as ‘mirrored EQ’ (Mynett 2017: 300). Middleton similarly appreciated the sub-bass energy of the kick and its contribution to overall low-end weight, a perspective shared by Getgood. While being typically meticulous in his processing, Otero noted that he does not fixate on the relative positioning of the kick and bass, instead responding to the specific requirements of the material at hand. This approach was paralleled by Scheps, who stated: ‘I generally don’t think about that between instruments’.

Most producers, including Nordström, Getgood, and Middleton, also adjusted their compression techniques to avoid overly compressing the kick or impacting its lowest frequencies. They achieved this by excluding the kick from the overall drum compression, using lower send levels, or applying high-pass filters within compressors to minimize pumping effects and preserve the low-end weight.

Side-chain processing is widely used to manage low-end interactions (Mynett 2017: 241; Herbst and Mynett 2021a: 643). In this project, however, half the partaking producers—Scheps, Exeter, Nordström, and Otero—preferred to avoid it. Exeter remarked, ‘You’re just transferring the problem somewhere

else', instead opting for a more adaptive approach that tailored the kick sound to each section of the song through automation or separate tracks. He described creating a 'palette of tools' by developing distinct kick sounds, adjusting their characteristics based on what each section requires, and balancing different kick sounds to complement each section with the energy and frequency it requires. His method often involved automating the level balance between individual kick tracks. For slower sections, he blended a fuller kick with rich low-end frequencies to add weight, while in faster sections, he emphasized a high-end-focused, clickier kick to enhance clarity. 'In the faster section, it's more clicky, and it's just done by balance', he explained, highlighting how this intricate control maintained a clear low-end that was effective without overpowering the mix. Tailoring the kick to each section, Exeter avoided the one-size-fits-all approach of side-chain processing, crafting a more dynamic low-end that supported the track's structure.

Otero similarly viewed side-chain compression as a 'last resort or later in the process', prioritizing 'tone sculpting . . . to fix a frequency puzzle first'. For his mix of 'In Solitude', Otero achieved balance exclusively through frequency management, altogether foregoing side-chain compression. In contrast, Odeholm relied extensively on side-chaining to maintain his low-end hierarchy, aiming for a kick that was 'super fat and as loud as it possibly can be'. Developed during his work on *Ashen* (2023) by Humanity's Last Breath, his method involved momentarily 'ducking' the bass, which ensured kick clarity without losing sustain (Herbst and Mynett 2021a: 643). He applied this technique across nearly all elements—guitars, drum rooms, cymbals, and synths—focusing specifically on the low frequencies to prevent an overt pumping effect. By side-chaining only the low-end portions of these instruments to the kick, Odeholm achieved a powerful low-end blending smoothly for maximum impact, sonic weight, and clarity.

Both Bogren and Getgood employed a 'keying' method, linking the bass to the kick. Bogren noted that this approach worked best in sections without fast double-kick patterns, as these could lead to inconsistent or imbalanced sounds. Getgood prioritized a 'big bass tone', balancing it against the kick to 'make the bass huge and upfront' without overwhelming the drum. Notably, Bogren employed a unique technique by keying the bass to the toms. He explained that toms, when being played, produce considerable low-end, which can create 'a mastering issue'. Compressing the bass based on tom activity, he avoided low-end spikes that could lead to distortion during mastering, particularly during high-energy tom fills.

6.3.4.3 Bass Processing

Most producers processed the bass extensively to control its sonic weight, particularly compared to guitars, which were generally crafted at the source.

Both Getgood and Bogren emphasized the bass's important role in a metal mix, especially its contribution to overall sonic weight. Bogren used limiting and multiband compression to achieve note stability, a technique also employed by Getgood and Middleton. Condensing the dynamic range was equally important to Otero and Nordström, who compressed the DI signal before routing it through amplifier simulations to create a rounder and more consistent tone. Odeholm utilized an array of processors to maintain stable bass levels, applying extreme levels of compression, filtering, and distortion to produce what he described as a 'sausage of low-end'. For Odeholm, the bass in contemporary mixes needed to be 'super-processed' to 'keep up'.

Distortion represented a major area of divergence. Whereas Otero used saturation in the high-end to create a 'full sound', Odeholm applied heavy distortion across the entire bass frequency range, considering it to be essential for maintaining low-end consistency. This approach contrasts with standard advice, taken by Bogren and Middleton, which recommends limiting distortion to the mid and high frequencies to preserve note clarity and punch (Mynett 2017: 285–294).

Spectral processing strategies varied further among producers. Bogren, Nordström, Scheps, and Otero highlighted the importance of crafting the bass tone in response to both drum and guitar sounds. Bogren described his approach as flexible and iterative: 'I usually create multiple bass sounds, and then I use whatever seems to fit, but it is paramount that I already have some sort of guitar sound'. Instead of adjusting the bass solely to the drums, he first established drum and guitar tones before adapting the bass to complement them. He explained: 'When I mix, I try to nail the drums and rhythm guitar sounds . . . and also adapt the playing of the bass to the rhythm and tuning'. This iterative adjustment ensured that the necessary back-and-forth changes determined how much low-end content the rhythm guitars could carry. This dynamic interplay between instruments reflects a shared philosophy in metal mixing: achieving a balanced, powerful low-end by carefully adapting the bass to the surrounding arrangement. Consequently, producers were cautious to adhere not too strictly to general principles regarding equalization. Yet, they generally attenuated upper bass and lower mid frequencies to prevent energy build-up across instruments in this range (see Mynett 2017: 256). Nordström also emphasized the importance of bass and guitar tuning in shaping the mix, advocating for attentive listening and openness to adaption.

The overall processing of the bass resulted in a range of low-end textures across the mixes. Odeholm's use of distortion on the bass's low frequencies demonstrated that, with careful management, low-end distortion can be kept from becoming muddled. The definition of notes across the mixes, particularly in sections featuring bass runs, highlights how the producers enhanced specific sections; they not only balanced weight and clarity through distortion and EQ but also used automation. Exeter's mix, for instance, stood out

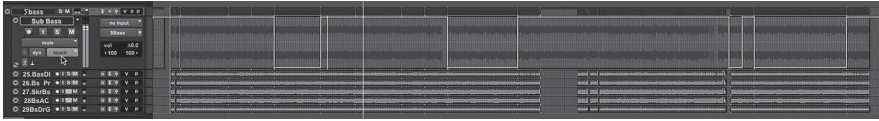


FIGURE 6.13 Automated sub-bass synthesizer in Exeter's mix, adding weight to slower sections.

for its extensive use of automation, including a unique programmed sub-bass synthesizer activated only during sections with slower rhythmic subdivisions, where additional sonic weight could be accommodated (Figure 6.13).

6.3.4.4 *Guitar Processing*

Guitars were processed minimally by all producers, reflecting their emphasis on achieving the desired tone at source through re-amping, a practice consistent with established conventions in the field (Herbst and Mynett 2021b: 145–146). This minimal approach reduced the need for extensive tonal adjustments, allowing producers to focus on contextual adaptations to fit the mix. Maintaining a consistent level was a priority, as most producers employed dynamic treatment beyond the natural compression provided by guitar distortion in order to control resonances created by the interplay of distortion, pitch range, and palm-muted technique. Only a few decided not to use tonal colouration, typically associated with compressors. For example after experimenting with several broadband compressors, Exeter opted for a dynamic range controller (Massenburg), which provided level consistency without altering the tonal character. Otero, by contrast, avoided broadband compression on guitar tracks or the guitar buss altogether, instead relying on heavy compression at the mix buss level to achieve a dynamic consistency across the entire mix. Many producers used multiband compression or dynamic EQ to selectively control lower frequencies, which can build up on specific notes or during palm-muted playing (Herbst and Mynett 2021a: 641; Mynett 2017: 244). Nordström, who adopted this technique as early as the 1990s, described its role in managing sonic weight across instruments, predating its popularization by Andy Sneap in the mid-2000s⁷:

I try to get rid of bass [frequencies] in the rhythm guitars, that's just like the bass's own area. That's where it is together with the bass drum. And if they work together, you can hear the bass and also hear the bass drum and punch in the bass drum. What I normally do, like with the guitars, I started that actually early in the '90s. I took the compressor and let it work only in the bass frequencies. When the guitar goes, the compressor goes in and starts compressing only in the bass [frequencies]. . . . [I]f the

bass drum is in 80 Hz, maybe I'll go like 120 Hz on the bass, so they play in a different area. . . . I try, like with that multiband compression on the guitar, to reduce the amount of bass so we don't get this resonance. Like back in the '90s when we were recording these early death metal albums, there was bass on full, mids on zero, and treble on full. I had a Marshall cabinet, and they are for heavy music guitar recording. They sound good, but they don't manage when they get this amount of bass; they go like boom, boom. That's when I started compressing bass on the guitars, and it turned out so much better.

For 'In Solitude', Nordström applied multiband compression to the guitar tracks below 200 Hz, reducing the level by 2 to 3 decibels on palm-muted notes. While he acknowledged that avoiding multiband compression could yield a heavier guitar sound, he prioritized low-end clarity across instruments, which he found to be more effective in achieving a balanced mix. Other producers, including Exeter, Middleton, Getgood, Odeholm, and Bogren, employed multiband compression, too. Middleton described the objective as creating a 'linear sausage shape' of sound, ensuring consistency and balance. That was an unusual move for Bogren, who typically avoids multiband compression, citing its potential to introduce complications. For 'In Solitude', he chose to apply it sparingly to address specific issues, yet decided on compressing only two of the four guitar tracks, preserving clarity in palm-muted notes on those tracks while maintaining the unprocessed low-end on the others. This subtle approach aligns with the philosophy of Andy Sneap, who advocates for targeted rather than general applications of multiband compression (Mynett 2017: 245). Otero shared Bogren's reservations about using multiband compression and dynamic EQ on guitars, highlighting their unpredictability and preferring to use these tools sparingly. Scheps expressed even stronger opposition to multiband compression, asserting that the lack of phase coherence at frequency crossover points could degrade the guitar tone. Given his reliance on parallel compression, Scheps further argued that applying multiband compression on a single buss could introduce phase issues when blended with a parallel buss.

Opinions on low-end frequency control varied considerably, as illustrated in Figures 6.15 to 6.17. Some producers, unconventionally, prioritized sub-bass energy in the guitar tracks. For instance Middleton revised his approach over the years, initially using a high-pass filter at 80 Hz, while he now emphasizes this range to enhance the guitars' thickness and density, applying a similar boost to the kick and snare. To balance this boost, he attenuates guitar frequencies around 180 to 200 Hz, where palm-muted notes often cause resonance, while boosting the bass around 190 Hz filled the space left by the guitars. In his experience, this adjustment eliminates the 'muddy part of the low-end' while retaining sonic weight. Scheps shared a similar perspective,

noting that in metal, guitars often contribute as much low-end as the bass due to the latter's mid-range presence, amplified by distortion:

I think with rock albums, it's okay to be dense and for the guitars to be more mid-range. But in metal . . . , where the bass is generally doubling the guitars, the bass ends up with presence in the mid-range because of the distortion. But their low-end is just being borrowed by the guitars.

A consensus was observed regarding the extended low-end range of guitars, with high-pass filters applied as low as 70 Hz (Middleton) or even 60 Hz (Getgood) in some cases (see Mynett 2017: 295). Many producers also attenuated the lower mid-range to clean up the low-end (Mynett 2017: 296–299). Getgood emphasized the importance of this technique:

Probably the most crucial thing of any is cutting around 250, 300 [Hz], not super wide Q [bandwidth], just enough to take out any wooliness that's in there. You want to find the frequency spot where you barely notice it when you cut it. Like it really should not cause the guitar sound to fall apart. You're just making some space there, and it should enhance the clarity.

Bogren agreed, describing his EQ approach as being predominantly corrective. For him, EQ is about making the guitar sound smaller and more focused, thereby creating space for other elements to be intelligible in the mix (see also Mynett 2017: 295). This emphasis on cleaning up resonances and balancing frequency ranges demonstrates the producers' careful attention to maintaining clarity and impact within the dense sonic spectrum of metal production.

6.3.4.5 *Comparative Low-End Analysis*

This section analyses both visual and auditory aspects to compare the various low-end management techniques discussed. Figure 6.14 presents a loudness-normalized spectral analysis of the kick, bass, and guitar in Bogren's mix. It illustrates that the kick drum is more than just a simple percussive element, combining a low-frequency 'thud' around 86 Hz with a high-frequency click around 3.6 kHz. Additional spectral peaks and valleys between these points influence the interaction between the kick, guitar, and bass. For pitched instruments like the bass and guitar, each note consists of a fundamental pitch (e.g. 440 Hz for A440) and harmonic overtones—multiples of the fundamental frequency (e.g. 880 Hz, 1,320 Hz).

As discussed in Chapter 5, earlier production practices, typically before the mid-2000s, often positioned the bass guitar beneath the kick drum (Wanasek

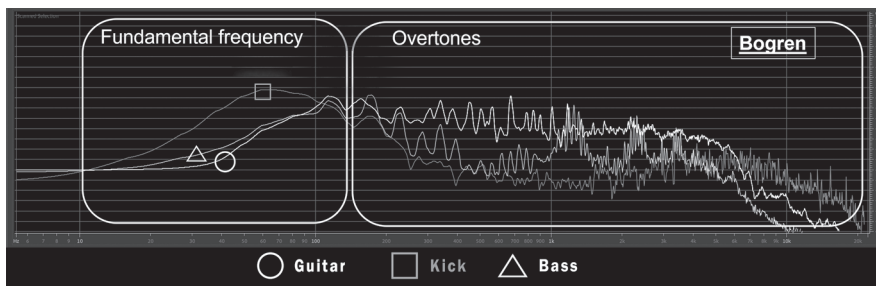


FIGURE 6.14 Kick, bass, and guitar spectra of Bogren's mix.

2017). This arrangement stemmed from kicks carrying less low-end weight than is possible today with advanced drum-triggering technology, necessitating the bass to provide the primary low-end foundation. In contrast, Bogren's contemporary kick adopts a 'scooped' profile, as illustrated in Figure 6.14. The kick's low-frequency peak centres at 86 Hz, beneath the bass and guitar fundamentals, while its high-frequency click resides around 3–4 kHz (see Mynett 2017: 266). The bass and guitar peaks align around 110 Hz, corresponding to the A2 pitch, ensuring separation from the kick and clarity in the low-end. This configuration is particularly effective in rhythmically intricate kick patterns with rests rather than constant double-bass drumming; otherwise, a continuous double bass risks creating a muddy, booming effect. This modern kick-under-bass strategy was found to be the most common approach among the producers in mixing 'In Solitude'. Not only Bogren, Nordström, and Otero but also Scheps favoured this method (Figure 6.15) to maintain clarity, for which the kick is placed beneath the bass's fundamental to avoid frequency overlap.

By contrast, Odeholm and Middleton adopted an alternative strategy that aligns the kick's fundamental frequency with that of the bass guitar (Figure 6.16). This kick-and-bass-aligned approach maximizes low-end impact by reinforcing shared frequencies among the kick, bass, and even guitars. This technique generates a denser and more powerful low-end, but it blends kick and bass frequencies, which sacrifices some clarity.

Exeter and Getgood employed a third approach by placing the bass below the kick (Figure 6.17). Exeter achieved this by adding a sub-bass synthesizer, tuned an octave below the bass guitar, to reinforce the track's foundational low-end. Attaining a similar effect, Getgood relied solely on traditional processing methods, demonstrating a more conservative approach. These subtle variations in low-end structuring illustrate the stylistic differences across metal production, influenced by the producers' aesthetic preferences.

The auditory qualities of the kick drum reveal a shared tonal foundation across most mixes, likely because most producers used the provided acoustic

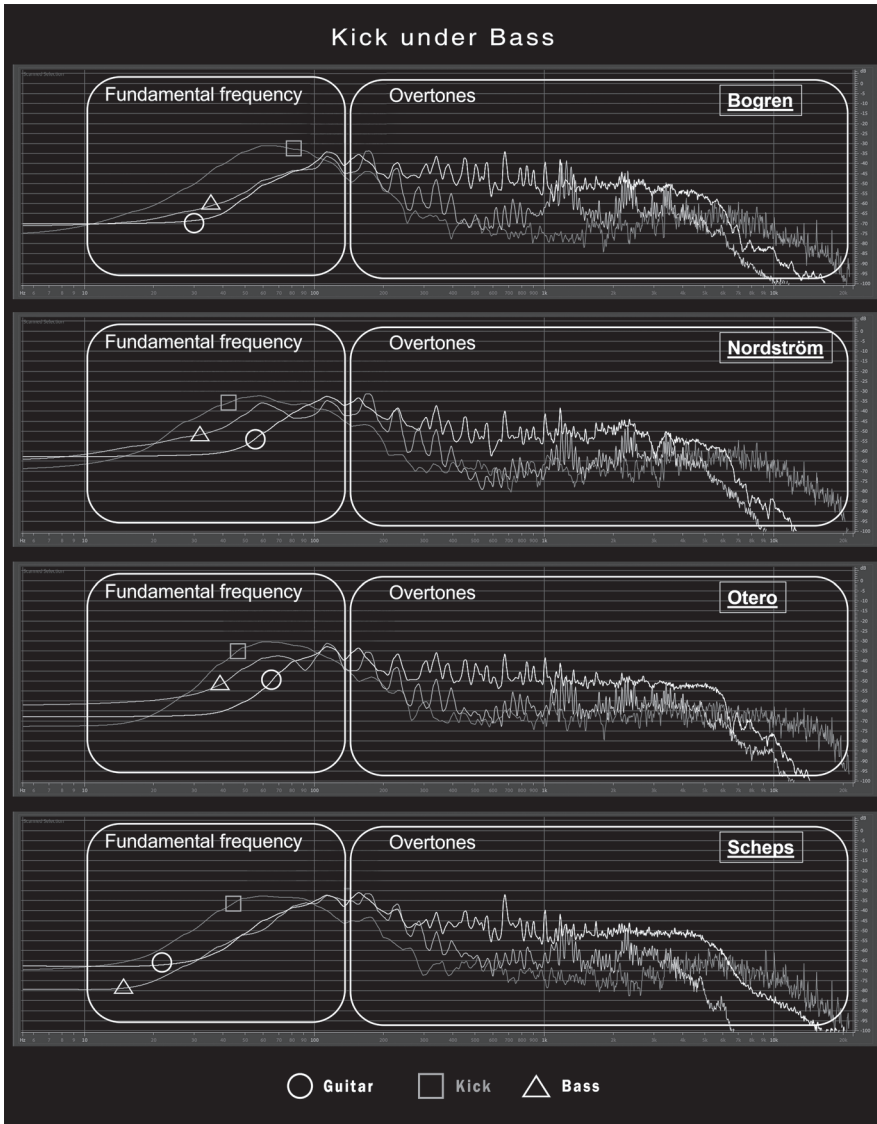


FIGURE 6.15 Producers following the kick-under-bass approach.

kick tracks or comparable samples. Despite these similarities, the mixes exhibit distinctive characteristics. Whereas Bogren's kick achieves a natural tone, even with the reinforcement of four samples, Nordström's kick shares this natural quality but with a slightly lower spectral focus, contributing to a more pronounced low-end presence. In contrast, Getgood's and Middleton's kicks feature a hyperreal aesthetic, focusing on high-frequency clarity and

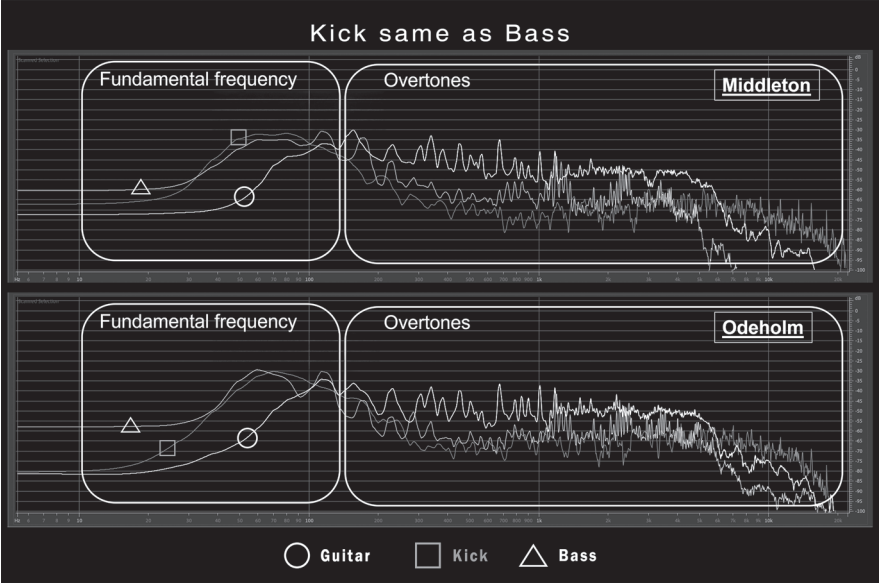


FIGURE 6.16 Producers placing the kick and bass in the same region.

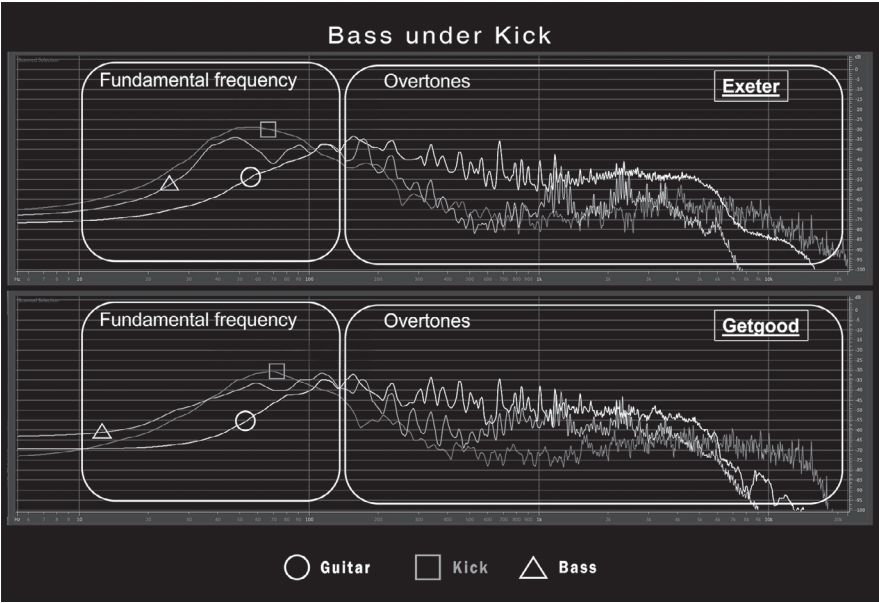


FIGURE 6.17 Producers following the bass-under-kick approach.

click accentuation. Middleton's kick, in particular, sounds more processed, as it builds entirely on sample replacement. Scheps, who stands out with his sample-free, organic kick drum sound, focused on a higher spectral range, intending to give the drum sound less low-end weight and a more subdued presence in the mix. At the opposite end of the spectrum, Odeholm's kick embodies a hyperreal and deeply resonant tone with a similarly pronounced click quality, achieving a consistent and impactful low-end through extensive processing. Otero's kick processing follows a similar approach for a deep and resonant quality, but it sounds slightly less processed than Odeholm's. These extremes are balanced in Exeter's kick, combining low-end weight from samples with a naturalistic tone that avoids excessive synthetic qualities.

The relationship between the kick drum and bass is equally insightful. Nordström's bass, extending into the sub-bass range around 30 Hz, retains a well-defined low-end, clarity, and mid-range presence through distortion, complementing the guitars while leaving space for the kick. Similarly, Otero's bass exhibits significant mid-range presence and distortion, blending cohesively with the guitars while preserving clarity. In contrast, Scheps's bass occupies a higher range, around 100 Hz, offering a less-distorted tone with reduced emphasis on attack and punch. This approach shifts the low-end weight towards the guitars rather than the bass and creates a mix with a less dense bottom-end typical in metal.

Getgood's bass tone stands out for its layered, multi-signal approach that achieves cohesive integration with the guitars to form a meta-instrument. This technique blurs the traditional distinction between guitar and bass, contrasting with Exeter's mix, where the roles of guitar and bass remain distinct despite the bass similarly positioned below the kick. Getgood's approach employs distortion to balance the brightness of higher frequencies with a substantial low-end foundation, including considerable sub-bass content. Likewise, Odeholm's bass tone incorporates pronounced distortion, with a notable presence in the upper frequencies and a strong focus around 60 Hz that enhances its impact in the weight-bearing low-end. Middleton's bass has a raspier midrange-focused tone that mirrors Odeholm's balance of high-end distortion and low-end robustness but is achieved with a sound deriving through a subtler high-pass filtering strategy, retaining substantial low-frequency energy. Whereas Exeter's bass emphasizes low-end energy around 40 Hz, producing a deep and resonant tone, Bogren's mix achieves the most balanced bass tone, characterized by moderate low-frequency energy, clear articulation, and a well-defined presence of string detail.

These varied approaches to low-end management illustrate the diverse aesthetic priorities among metal producers. Odeholm, Otero, Nordström, and Exeter focus on crafting a dense low-end, subtly shifting all instruments lower in the frequency spectrum to achieve weight and heaviness. Odeholm combines great amounts of distortion and brightness with low-end heaviness

to create hyperreal proximity and clarity. Nordström offers a similarly massive but more natural low-end. In between is Otero, who strikes a balance between these two extremes. Exeter maintains a deep low-end presence by emphasizing natural tonal elements, lending his mix a distinctive character. With a more restrained low-end approach, Scheps focused on clarity by highlighting bass and guitars while understating the kick. The result is a clean, traditional aesthetic that might lack the weight typical of modern metal but adheres to rock-inspired norms. Getgood and Middleton, meanwhile, emphasize mid-frequency energy and low-end distortion in the bass, supporting the kick in the sub-bass region. Middleton's approach retains low-end consistency without overwhelming the mix, while Getgood's layered method integrates bass and guitars into a cohesive meta-instrument. Bogren's low-end approach is similarly balanced but slightly less processed, resulting in a more live-sounding aesthetic that preserves the clarity of individual gestures while maintaining substantial weight.

Regarding low-end management, producers engage in a balancing act tailored to meet the genre's demands for both weight and clarity; they calibrate kick, bass, and guitar frequencies using tools such as selective phase alignment, multiband compression, and dynamic EQ. Some producers emphasize a unified, massive low-end, while others prioritize separation to retain clarity during rhythmically dense sections. These diverse approaches highlight the technical challenges and aesthetic versatility of metal's low-end framework, which demonstrates how subtle adjustments, be it in phase, spectrum, or processing, can yield markedly distinct sonic identities. The range of techniques showcases the genre's broad aesthetic spectrum, which allows producers to explore both traditional and hyperreal aesthetics and ultimately achieve cohesive yet impactful mixes that reflect individual stylistic visions.

6.3.4.6 *Orchestration*

The orchestration in 'In Solitude' combines strings, synthesizer pads, and horns to create an additional layer of ambience and weight, particularly noticeable in some of the breakdown sections (2:51–3:08). The strings and synthesizers provide atmospheric textures, and the horns support the substantial low-end weight, both contributing to the sense of heaviness. However, integrating these elements poses challenges for managing sonic space in a dense metal mix. Each producer approached the orchestral components with individual strategies, often balancing their potential to augment heaviness at the risk of overshadowing the core instruments.

Exeter highlighted the brass as the 'heaviest part' of the mix, viewing its texture and contrast as being pivotal in amplifying the breakdown's impact. Nevertheless, he softened the brightness of the strings and kept the brass relatively subdued in his mix, perhaps prioritizing cohesion over the brass's

extensive weight. Scheps, on the other hand, chose to omit the brass and strings almost entirely, reasoning it with limited sonic space. His decision reflects the tension between the heaviness of orchestral elements in isolation and their integration within the mix. Scheps's approach focused on preserving clarity and impact for the core instruments, illustrating the trade-offs inherent in metal production.

Nordström adopted a restrained approach to orchestration, allowing strings to be heard sporadically while largely forgoing the brass. This subtlety is notable, given his experience with symphonic black metal, where he has previously managed orchestration on Dimmu Borgir releases. In contrast, Bogren emphasized the strings' staccato and pizzicato textures, integrating them prominently while using the brass sparingly to prevent it from encroaching on the low-end space of the rhythm section. This selective approach indicates an effort to balance orchestral detail with the heaviness of the bass, guitars, and drums.

Middleton and Getgood prioritized the guitars as the focal point of the breakdown, with a minimal emphasis on the orchestration. But unlike Middleton, Getgood focused more on balanced strings and brass to maintain their presence alongside the guitars. Otero and Odeholm kept the strings in the background, while Otero granted the brass greater prominence than other producers. However, Odeholm's orchestration choices remained consistent with his hyperreal aesthetic to ensure that the orchestral elements enhanced the breakdown's impact without overshadowing the mix's clarity or weight.

This breakdown section demonstrates the challenges of incorporating orchestration into a metal mix. While orchestral elements such as strings and brass can add significant weight, their integration often requires a careful balancing to prevent them from overwhelming the core instruments.

6.3.4.6.1 Clarity

Clarity in metal production depends on carefully balanced low, mid, and high frequencies. Excessive high-end energy can detract from the overall weight, just as an overly dominant low-end can obscure detail, definition, and intelligibility. Achieving this equilibrium ensures that each performative element—instruments, vocals, or supplementary sounds—is conveyed effectively, even within the genre's inherently dense arrangements (Mynett 2017: 9–21). To this end, producers employed EQ and distortion techniques across various mix elements. A great focus was placed on ensuring that the snare could cut through the guitar wall. Exeter, for instance, stressed the necessity of applying a 'massive amount of top-end boost' to the snare, not to alter its inherent tone but to provide sufficient brightness to pierce the mix. Without this boost, he explained, the snare would 'not [be] going to cut through a track. So, you just put in as much EQ as necessary'. Other

producers, such as Getgood, echoed this approach, identifying the 4 to 5 kHz range as being particularly effective for ‘mak[ing] the snare cut through the mix a little bit more’. Middleton similarly emphasized the 2 to 5 kHz range, noting that boosting this region while attenuating lower mid frequencies could enhance the snare’s presence and achieve a ‘yin and yang effect’. Otero supported this view, describing a 500 Hz cut as standard for removing ‘cardboardy knockiness’, thereby creating space for other instruments and refining the snare’s tone. Comparable EQ adjustments were applied to the toms, which helped them project more clearly, especially during fast fills.

Efforts to enhance clarity also extended to the guitars, which often obscure other elements in the mix rather than being masked themselves. Like the drums, producers favoured boosting the upper mids and highs of the guitars while attenuating the low mids. Bogren described this approach as a

pretty typical way of EQ and stuff that goes into a metal mix, where you basically have to get rid of some of the fundamental frequencies like the root notes or the first couple of harmonics. They usually build up quite a lot. And the same thing will happen unless you are a perfectly arranged orchestra. These things will tend to build up, and then they’re playing on the same note with those elements in the band and the mix. And then you have to find ways of not making those frequencies become too much in the sum of everything. Getting rid of some low mids and emphasizing some highest or high mids is a pretty standard thing.

For Middleton, the 7 to 10 kHz range was pivotal, as it added energy and vibrance to the guitar tone while enhancing proximity, resulting in a more immediate sound (Mynett 2017: 296–302). In contrast, other producers, such as Scheps and Getgood, found that boosting around 1 kHz improved clarity and tone, particularly by enhancing the definition of picking sounds. Getgood noted that this boost sharpened the guitar’s attack and enabled it to stand out amid the other elements in the mix.

Bass processing adhered to similar principles once the foundational tone was crafted from the various layers. Getgood highlighted that boosting mid frequencies added tonal characteristics essential for the bass to remain discernible within the mix (see Mynett 2017: 289). He elaborated that frequency boosts around 900 Hz and 2 kHz, although potentially unappealing in isolation, provided the ‘clunky clacking character’ necessary for the bass to cut through:

Those will both be bringing some kind of clunky clacking character that, to be honest, I didn’t find super pleasant to listen to on its own until you get used to it; but in the mix is what really allows it to cut through.

Distortion, conventionally associated with signal degradation (Hosch 2011), was employed by producers to enhance clarity and intelligibility. By enriching the overtone spectrum, distortion increases the presence of each signal within the mix, allowing elements to achieve better definition. Using distinct types of distortion across instruments further ensures that each occupies its own unique sonic space. Bogren articulated this approach, stating, 'In order to create . . . a different space for each element in the mix, I do use a lot of distortion on other things again to be able to enhance overtones and to be able to fight those guitars a little bit'. Instead of applying the same distortion units across different audio sources, he used tape emulators on drums and a different type of overdrive on vocals to prevent elements from blending indistinctly. This method extended to layered guitars, where each pair received separate cabinet or amplifier treatments to avoid psychoacoustic blending issues that arise when identical processing is applied across elements. Regarding vocals, Bogren advocated using a different microphone chain for backing vocal harmonies, which he found simplified the mixing process: 'It's so easy to get it in' compared to applying the same chain to both lead and backing vocals.

Bogren's detailed approach to distortion matched that of Scheps, Nordström, and Odeholm, who all applied varying degrees of saturation or distortion to sculpt the highly distorted guitars even further. Scheps explained that enhancing the distorted texture helped the guitars compete with the similarly distorted drums and contribute to the mix's overall heaviness:

The two guitars are going into an aux that's getting some saturation. And the even [harmonics] normally, I'm all about the heavy because you get a lot more harmonic content. Obviously, there's already a lot of distortion, but there was something about the mids that just didn't feel filled up enough for lack of a better phrase, probably because I'm adding distortion to the drums. That takes up mid-range room. Therefore, I needed more mid-range out of the guitars so that they get the boost, but I wasn't getting enough out of the boost. So, I added a little saturation.

He elaborated that the mid-frequency boost achieved through distortion provided considerably more audio material he could work with, allowing for corrective EQ (attenuation) instead of creative EQ (boosts). This method also enabled the application of narrower bandwidths, which ensured greater precision in sculpting techniques. Nordström was less specific in his reasoning, simply remarking that distorting the guitars further made them louder and more present, a sentiment echoed by Exeter. Interestingly, Exeter advised that saturating guitars in the mix had the additional effect of taming the top-end and controlling abrasion, which is a perhaps counterintuitive idea, given

that distortion typically enhances high harmonics and brightens the sound. However, Exeter clarified that achieving this taming effect required experimentation with different saturation tools and settings.

Distortion also played a central role in enhancing vocal presence and intelligibility (Mynett 2017: 325–327). Exeter noted that adding ‘harmonics a few octaves up’ through distortion substantially elevated the prominence of the vocals in the mix, enabling them to occupy a more forward position. Bogren also recognized distortion and compression-induced saturation as effective alternatives to EQ for shaping vocal tones. He explained that these techniques allowed him to enhance vocal clarity and determine their position within the mix without resorting to excessive EQ adjustments, which can introduce harshness:

I tend to use compression and distortion and distortion by compressing as much as possible, and then I use EQ to fix the rest. A big part of the frequency response and the EQ curve comes from compression. You can basically see it as if you compress it with fast release times and make it distort. If you use pretty extreme compression like the Distressor, for example, I have this British mod thing switch that makes it distort these things, just creates more treble, and gets rid of low mids, and suddenly you have a mixable vocal track. Because if I start by trying to EQ and EQ and EQ, I will never end, and I get this spiky vocal track that is really hard to get in there. I usually try to retain more low-end in my vocals and use that as a driver into or as a catalyst. The compressor will react in a very different way if it can have all that low-end in the vocals or low mids, and it creates more harmonic content. Then, I get something that is easier to mix in. Usually, that’s what I start to do. I don’t even touch the EQ; I try to work with compressors. . . . Then I’m usually 90% there. After that, I do the final EQ things.

Bogren noted that distortion meets two essential objectives: improving vocal intelligibility and achieving dynamic consistency and balanced spectral presence. Clarity can be obtained without overemphasizing high frequencies, which can sound artificial or overly bright. He pointed out that metal vocals inherently benefit from distortion to compete with heavily saturated and distorted tones of guitars and other instruments. The need to generate harmonic richness explains why he finds clean vocals more challenging to mix than extreme vocals. Unlike their distorted counterparts, clean vocals lack the natural grit and harmonics that help them cut through dense instrumental arrangements:

Vocal-wise, usually, if there are heavy songs that just have the grunts, then it’s a little easier to mix, to be honest, because then you don’t have the

pitch factor, and the words are a little easier to get across. I don't know; maybe it's the distortion factor of the vocals because, basically, when you sing with grunts, you distort your voice. And you naturally have more harmonics, so it's easier to mix them in a way, whilst a clean vocal has less information in the frequency range, and that makes it actually harder to get in somehow.

Getgood added that combining heavy compression with saturation is essential for 'getting the vocal over the finish line', effectively shaping its waveform to resemble the steady, rectangular structure evident in distorted guitar and bass tones (Mynett 2017: 245–249). Odeholm, while generally routing all instruments through a buss distortion for tonal cohesion, typically excludes vocals from this process. However, in 'In Solitude', he made an exception, applying distortion to the extreme vocals not only to enhance clarity but also to amplify their aggressive character.

Reverb adjustments were found to be an unexpectedly effective tool for improving clarity. Bogren and Getgood, for instance, tailored their reverb effects by applying EQ and even distortion to emphasize higher harmonics and brightness while attenuating muddy energy in the lower mids. Otero described that a brighter reverb applied to the snare could help it cut through a dense mix, a technique similarly employed by Exeter. However, Getgood cautioned against overly bright reverbs on the snare, noting that while they may enhance clarity, they risk overpowering the natural ambience provided by room tracks or ambient samples. Although this setup may not compromise clarity directly, it could diminish cohesion and affect the mix's overall sonic integrity.

When addressing vocal clarity and intelligibility, the producers adopted varied approaches to reverb and delay to position vocals effectively within the mix. Getgood and Middleton preferred shorter delays and minimal reverb to keep vocals prominently forward, while Nordström employed a comparable delay with an added emphasis on reverb, as did Odeholm. By contrast, Bogren and Exeter favoured longer delays over reverb, highlighting how delays can maintain vocal prominence without pushing them further back in the mix, a risk more commonly associated with excessive reverb (Mynett 2017: 316–325). Scheps took the opposite approach, using more reverb than delay, which produced a slapback effect, reminiscent of classic rock'n'roll mixes. This choice added an airy quality, positioning the vocals farther back in the soundstage. Notwithstanding that his vocal processing is comparatively 'wet', Bogren achieved remarkably high levels of clarity and integration in his mix. His vocals stood out while smoothly blending into the arrangement, likely due to his meticulous spatial processing, tonal refinements, and deliberate balancing of vocals with guitars. This detailed

approach ensured that the vocals remained prominently and cohesively interwoven with the mix's other elements, which demonstrates a careful interplay between clarity and cohesion.

Besides spatial effects, EQ, compression, and distortion, advanced techniques play a pivotal role in enhancing vocal clarity within dense metal mixes. For instance multiband compression and dynamic EQ allowed producers to refine tonal balance and dynamics in ways that extended beyond the capabilities of broadband compression or distortion. However, many producers like Bogren and Exeter argued that achieving vocal clarity also required extensive automation. This manual adjustment responds to the shifting dynamics of the arrangement and the variations in vocal styles and ranges across different sections of the track. Odeholm contrasted by adopting a more automated approach by utilizing a vocal rider (by Waves) to achieve comparable control without extensive manual intervention.

To further enhance vocal clarity, Bogren employed subtle 'ducking' of guitars and synthesizers, ensuring that the vocals sit prominently within the mix. When the vocals pause, the guitars and synthesizers are allowed to rise slightly, filling the space and maintaining balance within the mix. This technique highlights Bogren's philosophy of prioritizing vocals as 'always the most important thing' in the mix, a stance that elevates them above the guitar timbres traditionally regarded as central to the metal genre.

The varied approaches to maintaining clarity demonstrate the challenges of mixing metal, where every instrument and vocal element must occupy a distinct spectral and spatial space; combined, this generates an overall cohesive sound. Employing a combination of techniques, including EQ, distortion, reverb, delay, compression, and automation, producers craft mixes that preserve both clarity and the sonic weight characteristic of the genre. These methods ensure that each element achieves maximum impact, intelligibility, and weight without crowding the mix. They ensure a distinct vocal presence within a dense arrangement by finely tuning the tonal interplay between guitars, bass, and drums and employing targeted vocal processing techniques like dynamic EQ and automation. Bogren's strategic use of ducking to prioritize vocals over guitars and synthesizers exemplifies the strategies required to maintain clarity within a densely arranged mix. His approach illustrates the delicate balance between clarity and weight that defines effective and cohesive metal production (Mynett 2017: 9–21).

6.3.4.7 *Controlling Bleed and Abrasion*

Enhancing clarity using EQ and distortion to brighten sonic textures inherently risks introducing abrasive qualities, necessitating a careful management by producers. A focus for many producers was controlling cymbal bleed, especially when working with original acoustic recordings, rather than

replacing them with samples (Herbst and Mynett 2021a: 639, 2021b: 146, 2023a: 19–20). Various gating techniques were employed to mitigate this issue. Getgood gated the acoustic kick and snare tracks, while Exeter applied gating specifically to the snare. Instead of gating the drum tracks themselves, Scheps applied gates the snare reverb to attenuate hi-hat bleed and reduce harshness. Nordström, however, eschewed gating almost entirely, valuing the spill for its contribution to a more organic drum sound. He was an exception among the producers, using gates only on toms to eliminate all unwanted audio. Other producers more commonly achieved clean toms through waveform edits, which removed bleed at its source and provided greater flexibility for subsequent processing (Herbst and Mynett 2023a: 191–200).

In addition to gating, many producers employed dynamic processors to manage bleed issues more subtly. Otero favoured multiband expansion over traditional gates, allowing for selective responsiveness to high-frequency cymbal bleed while preserving the sustain of lower frequencies, particularly in the kick and toms. He explained that this approach would ensure the lower frequencies retain their weight while snare ghost notes sound natural. Otero described multiband expansion as a way to

do it in a more natural way where it just tucks it into the mix. I get that initial snap from a tom hit, for instance, but then ducked out of the way fast, and it lets the low-end bloom a little bit longer.

Getgood also employed multiband expansion, noting that it allowed him to retain more of the acoustic drum sound while significantly reducing bleed, thereby decreasing his reliance on samples. To further address bleed, Getgood used one of his distinctive techniques: applying multiband distortion around 1 kHz on the snare. Limited dynamics control in the distortion processor responded effectively against bleed, keeping the snare clear without introducing harshness. Odeholm introduced a unique solution for tom bleed by using parallel transient designers. Attack transients were removed on one track to isolate cymbal sustain before he flipped the phase and effectively cancelled out cymbal sustain, leaving behind only the tom transients with controlled cymbal elements. Bogren achieved comparable results but relied on parallel EQ and compression rather than transient manipulation.

In addressing potential harshness and abrasiveness within both the drums and the broader mix, producers employed diverse strategies to manage challenging frequencies. Cymbals captured in the overhead microphones frequently posed considerable issues, prompting most producers to utilize intelligent processors such as Soothe, Gullfoss, and Brainworx Refinement. These tools effectively reduced harshness and upper-range resonances while preserving the cymbals' natural tonal character, enabling them to occupy a prominent yet controlled place in the mix. Many producers paired these

processors with precise EQ cuts to target problematic ‘whistly’ frequencies. Middleton, for instance, emphasized the importance of surgical EQ adjustments while cautioning against excessive removal of low-end content from the overheads, which could otherwise result in cymbals sounding overly bright and piercing.

The strategies used to mitigate harshness in guitar tones closely mirrored those applied to overheads, with producers employing surgical EQ to manage resonances, particularly within the sensitive 2 to 5 kHz range (Zwicker and Fastl 2007: 17–22). While Scheps utilized a de-esser centred around 4 kHz to soften harsh tones, Otero and Getgood employed low-pass filters set between 7 and 10 kHz to tame excessive high frequencies (Mynett 2017: 300). Middleton adopted a similarly targeted approach, focusing on ‘fizz’ frequencies near 6 kHz, balancing the removal of harshness with the retention of brightness. These techniques allowed for a brighter yet balanced guitar presence in the mix. The bass required comparable attention to control the harshness of pick attacks, with producers employing a combination of de-essing, multiband compression, intelligent processors, and strategic EQ adjustments. Getgood, for instance, incorporated low-pass filtering to smooth out the bass while preserving its clarity and tonal integrity.

Vocals demanded processing to achieve a prominent presence without introducing harshness. Many producers turned to intelligent processors such as Soothe and Gullfoss, supplemented by traditional de-essers and EQ, to address resonances caused by consonants, sibilance, and vocal-microphone interactions (Mynett 2017: 302–305). Getgood highlighted the advantages of intelligent processors, explaining, ‘I love Soothe for making the esses sound right. It gets rid of a lot of the more peaky stuff in there. So, the pronunciation sounds really good, and it just sounds a lot less harsh’. Similarly, Otero found Gullfoss sufficient for achieving vocal smoothness, as it is a means that inherently combines de-essing and multiband compression. Odeholm added that vocal reverbs also needed careful handling to avoid harshness. He would often apply bandpass filters between 500 Hz and 3 kHz to tame abrasive frequencies and reduce muddiness in the low-end. These strategies illustrate a high level of precision required to balance vocal clarity and presence, allowing the vocals to cut through dense arrangements without overwhelming the mix with excessive brightness or harshness.

Intelligent processors are increasingly adopted for the hyperreal aesthetic required in modern metal. This practice extends to the mastering stage, where tools like Gullfoss and Soothe were used alongside traditional EQ and multiband compression to offer fine-tuned control over spectral balance. These advanced tools proved particularly effective at reducing abrasive frequencies without compromising the mix’s impact, making them valuable for achieving the polished sound characteristic of contemporary metal production.

The producers' approaches to managing bleed and controlling abrasive frequencies highlight the balancing act necessary to maintain clarity while minimizing harshness. Techniques such as multiband expansion, dynamic EQ, and intelligent processing enabled them to achieve precise control without sacrificing tonal character. This balancing act was especially necessary in handling cymbals, vocals, and guitars, where even subtle adjustments impact the perception of balance and cohesion in the mix. Carefully preserving the natural timbre of instruments while attenuating unwanted resonances, the producers demonstrated the complexity and adaptability required to manage the sonic density of metal production.

6.3.5 *Concluding Remarks*

The insights gathered from the producers reveal a holistic and intricate approach to achieving heaviness in metal music production, which encompasses creative, technical, and cultural dimensions. Although heaviness is foundational to the genre, it is not a singular effect but rather a complex phenomenon that requires nuanced strategies to achieve it. Each producer's interpretation highlights heaviness as an amalgamation of sonic weight, intensity, and emotional expression, where low-end impact and clarity are necessary to produce a captivating and visceral listening experience. Instead of adhering to a rigid formula, producers employ highly individualized approaches shaped by their preferences and experiences in specific subgenres (see Herbst and Mynett 2021a, 2021b, 2023a)—in contrast to the increasing standardization observed elsewhere (Thomas 2015; Thomas and King 2019). These strategies aim to balance human expression with hyperrealism, reinforcing the emotional and physical impact of the music. Heaviness, therefore, transcends sheer loudness or density (see Miller 2021); it involves the deliberate structuring of the virtual space to create a cohesive and intense experience that resonates emotionally with the listener.

Achieving this balance necessitates addressing the unique challenges inherent in metal production. Producers must manage overlapping frequencies, mitigate resonances across the spectrum, and resolve spatial conflicts within the dense wall of sound that typify the genre. The goal is all about preserving the individuality of each instrument while ensuring that each integrates smoothly within the mix. Clarity becomes essential because it retains the distinct tonal characteristics of the drums, guitars, bass, and vocals and conveys the composition's complex structures and expressive performances. Multiband compression, EQ, distortion, automation, and parallel processing are common tools that allow producers to define the spectral and spatial space required for each element. These methods maintain the mix's intensity while ensuring that each element remains clearly defined. The dynamic, responsive adjustments made by the producers demonstrate their dedication to creating

an intricate yet impactful listening experience. Every sonic detail is crafted to contribute to the overarching heaviness that defines metal music.

In mixing ‘In Solitude’, the producers employed widespread techniques, ranging from basic adjustments to highly sophisticated processes, to sculpt the track’s heavy aesthetic. Intelligent processors such as Soothe and Gullfoss were paired with tools like transient designers and dynamic EQ to control bleed, tame abrasive frequencies, and manage resonance. This precision went beyond isolated fixes, shaping a cohesive whole where each element was integrated into a clear, defined, and powerful sound. The producers skilfully crafted the hyperreal qualities typical of modern metal, striking a balance between weight, size, and clarity through spatial positioning and spectral management. Foregrounding the unique contributions of each instrument while balancing their interaction within the mix, they honoured the genre’s dual emphasis on sonic heft and intricate detail, producing a dense yet distinctly articulated sound.

This balance between technical control and artistic intent encapsulates metal music’s complex and powerful quality. As the partaking producers demonstrated, achieving heaviness is a nuanced and dynamic pursuit that prioritizes sensitivity to detail over merely maximizing all elements (Miller 2021; Volák 2022; Xhignesse 2024). The sophisticated blend of low-end weight, aggressive mid-range articulation, and crisp high-frequency detail envelops the listener in a sound that conveys both intensity and subtlety. Producers who achieve this synergy demonstrate that heaviness transcends mere auditory sensation but develops instead into a meticulously crafted experience that highlights the innovation, versatility, and precision of modern metal production.

Evaluating which mix embodies the greatest heaviness is a highly subjective endeavour, deeply rooted in personal interpretation and individual perception. Rather than crowning the ‘heaviest’ mix, this analysis sought to illuminate the diverse production techniques that embody the distinct sonic identity of its producer. These accomplished producers have each honed a distinct mixing methodology that reflects their artistic vision and technical expertise. Their approaches, shaped by personal aesthetic preferences, may resonate highly with one producer but might not work for another.

Perception—the observation and interpretation of sensory information to construct internal representations of the external world (Volák 2022)—is deeply influenced by individual experience. As the adage goes, reality is not what it is; reality is what we are. This principle is particularly pertinent in the domain of audio production, where personal preferences, creative intent, and even physiological factors can shape one’s perception of heaviness. For example producers with hearing impairments from years of high-volume mixing may perceive sound differently, often favouring brighter productions. Listening to the mixes of ‘In Solitude’, it is important to recognize that

each listener brings a unique auditory perspective to the experience, influenced by their individual relationship with sound and its musical qualities, including their conception of heaviness (Xhignesse 2024). In the end, the judgement of which mix embodies heaviness most effectively lies with each listener. This conclusion highlights the profoundly personal and complex nature of heaviness—an experience that transcends objective measurement and is highly individual.

Notes

- 1 We would like to thank Eric Smialek for his input on the analysis of 'In Solitude' from a musicological perspective and as an outsider to the experiment. An earlier and highly abridged version of the production analysis of 'In Solitude' is published in Jan-Peter Herbst & Eric Smialek (2025). "Mixed' Results: An Introduction to Analyzing Metal Production through Eight Commissioned Metal Mixes". *Zeitschrift der Gesellschaft für Musiktheorie*, 22(1). <https://doi.org/10.31751/1222>
- 2 www.puremix.com/library/tutorials/templates/andrew-scheps-mixing-template
- 3 <https://mixwiththemasters.com/benefits/downloads>
- 4 However, he used Drum Leveler to reduce the dynamic range of these tracks, achieving a similar effect without the wave-shaping associated with compression.
- 5 Fully programmed drums are not uncommon in metal altogether. A previous study found that approximately 16% of the analysed professional mixes relied on them (Herbst and Mynett 2021a: 639).
- 6 More commonly, a third guitar is added only to specific sections, such as the chorus, to create a thickening effect. Examples include Metallica's *Black Album* (1991b) and Mastodon's *Once More 'Round the Sun* (2014) (Mynett 2017: 141).
- 7 One of the original discussions on the *UltimateMetal* forum, where Sneap shared his approach, can be found here: <https://ultimatemetal.com/threads/andys-guitar-eq-when-mixing.411958>

Bibliography

- Antares (2024). 'A Beginner's Guide to Dynamic Range in Audio Production'. *Antares Tech*. www.antarestech.com/community/a-beginners-guide-to-dynamic-range-in-audio-production. Accessed 27 September 2024.
- Berger, Harris M. (1999). *Metal, Rock, and Jazz: Perception and the Phenomenology of Musical Experience*. Hanover, NH: University Press of New England.
- Berger, Harris M. and Fales, Cornelia (2005). 'Heaviness in the Perception of Heavy Metal Guitar Timbres: The Match of Perceptual and Acoustic Features over Time', in *Wired for Sound: Engineering and Technologies in Sonic Cultures*, edited by Paul D. Greene and Thomas Porcello (pp. 181–197). Middletown, CT: Wesleyan University Press.
- Berger, Harris M.; Wallach, Jeremy and Greene, Paul D. (eds.) (2011). *Metal Rules the Globe: Heavy Metal Music around the World*. Durham, NC: Duke University Press.
- Brown, Andy R.; Spracklen, Karl; Kahn-Harris, Keith and Scott, Niall (eds.) (2016). *Global Metal Music and Culture*. London: Routledge.
- Corey, Jason (2017). *Audio Production and Critical Listening*. New York, NY: Routledge.
- Covach, John (1997). 'Progressive Rock: "Close to the Edge", and the Boundaries of Style', in *Understanding Rock: Essays in Musical Analysis*, edited by John Covach and Graeme M. Boone (pp. 3–31). Oxford: Oxford University Press.

- Crowdy, Denis (2013). 'Chasing an Aesthetic Tail: Latent Technological Imperialism in Mainstream Production', in *Redefining Mainstream Popular Music*, edited by Sarah Baker, Andy Bennett, and Jodie Taylor (pp. 150–161). New York, NY: Routledge.
- Ekeröth, Daniel (2008). *Swedish Death Metal*. Brooklyn, NY: Bazillion Points.
- Fenton, Steven and Lee, Hyunkook (2019). 'A Perceptual Model of "Punch" Based on Weighted Transient Loudness'. *Journal of the Audio Engineering Society*, 67(6): 429–439.
- Flick, Uwe (2010). *In Introduction to Qualitative Research*. London: Sage.
- Gracyk, Theodore (1996). *Rhythm and Noise: An Aesthetics of Rock*. London: Tauris.
- Guettler, Knut (2011). 'How Does Rosin Affect Sound?' *String Research Journal*, 2(1): 37–48.
- Hagen, Ross (2011). 'Musical Style, Ideology, and Mythology in Norwegian Black Metal', in *Metal Rules the Globe*, edited by Harris M. Berger, Jeremy Wallach, and Paul D. Greene (pp. 180–199). Durham, NC: Duke University Press.
- Hannan, Calder (2018). 'Difficulty as Heaviness: Links between Rhythmic Difficulty and Perceived Heaviness in the Music of Meshuggah and the Dillinger Escape Plan'. *Metal Music Studies*, 4(3): 433–458.
- Harden, Alex (2019). 'Narrative and the Art of Record Production', in *Producing Music*, edited by Russ Hepworth-Sawyer (pp. 263–277). New York, NY: Routledge.
- Herbst, Jan-Peter (2014). *Netzwerk Sound [Network Sound]*. Augsburg: Wissner.
- Herbst, Jan-Peter (2016). *Die Gitarrenverzerrung in der Rockmusik: Studien zu Spielweise und Ästhetik*. Berlin: LIT.
- Herbst, Jan-Peter (2017). 'Historical Development, Sound Aesthetics and Production Techniques of the Distorted Electric Guitar in Metal Music'. *Metal Music Studies*, 3(1): 24–46.
- Herbst, Jan-Peter (2019a). 'Distortion and Rock Guitar Harmony: The Influence of Distortion Level and Structural Complexity on Acoustic Features and Perceived Pleasantness of Guitar Chords'. *Music Perception*, 36(4): 335–352.
- Herbst, Jan-Peter (2019b). '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): 53–69.
- Herbst, Jan-Peter (2020). 'Metronomic Precision of "Teutonic Metal": A Methodological Challenge for Rhythm and Performance Research'. *Samples*, 18. www.gfpm-samples.de/Samples18/Herbst2.pdf. Accessed 8 October 2024.
- Herbst, Jan-Peter (2021). 'Culture-Specific Production and Performance Characteristics: An Interview Study with "Teutonic" Metal Producers'. *Metal Music Studies*, 7(3): 445–467.
- Herbst, Jan-Peter and Bauerfeind, Karl (2021). 'Teutonic Metal: Effects of Place- and Mythology-Based Labels on Record Production'. *International Journal of the Sociology of Leisure*, 4(4): 291–313.
- Herbst, Jan-Peter and Mynett, Mark (2021a). 'Nail the Mix: Standardization in Mixing Metal Music'. *Popular Music & Society*, 44(5): 628–649.
- Herbst, Jan-Peter and Mynett, Mark (2021b). '(No?) Adventures in Recording Land: Engineering Conventions in Metal Music'. *Rock Music Studies*, 9(2): 137–156.
- Herbst, Jan-Peter and Mynett, Mark (2022). 'What Is "Heavy" in Metal? A Netnographic Analysis of Online Forums for Metal Musicians and Producers'. *Popular Music & Society*, 45(5): 633–653.
- Herbst, Jan-Peter and Mynett, Mark (2023a). '"I Just Go with What Feels Right": Variance and Commonality in Metal Music Mixing Practice'. *El Oído Pensante*, 11(1): 4–31.

- Herbst, Jan-Peter and Mynett, Mark (2023b). 'Lorna Shore's "to the Hellfire": A Study in Heaviness'. *Metal Music Studies*, 9(2): 189–213.
- Herbst, Jan-Peter and Mynett, Mark (2023c). 'Mapping the Origins of Heaviness between 1970 and 1995: A Historical Overview of Metal Music Production', in *The Cambridge Companion to Metal Music*, edited by Jan-Peter Herbst (pp. 29–42). Cambridge: Cambridge University Press.
- Herbst, Jan-Peter and Mynett, Mark (2025). *Heaviness in Metal Music Production: Learn from the Masters*. Volume 2. Abingdon: Routledge.
- Herbst, Jan-Peter; Reuter, Christoph and Czedik-Eysenberg, Isabella (2018). 'Guitar Profiling Technology in Metal Music Production: Public Reception, Capability, Consequences and Perspectives'. *Metal Music Studies*, 4(3): 481–506.
- Hosch, William L. (2011). 'Distortion'. *Encyclopedia Britannica*. www.britannica.com/technology/distortion-communications. Accessed 20 December 2024.
- Izhaki, Roey (2013). *Mixing Audio: Concepts, Practices and Tools*. Oxford: Focal Press.
- Johannesson, Ika and Klingberg, Jon J. (2018). *Blood, Fire, Death: The Swedish Metal Story*. Port Townsend: Feral House.
- Kahn-Harris, Keith (2007). *Extreme Metal: Music and Culture on the Edge*. Oxford: Berg.
- Kennedy, Lewis (2017). 'Functions of Genre in Metal and Hardcore Music'. PhD thesis, University of Hull.
- Lux, Marian and Herbst, Jan-Peter (2024). 'From Analogue to Algorithm: How Private Production Reshaped Metal Aesthetics'. *Metal Music Studies*, 10(3): 247–272.
- Melançon, Jérôme and Carpenter, Alexander (2015). 'Is Progressive Rock Progressive? Yes and Pink Floyd as Counterpoint to Adorno'. *Rock Music Studies*, 2(2): 125–147.
- Miller, Jason (2021). 'What Makes Heavy Metal "Heavy"?' *The Journal of Aesthetics and Art Criticism*, 80(1): 70–82.
- Moylan, William (2007). *The Art of Recording: Understanding and Crafting the Mix*. Amsterdam: Elsevier.
- Mynett, Mark (2016). 'The Distortion Paradox: Analyzing Contemporary Metal Production', in *Global Metal Music and Culture*, edited by Andy R. Brown, Karl Spracklen, Keith Kahn-Harris, and Niall Scott (pp. 68–88). London: Routledge.
- Mynett, Mark (2017). *Metal Music Manual: Producing, Engineering, Mixing, and Mastering Contemporary Heavy Music*. Abingdon: Routledge.
- Mynett, Mark (2019a). 'Defining Contemporary Metal Music: Performance, Sounds and Practices'. *Metal Music Studies*, 5(3): 297–313.
- Mynett, Mark (2019b). 'Heaviness in Three Dimensions: The Use of Sonic Space in Contemporary Metal Music Production', in *Art of Record Production: Creative Practice in the Studio*, edited by Simon Zagorski-Thomas, Katia Isakoff, Sophie Stévanec, and Serge Lacasse (pp. 66–79). Abingdon: Routledge.
- Mynett, Mark (2020). 'Maximum Sonic Impact: (Authenticity/Commerciality) Fidelity-Dualism in Contemporary Metal Music Production', in *The Bloomsbury Handbook of Music Production*, edited by Simon Zagorski-Thomas and Andrew Bourbon (pp. 293–302). London: Bloomsbury.
- Mynett, Mark (2022). 'Three-Dimensional Doom: My Dying Bride's "Your Broken Shore" (2020)', in *Analyzing Recorded Music: Collected Perspectives on Popular Music Tracks*, edited by William Moylan, Lori Burns, and Mike Alleyne (pp. 294–304). New York, NY: Focal Press.
- Pattie, David (2007). *Rock Music in Performance*. New York, NY: Palgrave Macmillan.
- Pillsbury, Glenn T. (2006). *Damage Incorporated: Metallica and the Production of Musical Identity*. New York, NY: Routledge.

- Reyes, Ian (2013). 'Blacker Than Death: Recollecting the "Black Turn" in Metal Aesthetics'. *Journal of Popular Music Studies*, 25(2): 240–257.
- Schmidt Horning, Susan (2004). 'Engineering the Performance: Recording Engineers, Tacit Knowledge and the Art of Controlling Sound'. *Social Studies of Science*, 34(5): 703–731.
- Schubert, Emery and Wolfe, Joe (2006). 'Does Timbral Brightness Scale with Frequency and Spectral Centroid?' *Acta Acustica*, 92: 820–825.
- Smialek, Eric (2015). 'Genre and Expression in Extreme Metal Music, ca. 1990–2015'. PhD thesis, McGill University.
- Smialek, Eric (2016). 'The Unforgiven: A Reception Study of Metallica Fans and "Sell-Out" Accusations', in *Global Metal Music and Culture*, edited by Andy R. Brown, Karl Spracklen, Keith Kahn-Harris, and Niall Scott (pp. 106–124). London: Routledge.
- Thomas, Niall (2015). 'The Development of Technology and Its Influence on Recorded Heavy Metal Music 1969–2015'. PhD thesis, University of Hull.
- Thomas, Niall and King, Andrew (2019). 'Production Perspectives of Heavy Metal Record Producers'. *Popular Music*, 38(3): 498–517.
- Volák, Vojtěch (2022). 'Heaviness: A Key Concept of Metal Music through the Lens of Deleuzian Philosophy'. *Studia de Cultura*, 14(3): 53–62.
- Wallmark, Zachary (2018). 'The Sound of Evil: Timbre, Body, and Sacred Violence in Death Metal', in *The Relentless Pursuit of Tone*, edited by Robert Fink, Melinda Latour, and Zachary Wallmark (pp. 65–87). New York, NY: Oxford University Press.
- Walser, Robert (1993). *Running with the Devil: Power, Gender, and Madness in Heavy Metal Music*. Hanover, NH: University Press of New England.
- Walther-Hansen, Mads (2020). *Making Sense of Recordings*. Oxford: Oxford University Press.
- Weinstein, Deena (2011). 'The Globalization of Metal', in *Metal Rules the Globe*, edited by Harris M. Berger, Jeremy Wallach, and Paul D. Greene (pp. 34–59). Durham, NC: Duke University Press.
- Williams, Duncan (2015). 'Tracking Timbral Changes in Metal Production from 1990 to 2013'. *Metal Music Studies*, 1(1): 39–68.
- Xhignesse, Michel-Antoine (2024). 'The Heaviest Metal'. *Philosophia*, 52(3): 681–697.
- Yang, Yan (2024). 'Metal Music Production: Clarity and Cohesion'. PhD thesis, University of Huddersfield.
- Zagorski-Thomas, Simon (2010). 'The Stadium in Your Bedroom: Functional Staging, Authenticity and the Audience-Led Aesthetic in Record Production'. *Popular Music*, 29(2): 251–266.
- Zagorski-Thomas, Simon (2012). 'Musical Meaning and the Musicology of Record Production', in *Black Box Pop: Analysen populärer Musik*, edited by Dietrich Helms and Thomas Phleps (pp. 135–147). Bielefeld: Transcript.
- Zagorski-Thomas, Simon (2014). *The Musicology of Record Production*. Cambridge: Cambridge University Press.
- Zwicker, Eberhard and Fastl, Hugo (2007). *Psychoacoustics: Facts and Models*. Berlin: Springer.

Discography

- AC/DC (1980). 'Back in Black', on *Back in Black*. Atlantic.
- At the Gates (2014). *At War with Reality*. Century Media.
- Black Sabbath (1971). 'Children of the Grave', on *Master of Reality*. Vertigo.

- Humanity's Last Breath (2023). *Ashen*. Unique Leader Records.
- Lamb of God (2020). *Lamb of God*. Nuclear Blast.
- Lorna Shore (2021). 'To the Hellfire', on . . . *And I Return to Nothingness*. Century Media.
- Mastodon (2014). *Once More 'Round the Sun*. Reprise Records.
- Metallica (1991a). 'Enter Sandman', on *Metallica (Black Album)*. Elektra.
- Metallica (1991b). *Metallica (Black Album)*. Elektra.
- Slayer (1986). *Reign in Blood*. Def Jam Recordings.
- Tchaikovsky, Pyotr Ilyich (1996). *1812 Overture, Marche Slave, and Francesca da Rimini in Full Score*. Dover Publications.
- The Caretaker (2016). *Everywhere at the End of Time*. History Always Favours the Winners.

Videography

- Wanasek, Joel (2017). 'Low-End Mastery Fast Track'. *Unstoppable Recording Machine*.

7

HEAVINESS IN METAL MUSIC PRODUCTION

7.1 On the Slippery Path to Defining Heaviness

7.1.1 *Heaviness as a Multifaceted Concept*

In metal music, heaviness is a complex, continuously changing goal pursued by pushing aesthetic and sonic boundaries using diverse approaches. Throughout metal's history, bands have continuously strived to become heavier. The fact that heaviness is revered in nearly all metal subgenres, which differ considerably in their aesthetics over more than 50 years, shows that the perception of heaviness is influenced by a wide range of musical and stylistic elements. This aesthetic diversity within metal, ranging from black metal's raw, atmospheric elements to doom metal's sorrowful tones to death-core's highly technical, breakdown-driven structure, presents a considerable challenge for scholars seeking to define heaviness across musical, perceptual, and cultural dimensions.

Each subgenre brings a unique interpretation of heaviness, shaped by variations in tempo, vocal style, instrumentation, and production techniques. In addition to its sonic qualities, heaviness holds value as subcultural capital; bands frequently tout their latest release as 'heavier' to assert authority and credibility within the metal scene. Given the varied and sometimes conflicting features accentuated across metal's subgenres, some scholars, such as Jason Miller (2021: 71–73), have concluded that formulating a sole, coherent concept of heaviness may be impossible.

The elusive, multidimensional nature of heaviness likely explains why practical guides for audio engineers or musicians widely omit the topic. This challenge became evident in the HiMMP project, where even expert producers

grappling with articulating how they achieve heaviness in their work. Like scholars, their struggles were rooted in metal's vast aesthetic diversity, with each producer reflecting a unique approach. As Josh Middleton aptly summarized, heaviness is 'like different ways of being killed in a horror film'. This diversity has grown with metal's diversification into dozens of subgenres (Hillier 2020). Intending to redefine and deepen the notion of heaviness, these new genres increasingly draw inspiration from other popular music genres: be it the intense performances of punk, the piercing and seemingly chaotic sounds of modern jazz, or the low-end weight and sonic density of EDM.

Understanding the complexity of heaviness involves considering three primary dimensions: objective, subjective, and relational. Objective components refer to measurable attributes, such as low-end frequencies, distortion, and dynamic range, all contributing to a physical perception of sonic weight. Subjective factors encompass individual interpretations and emotional responses shaped by listeners' personal experiences, genre familiarity, and cultural context. Relational elements result through contrasts and interactions between musical features within a song or across an album, which create a shifting perception of heaviness as listeners engage with a track, discography, or playlist. These three dimensions interact to form a multifaceted experience of heaviness that adapts across metal subgenres and listener expectations.

7.1.2 *Objective versus Subjective Aspects of Heaviness*

For heaviness to become an engaging experience, its perception must be guided by objective and subjective dimensions. This book conceptualizes how heaviness manifests in metal music, building upon foundational principles from the study of record production, such as embodied cognition, cross-domain mapping, sonic metaphors, and spectrographic translations. Audio engineers and musicians develop the ability not only to process aural cognition through metaphors but also to convert these metaphors, present in their cognitive processes and verbal communication with collaborators, into acoustic reality (Zak 2001; Porcello 2004). On the reception side, listeners undergo a similar mental process. Yet, rather than articulating perceptions of heaviness, listeners focus on interpreting the music through emotional and social dimensions, forming personal connections to the music and interacting with the broader social aspects of the metal scene, where shared interpretations of heaviness foster a collective experience (see Varas-Díaz and Scott 2016).

While producers and listeners approach heaviness from different perspectives, they are unified by shared core elements. Vojtěch Volák (2022: 59) points out that the perception of heaviness comprises both objective and subjective components. The objective side includes musical and tonal qualities

with specific physical properties that can be measured or described. For Volák, these revolve around the quality of ‘intensity’, exemplified by elements such as high loudness; resonant tones; and deep, low-end frequencies that create a sense of sonic weight. Key features include the frequency spectrum (particularly the low-end), dynamic range, timbre (including distortion), and rhythmic complexity or precision, which can be objectively assessed, providing a measurable basis for the often-physical sensation of heaviness that listeners experience.

However, subjective interpretation also influences the experience of heaviness. Listeners engage with heaviness subjectively by comparing the intensity of current music to past musical encounters. This subjective interpretation (see Herbst 2018, 2019) builds on various factors, such as the listener’s musical background, cultural context, and familiarity with the genre, creating a perceptual framework through which heaviness is experienced and understood. Michel-Antoine Xhignesse (2024) offers a complementary perspective, introducing the concept of ‘inaccessibility’, where complex or dissonant features, such as extreme loudness, distortion, tonal and harmonic dissonance, and intricate rhythms, demand considerable cognitive effort from listeners. This mental effort establishes a sense of inaccessibility that, in turn, heightens the listener’s perception of heaviness.

While Volák emphasizes intensity as a physical impact, Xhignesse highlights inaccessibility as a cognitive challenge; together, they illustrate how subjective interpretation is integral to experiencing heaviness. This dual perspective suggests that the ‘contextual concept’ of heaviness (Volák 2022: 60) is formed by listeners who distinguish between varying levels of intensity, inaccessibility, or other characteristics based on their prior listening experiences. As such, heaviness in metal music is determined as much by objective, measurable qualities as by each listener’s cultural, social, and perceptual background, resulting in a complex, multidimensional experience.

7.1.3 *The Role of Context in Heaviness*

Context shapes listeners’ perspectives of heaviness and influences how they interpret musical features across different eras, album sequences, and individual song structures. Both intensity and accessibility are relevant factors for comparing older and newer metal albums and songs, whereby older productions are typically perceived as subjectively less heavy than more recent ones (see Berger 1999; Miller 2021; Volák 2022; Xhignesse 2024). This perception is mainly due to advancements in songwriting, arrangement, performance quality, specialized engineering, and the extended capabilities of production technology. However, context extends beyond historical periods, encompassing smaller units like track order, which can also contribute to shaping the listener’s experience.

We previously discussed metal journalist Joel McIver's comparison of the heaviness of Metallica's *Master of Puppets* (1986b) and Slayer's *Reign in Blood* (1986), which deemed Metallica the winner due to its sonic weight, particularly in 'The Thing That Should Not Be' (1986c) (see Section 2.2.2). This track's heaviness is attributed to its sonic weight, size, and atmospheric qualities. Notably, though, it follows the faster and more aggressive 'Master of Puppets' (1986a), and this placement amplifies its impact. The stark contrast between these tracks is reflected in their tempo (220 bpm vs. 112 bpm) and tuning (standard tuning vs. a two-semitone drop), which create a temporal and sonic shift that heightens the listener's perception of heaviness in 'The Thing That Should Not Be'. This sequencing disrupts the energetic momentum set by the previous track and illustrates how strategic track order can amplify a song's weight and heaviness.

Not only does this shift in tempo and intensity establish a sense of weight, but it also highlights how cognitive demands change. While 'Master of Puppets' may challenge the listener's cognitive processing fluency through complex structures performed at a high speed (Xhignesse 2024), the slower pace of 'The Thing That Should Not Be' reduces this cognitive load, allowing the listener to experience the sonic weight and heaviness of each note more effectively. This contrast enables listeners to engage with heaviness on different levels, depending on whether the impact comes from fast aggression or slow and deliberate weight. As discussed, the context in which these tracks are experienced, whether within the album's sequence or on a streaming platform, affects perception. On streaming platforms, where tracks may be listened to out of order or in isolation, the intended contrast between fast and slow tracks may lose its impact, altering the listener's perception of heaviness.

In addition to track sequencing, the developing context within a single song—which we will expand on later regarding relational factors—can also influence the perception of heaviness as contrasts between musical elements unfold throughout the listening experience. These contrasts may involve shifts in timbre (clean vs. distorted); pitch range (low, palm-muted power chords vs. single-note riffs on higher strings); harmony (consonance vs. dissonance in chords and scales); vocal style (clean singing vs. shouting, screaming, and growling); drum patterns and rhythmic synchronization with other instruments (backbeat vs. blast beat); tempo (half-time vs. double-time); instrumentation (metal's core instruments vs. extended orchestration); and arrangement changes (variations in the number of guitar layers and vocal styles or harmonies). Such shifts often involve transitioning from performance/note complexity to sound/timbre (Pieslak 2008: 46) or vice versa, reflecting a dynamic relationship between clarity and sonic weight.

Lorna Shore's 'To the Hellfire' exemplifies how contrasting elements, given by changes in composition, performance, and production, amplify heaviness (see Herbst and Mynett 2023a). The track uses ongoing contrasts, such as

the interplay between acoustic and distorted tones, reverberated guitars and dry drums, deep growls and high-pitched screams, and abrupt tempo shifts, to create distinct forms of heaviness (Barratt-Peacock and Herbst 2025). This dynamic interaction between contrasting qualities makes each element feel heavier by comparison. The song's unpredictability, with abrupt transitions between different sections and juxtaposition of timbres (e.g. extreme vocals paired with clean choir, down-tuned guitars with high synthesizer pads), evokes an impression of chaos. Although rooted in the stylistic conventions of death and black metal, this chaos transcends these styles and demands effort even from listeners accustomed to more extreme forms of metal (Hannan 2018: 445). Moreover, virtuosic elements, such as rhythmic and metric disorientation, non-diatonic chords, dissonant minor modes, chromaticism, and augmented chords, further intensify this chaotic effect and add layers of complexity that reinforce the track's overall heaviness and require attentive engagement from the listener.

7.1.4 Sonic Storytelling and Emotional Heaviness

The HiMMP producers support the significance of contrasts within a song for achieving heaviness, likening their approach to sonic storytelling—an artistic process that uses musical dynamics and contrasts to guide listeners through an emotional journey—akin to the concept of sonic narratives (Burns, Woods, and Lafrance 2016; Harden 2019), but with less emphasis on vocal expression and lyrics. The emotional expression and impact of the music will be enhanced with rising and falling dynamics produced by variations in tempo, rhythmic subdivision, arrangement, instrumentation, and shifts in vocal styles. When spectral and dynamic contrasts create an arc through sound, the heavier moments are amplified within the song and across the album or EP. Like Exeter, Odeholm referenced over 40-minute-long songs that derive their heaviness from the emotional response they evoke. Both saw this emotional connection as central to the symbolically rich perception of heaviness. For Exeter, heaviness functions as an 'emotional response' that results from contrasts in atmospheres—light versus heavy or dark—and builds tension within the music, creating a powerful release that listeners interpret as heaviness. Exeter and Odeholm emphasized that this emotional connection deepens listeners' perception of heaviness, which illustrates how sonic storytelling creates a multidimensional experience by integrating 'sonic heaviness' (measurable factors) and 'emotional heaviness' (affective response).

One specific application of dynamic contrasts lies in preparing and introducing heavy musical features. For instance, build-up phases maximize the impact of heavy riffs, with Middleton citing the extended introduction to Metallica's 'Enter Sandman' (1991) as an example. The build-up in this introduction creates anticipation and sets the stage for the iconic main riff. By

contrast, Scheps sees an equally effective approach in the impact of surprise, provided that a sudden shift in tempo or timbre, like a breakdown or abrupt tempo drop, catches listeners off-guard and adds unexpected sonic weight. Prediction error theory (Huron 2008; Margulis 2014) offers insight into the effectiveness of surprise in enhancing heaviness. According to this theory, the brain continuously makes predictions about upcoming sensory information, but when unexpected elements—such as a sudden change in tempo, texture, or expression—come into play and disrupt these perceptions, the brain registers a prediction error, which heightens emotional responses. Research in neuroscience and psychology suggests that such surprises in music can trigger dopamine release that intensifies pleasure and emotional engagement (Zatorre and Salimpoor 2013). This emotional peak aligns with the intense experiences that metal fans associate with heaviness.

Conversely, repetition and familiarity can also amplify emotional responses over time (Margulis 2014). This cumulative effect may help explain why listeners may occasionally perceive older records as heavier than the newer ones or why predictable sections, such as breakdowns, retain their impact despite their expected nature.¹ Through these mechanisms—build-ups, surprises, and repetition—producers craft an intense experience that guides listener expectations and emotional responses and which amplifies heaviness as both an artistic expression and visceral encounter. In this way, sonic storytelling turns heaviness into more than just a sound; it becomes an emotional journey that inspires musicians, producers, and listeners.

7.1.5 Objective and Relational Factors of Heaviness

As alluded, the perception of heaviness in metal hinges on objective and relational aspects, each contributing to a captivating listening experience that combines measurable sonic elements with context-driven interpretations (see Barratt-Peacock and Herbst 2025). Objective, or ‘absolute’, elements include measurable features like distortion level, loudness, frequency profiles (e.g. sonic weight and density), spatialization (width), the number of guitar layers or drum samples, tuning, tempo, rhythmic subdivision speed, dissonance, and rhythmic or metric complexities. Whereas absolute elements correspond to specific musical interactions that are relatively straightforward to analyse using established musicological and computer-assisted methods, relational factors encompass the broader context in which these features are experienced, including virtual space, structural contrasts, and extra-musical associations with themes like transgression or extremity (Kahn-Harris 2007). Together, these objective and relational features support understanding how this multifaceted heaviness phenomenon is interpreted in metal music.

Although some relational aspects are measurable, they primarily occur through perception, mental representations, and listeners’ auditory processing

fluency (Xhignesse 2024). These aspects are shaped by how other elements are arranged in the mix (see Barratt-Peacock and Herbst 2025). For instance, sound sources create a sense of depth when positioned at varying distances from each other and the listener (see Moylan 2007: 50). Interpreting relational elements, where listeners continuously re-evaluate previously heard elements and adjust their predictive expectations of what comes next, can be understood through Edmund Husserl's phenomenology of temporality (see Merleau-Ponty 2012). This theory explains the interaction between retention (the phase in which a perceptual experience is held in consciousness) and protention (the anticipation of future moments). As the musical structure is inherently relational, its effects also unfold relationally over time, shaped by the remembered and anticipated relationships between musical elements. For instance listeners familiar with metalcore or deathcore anticipate breakdowns, sensing the impending heaviness before it arrives. This expectation, built on familiarity with genre conventions, also applies to individual riffs, where the memory of one heavy section can amplify the impact of those that follow, creating a feedback loop that intensifies the experience of heaviness. At a larger scale, this bidirectional relationship between past listening experiences and present musical cues extends to the ongoing development of metal, where changing genre norms, subgenre expectations, and technological advancements continuously influence production practices and listener expectations (see Volák 2022).

Viewing heaviness through this combined lens of objective and relational aspects suggests that perception can shift during listening as baselines change. Hence, the notion that heaviness can be reduced to absolute features or standardized engineering methods (Thomas 2015; Mynett 2017) is challenged by this perspective, demonstrating instead relational aspects that unfold in real time. While this idea may suggest that the perception of heaviness is highly subjective, a view supported by many scholars (Berger 1999; Mynett 2019b; Zagorski-Thomas 2014; Volák 2022; Xhignesse 2024), it is not random. Possible perceptions of heaviness can be systematically analysed by examining the interaction between absolute musical elements like arrangement, performance, and audio engineering and relational factors, such as the internal relationships within a song and broader auditory representations. These representations develop through general musical socialization (Walther-Hansen 2020) and genre-specific enculturation (Volák 2022; Xhignesse 2024), providing a framework through which listeners interpret heaviness in metal.

Within this context, the varied conceptualizations of heaviness expressed by the HiMMP producers illustrate how these objective and relational aspects relate. For instance Odeholm, Exeter, and Getgood emphasized emotional heaviness, often influenced by factors like lyrical themes or supporting aesthetic concepts. A low-fidelity aesthetic can convey nihilism, while intentionally degrading audio quality may sonically represent dementia, which adds an

emotional layer to the perception of heaviness. Lyrical themes, such as death, misanthropy, apocalypse, Satanism, and suicide, can likewise metaphorically amplify the perception of heaviness (Hannan 2018: 444), especially when these themes are transgressive relative to a listener's experience² and performed in an extreme metal style (Xhignesse 2024: 685, 691; Miller 2021: 78–79). Atmospheric elements, crafted through reverberation, drone effects, or ambient noise, which are commonly used in doom and black metal, can also evoke darkness, sadness, or a sense of menace, further enhancing the listener's emotional response (Wallmark 2018; Hudson 2022). Moreover, tempo modulation, intricate structures, or contrastingly slow tempos paired with minor keys and effects like reverb and delay are suitable for eliciting sensations of melancholy or dread, which reinforces the perceptual heaviness of doom metal (Yavuz 2017; Hannan 2021).

Some producers, most notably Nordström, Exeter, and Getgood, articulated heaviness through metaphors of heavy machinery and imposing objects, often in a warlike or mechanized context involving imagery of massive machines such as tanks, cannons, or robots. This association arises from factors like the sense of power, noise, low-end weight, mechanical precision, and the impression of an unstoppable force. Getgood, in particular, almost literally associates heaviness with the sound of enormous objects; however, the sense of size is relational, shaped not just by individual sounds but also by their placement within the broader mix. A core element of Getgood's conceptualization is the listener's experience of feeling small in proportion to the overwhelming sonic sensation, which resonates with Jean-François Lyotard's (1993) postmodernist reflections on the inhuman. From his view, precise, machine-like synchronization among instruments can convey a sense of mechanical aggression that surpasses human capability, which creates an overwhelming feeling of being dwarfed by a powerful, grander source. This connection between mechanical precision and heaviness aligns with Calder Hannan's (2018) analysis of Meshuggah's 'MonstroCity' (2016) and 'I Am Colossus' (2012), where tight polyrhythmic synchronization contributes to an intense, overwhelming sonic mass. Interestingly, many HiMMP producers referred to Meshuggah in their definitions of heaviness.

Although such precise synchronization can be described in absolute terms, the metaphorical associations of 'one-ness in sound' and machinery necessitate a relational interpretation. Tight synchronization not only depends on unity but also conveys it: when all instruments are perfectly aligned, they produce a single, cohesive force that amplifies the impact of each sound (Herbst 2020: 99–101). Meshuggah, for example, achieve this mechanical wall of sound through polyrhythmic precision (Pieslak 2007; Lucas 2018; Capuzzo 2018). In contrast, however, Nordström and Bogren advocate for the expressive value of micro-timing deviations, suggesting that such imperfections can enhance the perceived size of the wall of sound. This distinction hints at the

existence of different types of heaviness: one rooted in mechanical precision and another in ‘organic’ expression. Nonetheless, these two approaches need not be seen as mutually exclusive. While post-production techniques like quantization, phase alignment, and pitch correction can enhance recorded performances, the extent to which these technical adjustments affect emotional qualities like raw aggression raises questions to be debated. With today’s sophisticated production tools, experienced engineers can render such corrections imperceptible to listeners, striking a balance between organic and mechanical qualities that are adaptable to the musical and listening context.

Viewing heaviness through both absolute and relational lenses suggests that its perception is neither static nor confined to measurable parameters. Instead, heaviness is dynamic and adapting in response to the listener’s prior experiences, genre conventions, and the interconnectedness of musical elements within a song, album, or broader discography. These shifting baselines of heaviness, influenced by contrasts and contextual cues, demonstrate how producers manipulate sound to evoke emotional and somatic reactions. The following section reviews the role of technological mediation, which has been instrumental in pushing the boundaries of heaviness.

7.2 Hyperreality and the Technological Mediation of Heaviness

Throughout the book, we have sought to balance the significance of production, technology, and engineering techniques with the human agency of bands, engineers, and producers in crafting heaviness. The history of metal is marked by an increasing embrace of hyperreality, particularly in studio-produced artefacts that have developed into a distinct aesthetic, no longer intended to replicate the sound of a live band performance (Herbst and Mynett 2023b). As Bogren remarked, metal differs from other popular music genres, including rock, in that an unenhanced band performance, without the intervention of audio engineering, would sound anything but impressive: muddy, unbalanced, and lacking power. Such a raw sound would fail to convey metal’s intricate rhythmic structures, its dense timbres rich in the low-end, and expressive performances. If technological enhancements are essential for delivering metal performances, they serve a purpose beyond merely replicating live sound; they allow metal to transcend the limitations of acoustic reality through electroacoustic means.

This realization seems to have propelled metal bands, engineers, and producers alike. Instead of adhering to the complex and problematic ideals of live authenticity within rock music (Auslander 2023; Pattie 2007), most metal productions—except for low-fidelity productions in some subgenres including black metal (Reyes 2013)—have cultivated their own ‘highly effective reality’ (Mynett 2019b: 73). They achieve this new reality by fully leveraging the affordances of the recording medium, particularly during the

mixing stage of production. Not only will the core qualities of metal, such as heaviness, extremity, intensity, and aggression, be supported by a hyper-real aesthetic, but artists are empowered as well to push the boundaries of their performance capabilities and realize their creative visions. Florian Walch (2023: 54–79) has argued that musicians were envisioning extreme metal even before its inception, experimenting with different tempos, tunings, and timbres by altering the playback speed of their favourite records. Consequently, technology could be considered not just to be a tool but also conceptually integral to metal's aesthetic development.

As metal production has advanced, so has the functionality of digital tools. Bands, alongside their engineers and producers, have utilized new affordances not only to create sounds that are larger, weightier, more complex, or better defined but also to diversify their compositional styles, which are often enabled or supported by technology. Productions have become increasingly extreme and hyperreal, accomplished through both enhanced recorded performances and replacing or supplementing human performances with partially or fully programmed instrumental parts.³ Technology has thus proved to be a powerful means of transcending bodily limitations and allowing musicians to realize ever-more extreme and heavy music (see Wallmark 2018), fulfilling their aesthetic ambitions while remaining competitive in the neoliberal music industry (Netherton 2021).

While metal fans often downplay the commercial aspects of the music and scene, the sheer number of bands and releases available via streaming platforms demands a certain level of individuality for artists to stand out (Kahn-Harris 2007: 125–126; Netherton 2017). Heaviness, along with other forms of transgression, has historically been an effective strategy for artists seeking to enhance their chances of longevity and popularity (Berger and Fales 2005). Lorna Shore's 'To the Hellfire' (2021) serves again as a prime example: the song went viral on social media and streaming services, ultimately being voted the best metal song of 2021 by *Loudwire* magazine. According to interviews, the band explicitly pointed out their aim to create the 'heaviest song' (DiVita 2021), likely anticipating its appeal to the heaviness-craving metal community. Today's society has shifted from being a physical manufacturing to an attention-based economy (Franck 1998; Herzberg 2012; Léveillé Gauvin 2018), and, therefore, surprise, shock, and transgression carry both financial and symbolic weight. Since metal's inception, the primary approach to achieve this goal has been to create heaviness. This quality remains central to the genre's aesthetic and is essential for building and sustaining a following. As seen with 'To the Hellfire' (see Herbst and Mynett 2023a), pushing the boundaries increasingly requires technology and hyperreal mediation. For many artists with broader artistic ambitions, following suit may be a necessary, or even welcomed, step in that direction.

However, even with the apparent rise of hyperreality in metal productions (and live shows), avoiding an overly technologically deterministic perspective is essential for many producers. The most significant contribution will typically come from human agency. While interaction with technology can indeed yield unexpected results (Latour 2005; Bateman 1980; Bonnet 2020), technology is ultimately directed and controlled by humans: musicians, engineers, and producers. Despite advances in intelligent processing (Man, Stables, and Reiss 2019), these tools primarily assist engineers in handling mundane or repetitive tasks, allowing them to focus on realizing their aesthetic vision. The importance of human-directed technological application became evident in the producer mixes of ‘In Solitude’, where intelligent equalization tools were frequently employed to reduce harshness or create a more refined frequency spectrum.

While artificial intelligence may enable the offloading of more tasks in the future, including those that influence creative decisions like adhering to or subtly breaking with subgenre conventions (Williams 2023), these capabilities are not yet widely integrated into DAWs and stay more or less confined to individual plug-ins that engineers manually apply. Furthermore, metal is a genre deeply rooted in recorded performances, so it fundamentally depends on the quality and sonic identity of the recorded tracks—unless this paradigm changes. A substantial portion of the final production aesthetic is shaped by the recorded performance and the song’s arrangement, both entirely crafted by human actors.

Several HiMMP producers, including Exeter, Bogren, Nordström, and Scheeps, see technology’s primary role in assisting and facilitating musical creativity rather than being the driving force in metal music. Notwithstanding that technology undoubtedly shapes production aesthetics and sonic ideals, musicians’ foundational creative visions will always guide its application. As Scheeps noted, musical development is ultimately led by taste, with technology adapting to expand upon this creative base. Hence, rather than dictate it, technology serves to amplify musicianship. Odeholm holds another view, seeing innovations in digital production as actively inspiring songwriting, enabling him to realize new dimensions of heaviness, especially in progressive metal styles like ‘thall’. While music would primarily be about sonic impact, with production forming the backbone of his creative process, songwriting, arrangement, and performance are a means to support the pursuit of intense and hyperreal sounds. Odeholm’s approach contrasts with Bogren’s view that heaviness originates in structurally heavy compositions that retain their impact even with minimal production intervention. Consequently, achieving heaviness depends more on selecting compositions with inherently heavy structures, whereby technology acts as a secondary enhancer. Despite their different perspectives, both producers agree on the idea that contemporary metal requires a sophisticated and

integrated approach to arrangement and mixing, which balances human creativity with technological capabilities to produce a compelling sonic experience.

Overall, there appears to be a dialectical tension between using technology to transcend human limitations and preserving creative control exercised by musicians, engineers, and producers over production decisions. While technology affords tools that enable extreme forms of heaviness, its artistic application is ultimately shaped by the artistic and aesthetic goals of the human actors involved. In this context, the extent of technology use may be limited for ideological reasons, as seen in lo-fi black metal (Reyes 2013). Although most metal has distanced itself from the ideal of liveness and accurately representing live performances, authenticity remains a core value for much of the genre, albeit with varying definitions across its many subgenres. In addition to each subgenre, individual musicians, engineers, and fans have distinct preferences along the spectrum between authenticity and hyperreality.

7.3 Key Parameters of Heaviness

With the previous considerations and caveats in mind, we will now synthesize key parameters of heaviness, which are detailed in earlier chapters. This synthesis links analytical and theoretical aspects of the music to empirical evidence from the HiMMP interviews and mixing tasks, alongside insights gleaned from various professionals featured in journalistic media and prior interviews conducted by the authors. Acknowledging that this synthesis and the interrelationships described are inherently reductionist, we should reflect that no fixed set of musical features can fully define or guarantee heaviness (see also Miller 2021: 71–72). First and foremost, heaviness results from the convergence of various factors rather than from isolated features. Well-recorded performances are also assumed to underpin the sound and production-related aspects considered here, evidenced by all partaking producers who saw high-quality performances and recordings as essential prerequisites for effective production. Several producers observed that even a poorly engineered record could still convey heaviness if the underlying performance was compelling. Nordström, for example, cited Slayer's *Reign in Blood* (1986) as a technically weak production that nonetheless conveys a sense of anger and aggression, provoking a heavy impression. This interpretation supports the earlier discussion of emotional intensity and authenticity as fundamental components of heaviness. The diverse forms that heaviness takes across different metal genres, coupled with the range of views—from Odeholm's production-driven approach to Bogren's focus on songwriting—suggest that heaviness is shaped as much by aesthetic philosophies as it is by technical features.

7.3.1 *Tempo*

There is substantial evidence from journalistic sources (McIver 2009a, 2009b), theoretical analysis (Walch 2023; Xhignesse 2024), and empirical studies (Czedik-Eysenberg, Knauf, and Reuter 2017) showing that both fast and slow performances can effectively convey heaviness in metal. Fast tempi, in particular, often evoke feelings associated with energy, intensity, and aggression, mainly due to the performance's highly rhythmic and percussive nature when executed with tight ensemble synchronization (Mynett 2019a: 300). Iconic heavy metal bands like Motörhead (1970s), thrash metal pioneers such as Metallica and Slayer (1980s), and later extreme metal acts, including technical death metal band Suffocation, exemplify this high-speed intensity, using abrupt breaks and rapid rhythmic shifts to heighten the sense of heaviness. The blast beat, recognized as a 'flagship' technique in extreme metal genres like death and black metal (Walch 2023: 86; Hagen 2011: 186), further illustrates how fast speeds of subdivision contribute to a sense of heaviness. Metal's ongoing push towards faster speeds demonstrates the genre's commitment to enhancing heaviness through tempo. Beyond conveying raw energy, fast performances may also overwhelm listeners' cognitive processing capacity, as the brain struggles to keep pace with rapid subdivisions and intricate rhythms. This cognitive overload can create a sense of being overwhelmed, a psychological factor that intensifies the perception of heaviness (Xhignesse 2024).

Conversely, slower subdivisions evoke heaviness by allowing sonic weight to develop fully, creating an impression of immense size and mass (Walther-Hansen 2020: 105–107; Smialek 2015: 230). Slow performances foster an embodied experience, physically enabling listeners to feel the weight of each note or chord. Through the lens of embodied cognition, repeated slow riffs can convey a sense of physical mass or gravitational pull (Lakoff and Johnson 1980; Johnson 1987; Leman 2019). In this way, slow music may mirror the experience of moving a heavy object, deepening the listener's connection to the music's sonic weight. Genres like doom and sludge metal capitalize on this effect with sustained chords and long decay times, cultivating a sense of oppression and overwhelming intensity that contrasts with the speed and technicality of faster metal subgenres. In the HiMMP project, all but one producer associated heaviness with slower tempi, with Otero emphasizing that both fast and slow performances offer distinct forms of heaviness. The breakdown section of 'In Solitude' was unanimously regarded as the climactic point of heaviness, attributed to its slow tempo, which provided additional space for sonic weight to resonate. This observation aligns with literature on breakdowns in metal music (Berger 1999: 64; Pillsbury 2006: 10; Smialek 2015: 230, 290–292, 2023; Kennedy 2017: 88–89; Gamble 2019), which identifies them as peak moments of heaviness within songs due to their relatively greater weight and contrast with faster sections.

In subgenres such as metalcore and deathcore, breakdowns have become defining moments within songs, where both their intensity and comparability across songs and artists are valued, as demonstrated by the proliferation of breakdown compilation videos (see Bothmer 2024: 19–20). Tracks like Lorna Shore’s ‘To the Hellfire’ (2021), Brand of Sacrifice’s ‘Exodus’ (2023), and Veil of Maya’s ‘Synthwave Vegan’ (2023) showcase how breakdowns serve as climactic points of heaviness, each employing different techniques to create distinct sonic impacts. For instance while the breakdown in ‘To the Hellfire’ conveys an almost transhuman performance quality, building on the vocal delivery (Hopkins 2012), ‘Exodus’ emphasizes low-end weight paralleled with a dramatically slowed tempo. Conversely, ‘Synthwave Vegan’ utilizes intricate layering and density to produce a highly dynamic breakdown (Bothmer 2024: 38–39). Notably, the breakdown sections in these songs are often the ‘most replayed’ on YouTube, which highlights their centrality in the listener experience (Bothmer 2024: 25–37). They have transcended mere musical features to become cultural markers, which symbolize moments of peak heaviness and intensity that fans celebrate and share on social media (Bothmer 2024). This collective enthusiasm highlights a shared appreciation of heaviness in contemporary metal, which solidifies the breakdown’s role as a cultural and sonic cornerstone in defining the aesthetics of metalcore and deathcore.

7.3.2 *Sonic Weight and Size*

The HiMMP study finds sonic weight to be a fundamental factor in the perception of heaviness. Although previous research has explored this concept, much of it has focused on professional experience (Mynett 2017: 19–20), theoretical discussion (Walther-Hansen 2020: 105–107; Miller 2021: 79–80), or music-theoretical analysis (Smialek 2015: 230, 290–292; Wallmark 2018: 67). The producers interviewed in the HiMMP study directly affirmed the importance of sonic weight, thereby bridging theoretical perspectives with practical experiences. They noted sonic weight’s capacity to elicit a physical response in listeners, akin to the phenomenon of goosebumps or chills that certain musical features can provoke (see Grewe, Kopiez, and Altenmüller 2009; Bannister and Eerola 2023).

Different theories attempt to explain the experience of chills in response to music. One theory identifies ‘vigilance’ chills linked to feelings of awe, expectancy, and the sense of an approaching threat, often evoked by increasing loudness that mimics looming danger (Bannister and Eerola 2023: 242–243). Another theory posits ‘social’ chills, which arise from empathy and social bonding, triggered by qualities such as vocal timbre, poignant lyrics, or identification with the emotional expression of musical personas (Bannister and Eerola 2023: 243). While expressive qualities and emotional engagement

drive both types of chills, heaviness in metal functions predominantly through embodied cognition (Lakoff and Johnson 1980; Johnson 1987; Adlington 2003: 314). Here, the emphasis is on physical sensations, particularly from low-end frequencies, which create a visceral impact on the listener's body. Unlike chills often elicited by vocal expressions like a singer's voice cracking with emotion, the perception of heaviness is directly linked to the intense, physical effect of low-frequency sounds. Producers in the HiMMP study reported experiencing 'overwhelming body sensations' and 'shivering like animals' in response to the powerful resonance of heavy, low-end frequencies.

Such physical response extends in metal beyond sheer physiology, carrying a social and cultural meaning influenced by socialization within its scene (Weinstein 2000; Walther-Hansen 2020). Metal's long-standing associations with power, defiance, and aggression (Weinstein 2000; Kahn-Harris 2007) infuse these bodily sensations with cultural significance. Within the metal community, heaviness is not just a sonic characteristic but also a marker of extremity that symbolizes values like strength and resilience. The physiological impact of low frequencies reinforces these cultural connotations by creating a tangible, embodied experience of some of the genre's themes. Thus, when metal fans experience chills or intense bodily reactions to pronounced bass frequencies, they are not just responding physically to the music but also engaging with its symbolism. This visceral reaction forms part of a shared understanding of heaviness, which resonates with the genre's thematic focus on rebellion and empowerment (Weinstein 2000; Kahn-Harris 2007). In this way, the low-end impact transcends individual physical sensation and becomes a collective experience that reaffirms social identities and subcultural values. This convergence of physical, psychological, and social elements deepens the genre's aesthetic of extremity and illustrates how embodied cognition and cultural theory intersect to shape the perception of metal.

Metaphors and imagination also appear to play a role in enhancing the perception of heaviness. Several newer-generation producers described achieving the desired impression of heavy machinery through careful engineering of instruments, complemented by samples, electronic sounds, and bass drops, drawing influence from electronic styles of popular music. Another central metaphor associated with weight is size, as heavy objects are typically perceived as larger (Walther-Hansen 2020: 105–107). Low-end weight can heighten the perceived vertical dimension of a three-dimensional sound stage, imparting a hyperreal, larger-than-life quality to the band's performance. Thus, while heaviness shares physiological parallels with chills, it operates on a distinct level by blending embodied sensations, metaphorical associations, and socially constructed meanings through the convergence of physical and cognitive processes.

The HiMMP producers highlighted the guitar as being essential to achieving sonic weight, consistent with its widely recognized importance in the

genre (Walser 1993; Berger and Fales 2005; Mynett 2016; Herbst 2017b). Sonic weight in guitar tone is emphasized through distortion, difference tones generated by power chords⁴ (Herbst 2017a), palm-muted picking, and down-tuning. These effects are further augmented by the instrument's amplification chain and microphone placement, with the proximity effect playing a notable role (Herbst 2017b). Scheps voiced a particularly radical perspective, stating that guitars—more than bass and drums—are central to the sonic weight in most metal. This emphasis on the guitar's bottom-end marks a divergence from rock and many other popular music genres. While Bogren supported this view, highlighting the low-end boost from palm-muted playing as being central to metal's structure and tonality, Nordström viewed down-tuning as the pivotal factor in creating heaviness in metal. In comparison, the producers generally regarded the bass as a subtle reinforcement of the dominant guitars, contributing to the concept of a 'meta-instrument' in several 'In Solitude' mixes. Notably, in some mixes, the bass was not confined to the stereo centre but panned to both sides above a specific frequency. This approach supports the guitars while enhancing cohesion and drawing attention to the bass through its unconventional and perhaps unexpected placement in the stereo field.

Nevertheless, the drums, especially the kick, snare, and toms, also have the potential to contribute to heaviness. Unlike Scheps, who prioritizes guitars for low-end weight, Odeholm employs a 'low-end hierarchy', in which the kick takes priority, followed by the bass and guitars. This approach reflects a more contemporary production philosophy, particularly prevalent in sub-genres where rhythmic precision and low-frequency energy are paramount to the music's impact, as is the case with deathcore and djent. In Odeholm's approach, the kick drum functions as the foundational element in the low-end spectrum, establishing a clear rhythmic pulse that the bass and guitars lock onto. Placing the kick at the base of the frequency hierarchy provides a defined, recurring anchor, maintaining low-end cohesion and reinforcing the bass frequencies. The kick's percussive attack and strong low-end presence create dynamic punch or 'force' qualities (Walther-Hansen 2020: 105–107; Adlington 2003) that enhance the heaviness of each bass and guitar note or chord, which makes the entire rhythm section feel tighter and more impactful. Achieving this cohesion requires a careful synchronization between the kick, bass, and guitars, which Odeholm accomplishes through precise editing, quantization, and sample-accurate phase alignment. This alignment combines low frequencies that maximize the music's weight with rhythmic impact to create a powerful, unified foundation that amplifies the perception of heaviness.

The contrast between Scheps' and Odeholm's approaches illustrates broader production philosophies that underly their priorities. Scheps' production style is rooted in more traditional rock and metal contexts, with

guitars as his primary means of creating a wall-of-sound effect that defines much of the genre's sonic identity. The low-end frequencies from distorted guitars are central to establishing heaviness in his mixes, where drums serve as a complement rather than the foundation of sonic weight. In contrast, Odeholm's approach prioritizes the kick drum and its interaction with the bass and guitars, embodying a more contemporary production philosophy, where rhythmic precision and low-end clarity take precedence over the sonic dominance of guitars. For Odeholm, the kick provides the essential low-frequency punch and energy that guitars alone cannot deliver. By emphasizing the kick drum within the low-end hierarchy, he ensures that the rhythmic pulse is tightly locked with the bass and guitars, resulting in a cohesive and powerful low-end foundation that maximizes the music's impact.

The contrast between Scheps and Odeholm, reflecting the spectrum of producers' philosophies observed in the HiMMP experiment, highlights broader shifts in metal production—from traditional methods that prioritize the organic interaction of recorded performances to modern techniques centred on rhythmic precision, synchronization, and low-end clarity. These contemporary approaches are often facilitated by digital technology, which allow for precise editing and phase alignment. Scheps' guitar-driven approach suits traditional genres like heavy and thrash metal, where guitars dominate the mix and serve as the primary source of heaviness. In contrast, Odeholm's kick-focused philosophy suits rhythmically complex and low-end-heavy sub-genres, where sonic clarity and impact are required to achieve the desired heaviness in the production.

Regarding the vocals' contribution to heaviness, the HiMMP producers paid them relatively little attention, even though their opinions varied. Whereas Bogren deemed vocals most relevant for the foundation of musical expression, Odeholm saw them as artistically less captivating than instruments and overall production, though necessary for commercial viability. Vocals add little to the heaviness of a track for Odeholm. Still, elements like pitch range, timbre, and modulation arguably contribute to sonic weight, making extreme vocal styles apt for enhancing heaviness, as seen in death metal, black metal, and deathcore.

Low, guttural vocals have long captivated metal fans; Cannibal Corpse's original vocalist (1988–1995), Chris Barnes, and his subsequent work with Six Feet Under (1993 till present) exemplify this style. These growled vocals often function more rhythmically than melodically, mirroring the deep timbres of distorted guitar and bass. This timbre enhances sonic weight and reinforces transgressive metaphorical associations. Additionally, subtle elements like pronunciation and vocal inflexion can influence the perceived heaviness of the delivery. Eric Smialek (2015: 269) suggests that lowering the first two formants in vowel articulation potentially makes vocal expression feel heavier, as do lower glissandi on sustained notes. Death metal vocalists, in

particular, often lower their formants when articulating short words and shift from brighter to darker vowels in longer words to produce a heavier sound (Smialek 2015: 276). The approach parallels the effect of down-tuned guitars and low-tuned drums, where lower-pitched notes contribute to a sense of metaphorical weight.

Beyond timbre and pitch, modern vocal production techniques play an important role in enhancing the heaviness of extreme metal vocals. A common approach is layering growled or screamed vocals to amplify their impact, creating a thicker, more saturated sound that blends with the instrumental texture. Applying distortion to vocals in post-production enhances their perceived aggression and abrasiveness by adding harmonic distortion. Pitch modulation, including pitch shifting and formant manipulation, is another approach to add depth and mass to the vocals, reinforcing overall heaviness. These methods achieve two goals: boosting vocal intensity and smoothly integrating vocals in the broader mix, where they complement the low-end weight of the instruments.

Extreme vocal styles contribute to metal's heaviness by sonically infusing it with symbolic and cultural connotations. Growled or screamed vocals embody transgression and rebellion (Kahn-Harris 2007), defying mainstream vocal aesthetics and challenging conventional boundaries of what is commonly deemed acceptable in vocal performance. This vocal aggression mirrors the music's intensity and adds a layer of cultural and symbolic meaning that resonates with metal's themes of defiance and extremity (Wallach, Berger, and Greene 2011; Varas Díaz, Scott, and Bardine 2023). Adopting extreme techniques, metal vocalists intensify the music's sense of heaviness by subverting vocal norms and embodying metal's ethos of transgression.

It is important to reiterate that while sonic weight contributes to the perception of heaviness, it is not synonymous with heaviness itself; rather, it represents one essential aspect of perceived sonic 'mass'. Mark Mynett (2017: 14–20) argues that low-end frequencies must be balanced with high frequencies to achieve a clear production sound in which each instrument and vocal is intelligible. High-frequency presence and clarity are thus essential for enhancing the expressive qualities of a performance. Moreover, sufficient high-frequency energy is required to produce the heightened level of hyperreality present in many metal productions, meeting listener and industry expectations for a 'high-fidelity' sound (see Herbst and Bauerfeind 2021).

Mid frequencies are a means of production that is often overlooked in discussions about heaviness. Notwithstanding that they may lack the sonic weight of low frequencies or the fine detail of high frequencies, they play an important role in the overall sonic experience; mid-range energy contributes essential qualities such as aggression and proximity, enhancing the immediacy and emotional intensity. Extensive mid-frequency attenuation,

or ‘scooping’, can result in a hollow sound, whereas preserving mid-range presence supports clarity and definition, even within dense layers of low and high frequencies. Well-balanced mid frequencies enable heaviness to be experienced not merely as mass but as a dynamic, multifaceted phenomenon: low-end weight provides the foundational grounding; high frequencies add detail, clarity, and intensity; and mid frequencies introduce an extra layer of aggression and complexity.

7.3.3 *Distortion, Loudness, and Sonic Density*

Distortion is undeniably a central musical and technical element of heaviness in metal music. Beyond serving as a defining sonic signifier of the genre, particularly for guitars, distortion amplifies a sound’s perceived aggression, intensity, size, and perceptual loudness by dynamically compressing the signal. The ‘In Solitude’ mixes showcase varied uses of leveraging non-linear processing to achieve an effective, powerful, and heavy mix, from gentle saturation and analogue compression to hard digital clipping. These wave-shaping techniques allow engineers to work with more audio while enhancing the perception of loudness and excitement (Wallach, Berger, and Greene 2011; Case 2007: 97–98). Distortion also supports an instrument’s or vocal’s capability to cut through the mix by enriching the harmonic spectrum, particularly in high frequencies. Simultaneously, it can contribute to overall cohesion by assimilating the tonal qualities of individual instruments and vocals, fusing them into a unified sonic mass.

In addition to its technical impact, distortion greatly influences the structural and perceptual components that constitute heaviness. When applied to complex chords or dissonant intervals, distortion increases harmonic complexity, which heightens the intensity of the music (Herbst 2017c, 2018). Tonally and metaphorically, distortion embodies transgression, particularly when applied to vocals that may already be distorted through techniques like growls and screams. These extreme vocal styles often push the boundaries of conventional vocal expression, and adding analogue or digital distortion further amplifies their presence, making them sound larger, more aggressive, and more imposing—much like the effect distortion has on guitar tones (Kennedy 2017: 75). This transformation of the human voice into something more monstrous or mechanized reinforces metal’s aesthetic of extremity and its thematic exploration of transhuman or posthuman elements (Hopkins 2012).

Layering multiple vocal takes with varied articulations and technologically enhanced tonalities produces a range of distorted textures, which results in otherworldly sounds that can be perceived as particularly heavy or sinister (Wallmark 2018). Distorted vocals introduce noise and non-harmonic components into the signal, amplifying their transgressive nature. This

manipulation of the voice, moving it away from its natural timbre, evokes a sense of something beyond human, which aligns with metal's thematic exploration of transgression, chaos, and the dissolution of boundaries between human and machine. As distortion generates psychoacoustic richness by encompassing harmonic as well as non-harmonic elements, it adds depth and complexity to the timbre, strengthening the overall perception of heaviness. Additionally, distortion injects noise into the signal, which, as Xhignesse (2024: 685) argues, enhances heaviness by creating a more chaotic and less accessible sonic sensation.

Sonic density is another quality that benefits from the saturation effect of distortion, yet holds distinct importance to heaviness. Closely associated with the 'wall of sound' effect, achieving this density effect was a primary goal for all HiMMP producers, facilitated by distortion and other processing techniques. Besides modern digital tools, including distortion plug-ins, sub-bass enhancers, and advanced mixing and mastering techniques, producers maximize loudness by compressing dynamic range, which allows them to push sonic density to its extremes. This process creates a sense of sonic mass that surpasses the capabilities of acoustic instruments alone. Through quad-tracking, sample stacking, and extreme compression, producers sculpt a larger-than-life sound that cannot be replicated in a live setting. Sonic density is crafted by filling the mix's frequency spectrum while carefully balancing the spectral content of individual sound sources to prevent masking—a complex endeavour. Producers accomplish this balance using EQ and multiband compression to carve out space for each instrument and minimize overlap in the low and mid frequencies. EQ helps separate the guitars, bass, and drums, giving each its own defined space in the mix, unlike multiband compression that stabilizes specific frequency ranges to prevent any one instrument from overwhelming the mix and to reduce spectro-temporal imbalances like harshness or rumble.

To fully occupy the frequency spectrum, the 'In Solitude' mixes and other documented productions in journalistic media use a variety of strategies, including layering and multiplying takes of guitar, bass, and vocals, with different sounds or harmonization and stacking of drum samples, alongside the regular use of distortion. All but one of the HiMMP producers opted for quad-tracked guitars in 'In Solitude', often using two signals per guitar performance to create a hyper-dense sound.⁵ Each producer also made multiple copies of the bass performance, processing each with distinct tonal characteristics to establish a robust low-end presence without overpowering other elements. Similarly, nearly every producer enhanced the drum sound by layering multiple samples per instrument, adding both weight and impact to the rhythm section. Lastly, rather than removing growled vocals blended with the clean ones, some producers duplicated them to emphasize this effect across the mix.

7.4 Conclusion

The quest for heaviness in metal music is multifaceted in that it involves compositional, performative, and technological elements. Achieving heaviness goes far beyond increasing loudness or adding distortion; producing heaviness requires a careful balance of recording and production techniques, compositional choices, performative expression, and emotional depth. Throughout this book, we have suggested that heaviness is a subjective and changing concept born from the interaction of songwriting, performance qualities, engineering decisions, and the ways in which listeners perceive and interpret music. This dynamic does not come from musical characteristics alone; it relies on personal preferences, musical and technological advancements, autobiographical connections, and shared genre conventions. As metal continues to develop, so too does its approach to heaviness. Nevertheless, for metal to convey heaviness, it typically draws on several expected and established musical and sonic factors. Elements such as sonic weight, emotional power, rhythmic precision, and technological innovations create a listening experience that exceeds the sum of its parts. Metal producers and artists continually experiment with these elements, combining them in original ways to explore new forms of expression.

The adaptability of heaviness allows for varied interpretations across metal subgenres, where distinct qualities are emphasized to distinguish each style aesthetically, ideologically, or emotionally. For example, while doom metal relies on slow tempi and dense, resonant tones to convey sonic weight, deathcore focuses on breakdowns and rhythmic intensity to achieve its version of heaviness. This diversity situates heaviness as a concept open to interpretation that allows artists and listeners to shape it according to their tastes and subgenre preferences. The HiMMP study found numerous examples of producers emphasizing different aspects of heaviness, such as aggression, chaos, intensity, or brutality, depending on their creative priorities. Given this flexibility, heaviness can function as both an aesthetic tool and a form of personal expression, which encourages artistic exploration and allows musicians to redefine and expand their boundaries. The vast number of possibilities offered by such adaptability likely explains the genre's enduring pursuit of ever-greater heaviness.

Heaviness is more than just a hallmark of metal; it carries profound ideological and personal significance. Musicians who create heaviness as an act of artistic expression will likely benefit from the resulting visibility, growth, and long-term success. On the production side, capturing and shaping heaviness are not only a technical exercise for engineers and producers but also a reflection of their craftsmanship and artistic labour. For listeners, heaviness transcends sonic properties and forges an emotional connection to the music and between other fans. It acts as a conduit for expressing rebellion,

empowerment, and solidarity within a shared community. In this way, heaviness becomes more than just an aesthetic goal; it is a meaningful form of communication that embodies many of metal's core values: authenticity, defiance, creativity, and emotional catharsis.

* * *

Through a broad portfolio of publications, audio materials, and videos, the HiMMP research project has observed many sonic components and their interactions that influence the subjective perception of heaviness in metal music. What sets this project apart is its unique perspective on how some of the world's leading metal producers conceptualize and execute their vision of heaviness. The resulting mixes of 'In Solitude' showcase heaviness in its various forms. These mixes present invaluable artefacts that enable fans, listeners, and producers to explore, experience, and reflect on the aesthetics and mixing approaches that resonate with them the most.

Although the inability to distil heaviness into a single formula may seem unsatisfying, it in no way diminishes the success of the research. The project's goal of investigating how and why heaviness works in metal music production has been achieved through a multidisciplinary approach that incorporated a range of perceptual, musical, and technological dimensions. Drawing from fields as broad as embodied cognition, cognitive metaphor theory, audio engineering, and the art of record production, we have examined many decisions involved in songwriting, arrangement, mixing, and mastering that musicians, engineers, and producers must manage.

Spanning a wide range of subgenres and perspectives, this project equips producers, scholars, musicians, and fans with knowledge that will hopefully enrich and diversify their approach to metal production and fandom. One of its unique contributions is the empirical experiment with eight leading producers who have given us rare insights into their work and offered first-hand perspectives on engineering approaches and decision-making processes. The resulting audible artefacts are available for study, emulation, and practical application. Accompanying interview videos serve as audiovisual guides to these production techniques, while the written transcripts and screenshots, featured in Volume II of this mini-book series, *Learn from the Masters* (Herbst and Mynett 2025), provide additional material for independent analysis and study.

Notes

- 1 With breakdowns, both mechanics are probably at play. Emotional priming from expectations can enhance heaviness, but breakdowns feature musical or production elements that are usually surprising. These may involve the timing within the song, structural integration like false build-ups that delay the breakdown and

- create tension, or the intensity of the transition through various means, including tempo, instrumental density, rhythmic complexity, and production effects.
- 2 Julia Kristeva's (1982) theory of abjection is relevant in this context. It is reasonable to assume that abject topics, often present in extreme metal, can enhance the feeling of heaviness as a form of symbolic rebellion, in keeping with the general anti-mainstream ethos of the metal scene, particularly within extreme metal.
 - 3 Although synthesizing artificial vocals has seen rapid advances in recent years, not least due to the growing capabilities of artificial intelligence, programmed vocals remain relatively uncommon in most metal genres. Aside from their limited use in backing vocals, programming for lead vocals as a means to push vocal timbres beyond the thresholds of human expression is rare. Instead, different recorded expressions are blended to create inhuman and transgressive timbres.
 - 4 A fifth interval played as a power chord adds a measurable lower octave to the root when played with a high degree of distortion, lowering the guitar's tessitura to that of a bass guitar.
 - 5 It must be acknowledged, however, that quad-tracked guitars are not necessarily heavier than double-tracked guitars (see Mynett 2017: 134–137). Instead, the tempi and rhythmic subdivisions in 'In Solitude' lend themselves to a denser guitar tone afforded by using four guitars.

Bibliography

- Adlington, Robert (2003). 'Moving beyond Motion: Metaphors for Changing Sound'. *Journal of the Royal Musical Association*, 128(2): 297–318.
- Auslander, Philip (2023). *Liveness: Performance in a Mediatized Culture*. New York, NY: Routledge.
- Bannister, Scott and Eerola, Tuomas (2023). 'Vigilance and Social Chills with Music: Evidence for Two Types of Musical Chills'. *Psychology of Aesthetics, Creativity, and the Arts*, 17(2): 242–258.
- Barratt-Peacock, Ruth and Herbst, Jan-Peter (2025). 'The Effects of Ensemble Singing on Heaviness in Metal Music: Revisiting a Systematic Approach'. *Metal Music Studies*, 11(1): 65–89.
- Bateman, Wayne (1980). *Introduction to Computer Music*. New York, NY: Wiley.
- Berger, Harris M. (1999). *Metal, Rock, and Jazz: Perception and the Phenomenology of Musical Experience*. Hanover, NH: University Press of New England.
- Berger, Harris M. and Fales, Cornelia (2005). 'Heaviness in the Perception of Heavy Metal Guitar Timbres: The Match of Perceptual and Acoustic Features over Time', in *Wired for Sound: Engineering and Technologies in Sonic Cultures*, edited by Paul D. Greene and Thomas Porcello (pp. 181–197). Middletown, CT: Wesleyan University Press.
- Berger, Harris M.; Wallach, Jeremy and Greene, Paul D. (eds.) (2011). *Metal Rules the Globe: Heavy Metal Music around the World*. Durham, NC: Duke University Press.
- Bonnet, François J. (2020). *The Music to Come*. Rennes: Shelter Press.
- Bothmer, Leif (2024). 'Metalcore-Breakdowns in der Aufmerksamkeitsökonomie der digitalisierten Musikindustrie: Eine Fallstudie zur Analyse von Produktion, Promotion und Rezeption eines genrespezifischen Song-Abschnitts'. Undergraduate thesis (unpublished), Leuphana University of Lüneburg.
- Burns, Lori; Woods, Alyssa and Lafrance, Marc (2016). 'Sampling and Storytelling: Kanye West's Vocal and Sonic Narratives', in *The Cambridge Companion to the Singer-Songwriter*, edited by Katherine Williams and Justin A. Williams (pp. 144–158): Cambridge: Cambridge University Press.

- Capuzzo, Guy (2018). 'Rhythmic Deviance in the Music of Meshuggah'. *Music Theory Spectrum*, 40(1): 121–137.
- Case, Alexander U. (2007). *Sound FX: Unlocking the Creative Potential of Recording Studio Effects*. Oxford: Focal Press.
- Czedik-Eysenberg, Isabella; Knauf, Denis and Reuter, Christoph (2017). "Hardness" as a Semantic Audio Descriptor for Music Using Automatic Feature Extraction', in *Informatik 2017*, edited by Maximilian Eibl and Martin Gaedke (pp. 101–110). Bonn: Gesellschaft für Informatik.
- DiVita, Joe (2021). 'Lorna Shore's "to the Hellfire" Is the 2021 Song of the Year'. *Loudwire*. <https://loudwire.com/lorna-shore-will-ramos-to-the-hellfire-2021-song-of-the-year>.
- Franck, Georg (1998). *Ökonomie der Aufmerksamkeit: Ein Entwurf*. München: Hanser.
- Gamble, Steven (2019). 'Breaking down the Breakdown in Twenty-First-Century Metal'. *Metal Music Studies*, 5(3): 337–354.
- Grewe, Oliver; Kopiez, Reinhard and Altenmüller, Eckart (2009). 'The Chill Parameter: Goose Bumps and Shivers as Promising Measures in Emotion Research'. *Music Perception*, 27(1): 61–74.
- Hagen, Ross (2011). 'Musical Style, Ideology, and Mythology in Norwegian Black Metal', in *Metal Rules the Globe*, edited by Jeremy Wallach, Harris M. Berger, and Paul D. Greene (pp. 180–199). Durham, NC: Duke University Press.
- Hannan, Calder (2018). 'Difficulty as Heaviness: Links between Rhythmic Difficulty and Perceived Heaviness in the Music of Meshuggah and the Dillinger Escape Plan'. *Metal Music Studies*, 4(3): 433–458.
- Hannan, Calder (2021). 'Ghostly Longing: Tonality as Grieving in Bell Witch's Mirror Reaper'. *Metal Music Studies*, 7(2): 277–297.
- Harden, Alex (2019). 'Narrative and the Art of Record Production', in *Producing Music*, edited by Russ Hepworth-Sawyer (pp. 263–277): New York, NY: Routledge.
- Herbst, Jan-Peter (2017a). 'Akkordstrukturen im verzerrten Rockgitarrenriff. Eine experimental-analytische Studie zur Auswirkung von physikalischen und psychoakustischen Faktoren'. *ASPM Samples*, 15: 1–27. <https://gfp-samples.de/Samples15/herbst.pdf>.
- Herbst, Jan-Peter (2017b). 'Historical Development, Sound Aesthetics and Production Techniques of the Distorted Electric Guitar in Metal Music'. *Metal Music Studies*, 3(1): 24–46.
- Herbst, Jan-Peter (2017c). 'Influence of Distortion on Guitar Chord Structures: Acoustic Effects and Perceptual Correlates', in *Akustik Und Musikalische Hörwahrnehmung*, edited by Wolfgang Auhagen, Claudia Bullerjahn, and Christoph Louven (pp. 26–47). Göttingen: Hogrefe.
- Herbst, Jan-Peter (2018). 'Heaviness and the Electric Guitar: Considering the Interaction between Distortion and Harmonic Structures'. *Metal Music Studies*, 4(1): 95–113.
- Herbst, Jan-Peter (2019). 'Distortion and Rock Guitar Harmony: The Influence of Distortion Level and Structural Complexity on Acoustic Features and Perceived Pleasantness of Guitar Chords'. *Music Perception*, 36(4): 335–352.
- Herbst, Jan-Peter (2020). 'From Bach to Helloween: "Teutonic" Stereotypes in the History of Popular Music'. *Metal Music Studies*, 6(1): 87–108.
- Herbst, Jan-Peter (ed.) (2023). *The Cambridge Companion to Metal Music*. Cambridge: Cambridge University Press.
- Herbst, Jan-Peter and Bauerfeind, Karl (2021). 'Teutonic Metal: Effects of Place- and Mythology-Based Labels on Record Production'. *International Journal of the Sociology of Leisure*, 4(4): 291–313.
- Herbst, Jan-Peter and Mynett, Mark (2023a). 'Lorna Shore's "to the Hellfire": A Study in Heaviness'. *Metal Music Studies*, 9(2): 189–213.

- Herbst, Jan-Peter and Mynett, Mark (2023b). 'Mapping the Origins of Heaviness between 1970 and 1995: A Historical Overview of Metal Music Production', in *The Cambridge Companion to Metal Music*, edited by Jan-Peter Herbst (pp. 29–42). Cambridge: Cambridge University Press.
- Herbst, Jan-Peter and Mynett, Mark (2025). *Heaviness in Metal Music Production. Learn from the Masters*. Abingdon: Routledge.
- Herzberg, Martin (2012). *Musik und Aufmerksamkeit im Internet: Musiker im Wettstreit um Publikum bei YouTube, Facebook & Co*. Marburg: Tectum Verlag.
- Hillier, Benjamin (2020). 'Considering Genre in Metal Music'. *Metal Music Studies*, 6(1): 5–26.
- Hopkins, Patrick D. (2012). 'Transhumanism', in *Encyclopedia of Applied Ethics*, edited by Ruth Chadwick (pp. 414–422). San Diego: Elsevier.
- Hudson, Stephen S. (2022). 'Review of *Making Sense of Recordings: How Cognitive Processing of Recorded Sound Works* by Mads Walther-Hansen, Oxford University Press, 2020'. *Integral*, 35: 103–108.
- Huron, David (2008). *Sweet Anticipation: Music and the Psychology of Expectation*. Cambridge, MA: MIT.
- Johnson, Mark (1987). *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason*. Chicago, IL: University of Chicago Press.
- Kahn-Harris, Keith (2007). *Extreme Metal: Music and Culture on the Edge*. Oxford: Berg.
- Kennedy, Lewis (2017). 'Functions of Genre in Metal and Hardcore Music'. PhD thesis, University of Hull.
- Kristeva, Julia (1982). *Powers of Horror: An Essay on Abjection*. New York, NY: Columbia University Press.
- Lakoff, George and Johnson, Mark (1980). *Metaphors We Live by*. Chicago, IL: University of Chicago Press.
- Latour, Bruno (2005). *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
- Leman, Marc (2019). *Embodied Music Cognition and Mediation Technology*. Cambridge, MA: The MIT Press.
- Léveillé Gauvin, Hubert (2018). 'Drawing Listener Attention in Popular Music: Testing Five Musical Features Arising from the Theory of Attention Economy'. *Musicae Scientiae*, 22(3): 291–304.
- Lucas, Olivia (2018). "'So Complete in Beautiful Deformity': Unexpected Beginnings and Rotated Riffs in Meshuggah's obZen'. *Music Theory Online*, 24(3). <https://mtosmt.org/issues/mto.18.24.3/mto.18.24.3.lucas.html>.
- Man, Brecht de; Stables, Ryan and Reiss, Joshua D. (2019). *Intelligent Music Production*. New York, NY: Routledge.
- Margulis, Elizabeth H. (2014). *On Repeat: How Music Plays the Mind*. New York, NY: Oxford University Press.
- McIver, Joel (2009a). *Justice for All: The Truth about Metallica*. London: Omnibus.
- McIver, Joel (2009b). *The Bloody Reign of Slayer*. Kindle. London: Omnibus.
- Merleau-Ponty, Maurice (2012). *Phenomenology of Perception*. Abingdon: Routledge.
- Miller, Jason (2021). 'What Makes Heavy Metal "Heavy"?'. *The Journal of Aesthetics and Art Criticism*, 80(1): 70–82.
- Moylan, William (2007). *The Art of Recording: Understanding and Crafting the Mix*. Amsterdam: Elsevier.
- Mynett, Mark (2016). 'The Distortion Paradox: Analyzing Contemporary Metal Production', in *Global Metal Music and Culture*, edited by Andy R. Brown, Karl Spracklen, Keith Kahn-Harris, and Niall Scott (pp. 68–88). London: Routledge.
- Mynett, Mark (2017). *Metal Music Manual: Producing, Engineering, Mixing, and Mastering Contemporary Heavy Music*. Abingdon: Routledge.

- Mynett, Mark (2019a). 'Defining Contemporary Metal Music: Performance, Sounds and Practices'. *Metal Music Studies*, 5(3): 297–313.
- Mynett, Mark (2019b). 'Heaviness in Three Dimensions: The Use of Sonic Space in Contemporary Metal Music Production', in *Art of Record Production: Creative Practice in the Studio*, edited by Simon Zagorski-Thomas, Katia Isakoff, Sophie Stévanec, and Serge Lacasse (pp. 66–79). Abingdon: Routledge.
- Netherton, Jason (2017). 'The Entrepreneurial Imperative: Recording Artists in Extreme Metal Music Proto-Markets'. *Metal Music Studies*, 3(3): 369–386.
- Netherton, Jason (2021). 'Heavy Metal Fundraisers: Entrepreneurial Recording Artists in Platform Capitalism'. PhD thesis, The University of Western Ontario.
- Pattie, David (2007). *Rock Music in Performance*. New York, NY: Palgrave Macmillan.
- Pieslak, Jonathan (2007). 'Re-Casting Metal: Rhythm and Meter in the Music of Meshuggah'. *Music Theory Spectrum*, 29(2): 219–245.
- Pieslak, Jonathan (2008). 'Sound, Text and Identity in Korn's "Hey Daddy"'. *Popular Music*, 27(1): 35–52.
- Pillsbury, Glenn T. (2006). *Damage Incorporated: Metallica and the Production of Musical Identity*. New York, NY: Routledge.
- Porcello, Thomas (2004). 'Language and the Professionalization of Sound-Recording Engineers'. *Social Studies of Science*, 34(5): 733–758.
- Reyes, Ian (2008). 'Sound, Technology, and the Interpretation in Subcultures of Heavy Music Production'. PhD thesis, Pittsburgh University.
- Reyes, Ian (2013). 'Blacker than Death: Recollecting the "Black Turn" in Metal Aesthetics'. *Journal of Popular Music Studies*, 25(2): 240–257.
- Smialek, Eric (2015). 'Genre and Expression in Extreme Metal Music, ca. 1990–2015'. PhD thesis, McGill University.
- Smialek, Eric (2023). 'Contempt-of-Core: A Reception History of Metalcore Subgenres as Abject Genres', in *The Cambridge Companion to Metal Music*, edited by Jan-Peter Herbst (pp. 281–298). Cambridge: Cambridge University Press.
- Smialek, Eric and Herbst, Jan-Peter (2024). 'Towards an Analytical Methodology for Vocalist's Live Gestures in Extreme Metal'. *ASPM Samples*, 22 (forthcoming).
- Thomas, Niall (2015). 'The Development of Technology and Its Influence on Recorded Heavy Metal Music 1969–2015'. PhD thesis, University of Hull.
- Varas Díaz, Nelson and Scott, Niall (eds.) (2016). *Heavy Metal Music and the Communal Experience*. Lanham, MA: Lexington Books.
- Varas Díaz, Nelson; Scott, Niall and Bardine, Bryan A. (eds.) (2023). *On Extremity: From Music to Images, Words, and Experiences*. Lanham, MD: Lexington Books.
- Volák, Vojtěch (2022). 'Heaviness: A Key Concept of Metal Music through the Lens of Deleuzian Philosophy'. *Studia de Cultura*, 14(3): 53–62.
- Walch, Florian (2023). 'Extreme Metal across the Digital Divide: Music, Technology, Genre'. PhD thesis, University of Chicago.
- Wallach, Jeremy; Berger, Harris M. and Greene, Paul D. (2011). 'Affective Overdrive, Scene Dynamics, and Identity in the Global Metal Scene', in *Metal Rules the Globe*, edited by Harris M. Berger, Jeremy Wallach, and Paul D. Greene (pp. 3–33). Durham, NC: Duke University Press.
- Wallmark, Zachary (2018). 'The Sound of Evil: Timbre, Body, and Sacred Violence in Death Metal', in *The Relentless Pursuit of Tone*, edited by Robert Fink, Melinda Latour, and Zachary Wallmark (pp. 65–87). New York, NY: Oxford University Press.
- Walser, Robert (1993). *Running with the Devil: Power, Gender, and Madness in Heavy Metal Music*. Hanover, NH: University Press of New England.
- Walther-Hansen, Mads (2020). *Making Sense of Recordings*. Oxford: Oxford University Press.
- Weinstein, Deena (2000). *Heavy Metal: The Music and Its Culture*. Cambridge, MA: Da Capo Press.

- Weinstein, Deena (2011). 'The Globalization of Metal', in *Metal Rules the Globe*, edited by Jeremy Wallach, Harris M. Berger, and Paul D. Greene (pp. 34–59). Durham, NC: Duke University Press.
- Williams, Duncan (2023). 'Timbral Metrics for Analysis of Metal Production: Then, Now and What Next?', in *The Cambridge Companion to Metal Music*, edited by Jan-Peter Herbst (pp. 70–82). Cambridge: Cambridge University Press.
- Xhignesse, Michel-Antoine (2024). 'The Heaviest Metal'. *Philosophia*, 52: 681–697.
- Yavuz, M. Selim (2017). "'Delightfully Depressing": Death/Doom Metal Music World and the Emotional Responses of the Fan'. *Metal Music Studies*, 3(2): 201–218.
- Zagorski-Thomas, Simon (2014). *The Musicology of Record Production*. Cambridge: Cambridge University Press.
- Zak, Albin (2001). *The Poetics of Rock: Cutting Tracks, Making Records*. Berkeley, CA: University of California Press.
- Zatorre, Robert J. and Salimpoor, Valorie N. (2013). 'From Perception to Pleasure: Music and Its Neural Substrates'. *Proceedings of the National Academy of Sciences of the United States of America*, 110(2): 10430–10437.

Discography

- Brand of Sacrifice (2023). 'Exodus', on *Between Death and Dreams*. Self-Released.
- Lorna Shore (2021). 'To the Hellfire', on . . . *And I Return to Nothingness*. Century Media.
- Meshuggah (2012). 'I Am Colossus', on *Koloss*. Nuclear Blast.
- Meshuggah (2016). 'MonstroCity', on *The Violent Sleep of Reason*. Nuclear Blast.
- Metallica (1986a). 'Master of Puppets', on *Master of Puppets*. Elektra.
- Metallica (1986b). *Master of Puppets*. Elektra.
- Metallica (1986c). 'The Thing That Should Not Be', on *Master of Puppets*. Elektra.
- Metallica (1991). 'Enter Sandman', on *Metallica (Black Album)*. Elektra.
- Slayer (1986). *Reign in Blood*. Def Jam Recordings.
- Veil of Maya (2023). 'Synthewave Vegan', on *[M]other*. Sumerian Records.

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