Metal Music in the Federal Republic of Germany in the 1980s and 1990s: Record Production, Industry, and Heritage

by

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Abstract

This commentary and the associated portfolio of publications examine the two formative decades of metal music in the Federal Republic of Germany in the 1980s and 1990s from a production perspective. A multi-methodical and mixed-data research design is used, combining qualitative interviews and document and music analyses. The scope is narrowed to three areas: 1) the sonic signatures of German metal compared to foreign productions (mainly from the UK and USA); 2) the business and recording infrastructure of German metal production; 3) the heritage and cultural preservation of recorded metal music in Germany.

Re 1) The research proposes that German metal has a sonic, yet vaguely defined, signature, given the complexity of such an attribution. Apart from the detailed nuances that distinguish German metal from other parts of the world, further musical factors like the individual styles of bands and genre conventions are shown to play a significant role. Through interviews, it is demonstrated that even producers who have been instrumental in the first three decades of German metal find it challenging to define a German metal signature and differ in their views. As to what influences the perception and discourse of place or culture-specific sounds, they highlight further contextual aspects potentially more significant than auditory perception, such as imagined communities, myths, symbols, and historically developed stereotypes.

Re 2) The research examines the production landscape of early (West) German metal music. It proposes that common depictions in journalistic media fall short, limiting German metal history to a few independent record companies (Noise, Steamhammer, Nuclear Blast, Century Media) and producers (e.g., Harris Johns). The publications portfolio confirms a significant contribution of these actors, but for early metal to flourish, the development relied on a more extensive network of record companies, distributors, managers, and recordists. It is shown that German subcultural rock and metal production was historically disadvantaged against the dominant Anglo-American markets. However, as the research demonstrates, the scene's persistence and community-oriented ethos eventually advanced Germany to a considerable production location for German and foreign metal bands.

Re 3) The research reflects on the need to preserve the heritage of metal music as part of German national culture. It examines the tendency that music producers and studio owners do not consider artefacts used or created when producing a record worthy of heritage, believing these mainly serve the nostalgic interests of those involved in the process. According to them, what should be preserved is the released record as the most relevant contribution to metal culture. That is why recordists have taken on audio preservation, which is typically the responsibility of record companies, to prevent cultural artefacts from being lost. The research wishes to draw attention to the risk of losing audio and other material artefacts from the genre's production, aiming to stimulate reflection and encourage preservative action.

Keywords: German metal music; scene formation; record production; sonic signatures; place and culture-based sounds; recording industry; music business; cultural heritage; audio preservation

Portfolio of Published Works

Recommended order of reading:

1) Herbst, J.-P. (2019). The formation of the West German power metal scene and the question of a 'Teutonic' Sound. *Metal Music Studies*, 5(2), 201–223.

   https://doi.org/10.1386/mms.5.2.201_1

2) Herbst, J.-P. (2021). Culture-specific production and performance characteristics: An interview study with 'Teutonic' metal producers. *Metal Music Studies*, 7(3), 445–467.

   https://doi.org/10.1386/mms_00059_1

3) Herbst, J.-P. (2020). Views of German producers on 'Teutonic' metal: Production approaches and generational effects. In R. v. Appen & T. Hindrichs (Eds.): *One Nation Under a Groove: 'Nation' als Kategorie populärer Musik* (pp. 183–206). Transcript.

   https://doi.org/10.14361/9783839455814-010

4) Herbst, J.-P. & Bauerfeind, K. (2021). Teutonic metal: Effects of place- and mythology-based labels on record production. *International Journal of the Sociology of Leisure*, 4, 291–313.

   https://doi.org/10.1007/s41978-021-00084-5

5) Herbst, J.-P. (2020). Sonic signatures in metal music production: Teutonic vs British vs American Sound. *Samples*, 18, 1–26.

   http://www.aspm-samples.de/Samples18/Herbst.pdf

6) Herbst, J.-P. (2020). Metronomic precision of 'Teutonic metal': A methodological challenge for rhythm and performance research. *Samples*, 18, 1–27.

   http://www.aspm-samples.de/Samples18/Herbst2.pdf

7) Herbst, J.-P. (2021). The politics of Rammstein's sound: Decoding a production aesthetic. *Journal of Popular Music Studies*, 33(2), 51–76.

   https://doi.org/10.1525/jpms.2021.33.2.51

8) Herbst, J.-P. (2020). From Bach to Helloween: 'Teutonic' stereotypes in the history of popular music. *Metal Music Studies*, 6(1), 87–108.

   https://doi.org/10.1386/mms_00006_1

9) Herbst, J.-P. (2020). German metal attack: Power metal in and from Germany. In O. Seibt, M. Ringsmut, & D.-E. Wickström (Eds.): *Made in Germany* (pp. 81–89). Routledge.

https://doi.org/10.4324/9781351200790-10

10) Herbst, J.-P. (2022). Infrastructure of the German music business. In U. Schütte (Ed.). *The Cambridge companion to Krautrock* (pp. 59–73). Cambridge University Press. https://doi.org/10.1017/9781009036535.005

11) Herbst, J.-P. (2021). The recording industry as the enemy? A case study of early West German metal music. *International Journal of the Sociology of Leisure*, 5, 229–254.

https://doi.org/10.1007/s41978-021-00098-z

12) Herbst, J.-P. (2021). Recording studios as museums? Record producers' perspectives on German rock studios and accounts of their heritage practice. *Popular Music*, 40(2), 91–113.

https://doi.org/10.1017/S026114302100009X

13) Herbst, J.-P. (2022). Keeper of the Seven Keys: Audio heritage in metal music production. *Metal Music Studies*, 8(1), 109–126.

https://doi.org/10.1386/mms_00063_1

1. Introduction

I grew up near Paderborn in North Rhine-Westphalia, Germany, about 100 km from the Ruhr Area, with metal music hotspots such as Essen, Bochum, Gelsenkirchen, and Dortmund. Even though Paderborn is less known as a centre for metal music than those cities, it had a thriving underground metal scene well connected to other regional scenes, offering plenty of opportunities for bands to play live and link up with other artists. I was part of the scene as a guitarist of several metal bands, live sound engineer, and record producer running my own semi-professional studio.

In 2011, I was offered to produce an album for one of Paderborn's most successful metal bands, the power metal band Torian (since 2002). The budget granted by Sound Guerrilla Records was generous for a semi-professional band, so I wondered why the band did not want to record drums but programme them instead. Neither did I know why the drums had to be tuned a certain way—extremely low—and why the entire mix had to be built around the kick drum. Other requests from the band also puzzled me, such as recording multiple layers of background vocals; stacking countless rhythm and melody guitars; blending various synthesiser pads with the guitars; meticulously editing the guitar parts for maximum precision, including running melody guitars through Celemony Melodyne software to achieve perfect pitch and rhythmic accuracy.

Torian saw themselves in the tradition of German heavy and power metal, combined with influences from US-American bands such as Iced Earth, Manowar, Exodus, and Testament, and British bands like Iron Maiden. Its band members had a clear vision of the impression they wished to achieve when they instructed me to create an American guitar sound and German drums, and what that meant needed to be clarified to me. As a guitarist, I could distinguish between British and American guitar sounds, but otherwise, I did not understand many of the culture-specific nuances in the arrangement and mixing that my client asked me to implement. Back then, I mainly listened to Swedish and US-American metal and was unfamiliar with the domestic influences except for what I had picked up from reading metal magazines or speaking with fellow metalheads.

The production took a long time because it was difficult for me to comprehend the artistic vision, but finally, the record was released as a 62-minute concept album, *Dawn* (Torian, 2012). The band was pleased with their album, the main metal magazines reviewed it favourably (Bruder Cle, 2012; Kessler, 2012; Kohsiek & Brandt, 2014), and it earned Torian a record deal with one of their desired labels, Ram It Down, a company specialising in European power

metal. For their following releases, Torian chose Sebastian Levermann, founder of the internationally recognised German power metal band Orden Ogan (since 1996) and owner of Greenman Studios, who has become one of Germany's primary heavy and power metal producers in recent years.

Given my preference for Swedish, US-American, and British metal, conducting research on German metal was in no way planned. The research began as a coincidence when I found a metal producer who agreed to be interviewed about a guitar amplification technology I was studying (Herbst, 2019c). Familiar with the name Karl 'Charlie' Bauerfeind but not with his work, I did some background research and found a video in which he described himself as a 'Teutonic metal producer' (Delamar, 2010). Intrigued by the term, I conducted a rudimentary literature review and created a second interview schedule to interview Bauerfeind to learn more about the specifics of 'Teutonic' metal production. For my visit to his main place of work, Twilight Hall Studios of the known German metal band Blind Guardian (since 1984), he took a whole day to answer my questions and explain his understanding of 'Teutonic metal', supported by audio demonstrations of current and past productions, as well as an introduction into the architectural and acoustic specifics of the recording spaces. At that point, I knew Bauerfeind to be one of the leading metal producers in Germany, having worked with many popular German (e.g., Helloween, Gamma Ray, Running Wild) and foreign metal bands (e.g., Saxon, Motörhead, Venom, HammerFall, Angra).

A short while later, I conducted another interview about guitar amplification technology with metal producer Siegfried 'Siggi' Bemm, whose contact details I had through supervising a student research project on studio operators in the Ruhr Area (Herbst & Holthaus, 2017). A closer look at Bemm's discography (e.g., The Gathering, Unleashed, Morgoth) revealed him as the primary producer of the record company Century Media, which had become one of the world's most influential metal record labels since its foundation in 1988. My interest in guitar amplifiers faded quickly, and early German metal production became my focus. Later, I was fortunate enough to interview Harris Johns (e.g., Kreator, Sodom, Helloween), a recognised thrash metal producer for Noise Records (since 1983).

These interviews inspired more research on German metal. However, as most of the first wave of German metal producers could no longer be located, had passed away, or did not respond, I turned to younger producers like Sebastian Levermann and Lasse Lammert. They provided insights into their production practices, which I extended with the perspectives from

metal musicians, journalists, and academics to examine what is specifically German or 'Teutonic' about German metal. This phenomenon first piqued my interest when I produced Torian's *Dawn* (2012).

These interviews formed the beginning and first phase of the research, which aimed to investigate the sonic signature of 'Teutonic metal'. Each interview added new perspectives that I used to confront other interviewees, supplemented by journalistic literature I had reviewed in the meantime. In the second phase, I was interested in exploring how fan communities received artistic visions based on descriptions by German metal producers, exploring stereotypes and the music's reception inland and abroad. The third phase was marked by how German metal productions were preserved. It was inspired by the Home of Metal symposium and workshop at Birmingham City University (BCMCR, 2019), which was my first academic encounter with heritage studies. The fourth and final phase focused on the recording industry structurally to investigate the economic and technological context in which early metal was produced.

Research Intention

Despite the coincidental beginning and iterative knowledge gain that resulted in studies exploring individual issues in detail, the publications of this portfolio are coherent and focused, concentrating on metal music production and the recording industry in (West) Germany, with its artistic, cultural, and economic aspects. More specifically, this research portfolio examines the formative period of metal in the Federal Republic of Germany in the 1980s and 1990s, its stylistic features and sonic signatures, the record production conditions, practices and industry structures, and its reception and heritage.

Early metal scholarship focused on the genre's countries of origin, the UK and USA (Berger, 1999; Walser, 1993; Weinstein, 1991). Since metal music studies formed as a subfield of popular music studies in the 2010s, research in this area has grown exponentially. Two traits generally shared within popular music studies are noteworthy. Firstly, the genre was studied in various disciplines, including philosophy (Copilaş, 2019; Hoffin, 2018), psychology (Copilaş, 2020) and mental health (Messick et al., 2020; Quinn, 2019), linguistics (Kirner-Ludwig & Wohlfarth, 2018), sociology (Faust, 2016; Snaza & Netherton, 2016), history (La Rocca, 2017; Pichler, 2017) and classical studies (Djurslev, 2014; Swist, 2019), religious studies (Coggins, 2018; Olson, 2017), literary studies (Barnett, 2017; J. J. Roberts, 2017), education (Epp, 2019), art and design (Cardwell, 2017; O'Hagan, 2022), cultural studies (Spracklen, 2020), gender (Berkers & Schaap, 2018; R. L. Hill, 2016) and media studies (A. Brown, 2014, 2021; Hoad,

2017), increasingly from musicology and music theory (Capuzzo, 2018; Hannan, 2018; Hillier, 2018, 2020b; Kazdan, 2017), but rarely from music technology (Marrington, 2017; Mynett, 2019; Thomas & King, 2019; Williams, 2015). Secondly, when music was considered, it was mainly out of ethnological interest (Banchs, 2016; Bardine, 2021; Chiu & Seta, 2017; Knopke, 2014; La Luz Núñez, 2021; D. W. Lee, 2018; Pelayo, 2021; Quader, 2016; Wallach et al., 2011). This research tradition has led to a distinct gap in knowledge, which this research seeks to fill. On the one hand, the musical features of metal, especially from a record production perspective, are currently understudied. On the other, research on metal has expanded from the UK and USA to subcultures and scenes in the Global South (Banchs, 2016; Scaricaciottoli et al., 2020; Varas Díaz, 2021) or other non-Western countries (Hecker, 2016; Wallach, 2008), overlooking many countries from the second wave of metal in Western Europe, Australia, and Japan, including West Germany.

This research focuses on the Federal Republic of Germany as a significant country for metal music (production). After taking root in the 1980s and 1990s, Germany became a global metal music stronghold. The research focuses on how the genre was adapted from the UK and USA in these two decades when music industries and scenes were less globalised than today.

Research on metal from Germany is scarce, especially on West German metal, whereas metal from the Eastern German Democratic Republic (GDR) has been examined more extensively in two German-language PhD theses and resulting monographs (Okunew, 2021; Zaddach, 2018b) and essays (Okunew, 2016, 2018; Zaddach, 2016, 2018a). These theses describe how the socialist/communist system influenced rock and metal scenes with its fan practices and production mechanisms, marked by state surveillance, planned economy, and censorship. West German metal has merely been covered in two short book chapters that give a rudimentary overview of the early scene. Elflein (2017) summarises the early West German metal media, record labels, and geographical spread of bands. Krumm (2011) outlines the emergence of metal in the Ruhr Area, focusing on the young scene's main events, meeting places, and influential figures like record label owners and journalists. Some journalistic sources, mainly in German, further provide overviews of early West German metal bands, record labels, managers, and journalists (Mader et al., 1998; Schmenk & Krumm, 2010; Schmenk & Schiffmann, 2010), comprehensive documentaries on the metal record companies Century Media (Krumm, 2012) and Noise (Gehlke, 2017), and band biographies (Bender, 2011; Schumacher, 2014).

Overall, popular and metal music studies have paid relatively little attention to German metal apart from Rammstein. Most research has come from other disciplines, such as American

or German studies or media and cultural studies, all focusing on the band's play with stereo-types of exaggerated Germanness (Herbst et al., 2022; Kahnke, 2013; Krause, 2008; Littlejohn & Putnam, 2013; Schiller, 2014). Only a few studies have examined their musical features, like vocal expression or rhythmic performance (Burns, 2008; Elflein, 2015; Reed, 2007). Rammstein's staged Germanness is closely related to the international perception of 'Teutonic'. Conversely, when popular music research has studied the Teutonic in rock music, it primarily focused on Rammstein (Nye, 2012, 2013; Reed, 2007).

Research Aims, Questions, and Objectives
The research investigates the two formative decades of metal music in the Federal Republic of Germany in the 1980s and 1990s from a production perspective compared to the two dominant cultures of the UK and the USA. The following questions guided the research:

- What did early German metal producers and musicians make of their inspirations from the Anglo-American scenes?
- Did early German metal develop differently in comparison with UK and USA metal?
- Was there a 'Teutonic' sonic signature that distinguished German metal? If so, how did it differ from the dominant sound of UK and USA metal?
- What were the artistic and commercial intentions of German metal artists and produc-ers, and what strategies did they employ?
- How was German metal music received in Germany and abroad?
- How did stereotypes and expectations shape perception and action?
- What were the structures of the German recording industry, and how did they affect metal music production?
- How have early metal music productions been preserved as heritage?
- What value do recording studios and other artefacts created in metal music production have for their producers?

Its objectives were to:

- analyse how German metal music in its formative period was produced compared to that in the UK/USA;
- explore the existence of a 'Teutonic' sonic signature and, if so, how it differs from metal music from the UK/USA;

- investigate the creative intentions of German metal producers and artists, aside from their reception inland and abroad, and how these receptions have affected artistic processes;

- identify the production conditions and visions for early German metal music concerning recording technology, production aesthetics, and the recording industry's economic conditions;

- explore if and how early metal music productions have been preserved as heritage and what artefacts record producers consider worth preserving.

By the time metal music found its way to Germany, the country was divided into the Federal Republic of Germany (FRG, West Germany) and the German Democratic Republic (GDR, East Germany). With Germany's reunification in 1990, the GDR merged into the FRG. This research focuses on West German culture, which differed significantly from the East. Even though GDR metal music had a relatively small global impact, it has been studied more extensively (see Okunew, 2016, 2018, 2021; Zaddach, 2016, 2018a, 2018b), leaving West German metal (see Elflein, 2017; Krumm, 2011) an understudied genre of music and scene.

This research focuses on the first two decades of West German metal, but it also considers earlier and later developments when relevant to the research interest and argument. For example, it examines the impact older West German rock music, especially Krautrock, had on German metal music, culture, and business. Rammstein is considered because their members grew up in East Germany, yet the band was formed in the reunified FRG. They have achieved international success by capitalising on an exaggerated portrayal of Germanness in their sound, performance, and artistic persona while positioning themselves against the capitalist system and aesthetic of the West. Finally, the research's scope requires prioritising mainstream bands for their cultural impact and media presence, notwithstanding mainstream being relative, as readers unfamiliar with German metal may not be aware of all the bands discussed.

A Note on the Portfolio

As previously noted, this research was *not* originally conceived as a research project. It grew out as an encounter with the term 'Teutonic metal' used by a record producer I interviewed for another study. This awakened interest in Teutonic metal led to further interviews with German metal music producers of the first and later generations. Subsequently, the focus shifted to how the producers' perspective met that of musicians and listeners of metal, primarily by analysing

opinion-forming metal media in the form of articles, charts, polls, and printed interviews. Neither were the last two phases, the heritage and audio preservation of formative German metal, planned. An invitation to present and participate in the Home of Metal symposium and workshop (BCMCR, 2019), acknowledging 50 years of Black Sabbath and heavy metal, inspired me to investigate the heritage of early German metal productions (Herbst 2021d, 2022b). Similarly, my research on the recording industry context of early German metal responded to an invitation and commissioned chapter (Herbst 2022a) in a collected edition, the *Cambridge companion to Krautrock* (Schütte 2022). This research provided the impetus for a more in-depth analysis of the recording industry for metal music in the 1980s and 1990s (Herbst 2021c), building on developments in earlier Krautrock. Consistent with the principles of qualitative research underlying each part of the research portfolio, every finding, observation, and insight in the individual studies led to further exploration in an iterative manner. Each output focused on a distinct aspect, took a different perspective, or added detail and nuance, contributing to a more holistic and comprehensive understanding. The recommended reading order gives an insight into the iterative and incremental process of knowledge gained, especially in the first phase, the sonic signature of (West) German metal (Outputs 1–7). Outputs 8 and 9—the latter also a commissioned chapter—deal primarily with domestic and foreign perceptions of German metal and are inevitably related to and overlap with the research on German metal's sonic signature (Outputs 1–7). Outputs 10 and 11 focus on the production context of the German (metal) music industry, and Outputs 12 and 13 explore aspects of heritage and audio preservation.

The submitted research portfolio should be understood as a deliberate assembly of individual publications woven together with a strong research narrative that aligns with the research questions and objectives outlined earlier. These research questions and interests were explicitly or implicitly embedded in each article and hence essential to the coherence of the portfolio, which was finally assembled for this PhD by Publication. The first two interviews with metal producers Karl Bauerfeind (25 July 2017) and Siegfried Bemm (27 July 2017) marked the beginning of this research. They were held just before my move from Germany to the UK to take up a full-time position as a Lecturer in Music Production at the University of Huddersfield in August 2017. As it is not a funded project, the research activities, spanning the five years between the summers of 2017 and 2022, constituted the majority of my institutional research and contribution to the 2021 Research Excellence Framework. Thus, the focus on music production—production practices, production aesthetics and reception, audio heritage

and preservation, and the industrial record production context—is due not only to the distinct gaps in the current literature but also to my institutional denomination as an expert on music production.

2. Methodology

The research utilised a qualitative, empirical mixed-methods design consisting of three main methods (qualitative interview design, qualitative document analysis, and music analysis) combined for data and method triangulation (see Flick, 2018). Triangulation is the "combination of methodologies in the study of the same phenomenon" (Denzin, 1970: 291). It helps to mitigate the limitations of individual data sets and methods and reduces potential biases, including those inherent in specific data or methods (Patton, 1990). Triangulation is a recognised approach to establishing credibility and gaining validity through the confluence of evidence (Creswell, 2013: 251; Eisner, 1991: 100) to extend general quality criteria of qualitative research, such as credibility, plausibility, reflexivity, transferability, and transparency (see Corbin & Strauss, 2008: 297–312; Creswell, 2013: 243–268; Flick, 2009: 383–399). Methods and data sets were triangulated both within and between the individual studies.

Fundamental to the research were interviews with experts whose unique insider perspectives were captured with *Interpretative Phenomenological Analysis* (IPA). These were complemented by a wide range of journalistic media, especially music magazines, which served as historical documentation of the discourse and were studied through *Qualitative Document Analysis*. These discursive accounts were corroborated by *Musical Analyses* using a combination of critical listening and computer-assisted artefact analysis.

2.1 Interpretative Phenomenological Analysis (IPA)

One of the main aims of the research was to investigate what actors in the German metal scene experienced at the given time, so a phenomenological approach was chosen. Phenomenological research examines the "common meaning for several individuals of their lived experiences of a concept or a phenomenon" (Creswell, 2013: 76), which in this research was metal music production in the Federal Republic of Germany. In music technology, similar studies have adopted IPA. Adam Martin (2014) investigated the role and working practices of music producers ($N = 8$), and Niall Thomas (2015) explored the influence of music technology on recorded heavy metal music by capturing the experience of professional record producers and engineers ($N = 7$). I have also used IPA in several studies on the German recording industry to examine the working practices and economic situations of studio operators (Herbst & Holthaus, 2017), the business of studio musicians (Herbst & Albrecht, 2018a, 2018b), and the use of specific guitar amplification technology by metal producers (Herbst, 2019c).

IPA is an approach valuable for studies that aim to "explore the participant's view of the world and to adopt, as far as is possible, an 'insider's perspective' of the phenomenon under study" (Smith, 1996: 264) and that examine "how participants are making sense of their personal and social world […, including] the meanings that particular experiences, events, and states hold for participants" (Smith & Osborn, 2015: 28). As it is a phenomenological method, IPA pursues purposive sampling to identify participants with meaningful and relevant experiences to the research objectives (Creswell, 2013: 83). IPA prioritises detailed analysis and interpretation of rich data and is therefore in line with other phenomenological research approaches, which tend to be based on small sample sizes, "sacrificing breadth for depth" (Smith & Osborn, 2015: 29). Smith et al. (2009: 51) recommend a sample of three participants with extensive interviews of about one hour (Smith & Osborn, 2015: 25) to capture sufficient detail and ensure that each case can be analysed comprehensively and compared with others. Even detailed studies with only one case can be valuable (Smith et al., 2009: 29, 51). These cases represent a "perspective" rather than a "population" (Smith et al., 2009: 49), and although generalisations are not the primary concern, IPA allows general claims to be made (Smith et al., 2009: 3) that can be validated with further qualitative data or quantitative methods.

For several publications (Herbst, 2019b, 2020e, 2021a, 2021d, 2022b; Herbst & Bauerfeind, 2021) included in this portfolio, diverse perspectives were gathered by interviewing different groups of people:

- leading metal producers active since the beginnings of German metal (Harris Johns, Siegfried Bemm, Charlie Bauerfeind);
- later generations of German metal producers (Sebastian Levermann, Lasse Lammert);
- semi-professional metal musicians (Carl Delius, Colin Büttner);
- journalists (Colin Büttner);
- metal scholars who contributed expert input from a foreign perspective (Mark Mynett, Karl Spracklen).

It was not possible to recruit some of the other relevant producers from the formative phase of West German metal due to missing contact data, reluctance to respond, or death. Amongst the producers I could not reach were Kalle Trapp, Dieter Dirks, Michael Wagener, Tommy Newton, Tommy Hansen, Dirk Steffens, Horst Müller, Ralph Hubert, Axel Thubeauville, and Frank Bornemann. I am aware of the unbalanced gender distribution in the sample, but, unfortunately, there were no female or non-binary production experts active in the formative West German metal scene, at least not to my knowledge. As gender did not seem to be a key variable related

to the research objectives, neither at the beginning of the study nor when conducting the research, the final sample did not have a negative impact on the research findings. This research portfolio may instead serve as inspiration and foundation for subsequent studies on (West) German metal that concentrate on sociodemographic factors such as gender, class, and race.

The interviews were guided by a semi-structured schedule and were audio-recorded (Smith & Osborn, 2015: 29–30). However, in all instances, I gathered further undocumented information on the topic after the respective analysis and interpretation process to ask those involved for clarifications. Such confirmation is a central quality criterion of qualitative research (Lincoln & Guba, 1985: 314; Stake, 1995: 115) and valuable to build rapport with the interviewees, helping them open up and better convey their experiences (Smith et al., 2009: 57). With producer Charlie Bauerfeind, I also held a workshop entitled "British, US-American, Scandinavian and Teutonic Metal: A Producer's Talk About Nationality and Culture in Metal Music's Sound and Performance" at the international Hard Wired metal music conference in Siegen (Friday, 4 May 2018) and co-wrote an article about his experiences as a Teutonic metal producer (Herbst & Bauerfeind, 2021), which involved several meetings to plan and fine-tune the drafts. The formal interviews totalled 24 hours and 23 minutes and took place between 25 July 2017 and 30 November 2019:

Respondent	Interviews
Bauerfeind, Karl	256 minutes, Grefrath, 25 July 2017
	207 minutes, Grefrath, 21 February 2019
	155 minutes, Hamburg, 20 November 2019
Bemm, Siegfried	167 minutes, Hagen, 27 July 2017
	110 minutes, Hagen, 19 November 2019
Büttner, Colin	45 minutes, Recklinghausen, 10 March 2018
Delius, Carl	44 minutes, Paderborn, 7 August 2017
Lammert, Lasse	74 minutes, Lübeck, 5 February 2018
Levermann, Sebastian	74 minutes, Arnsberg, 18 November 2019
Johns, Harris	151 minutes, Berlin, 16 August 2018
	89 minutes, Berlin, 30 November 2019
Mynett, Mark*	48 minutes, Huddersfield, 5 February 2018
	16 minutes, Huddersfield, 20 February 2018
Spracklen, Karl*	27 minutes, Leeds, 21 February 2018

Note: Interviews marked with asterisks were held in English.

The interviews were transcribed, capturing semantic information but not prosodic aspects (Smith et al., 2009: 74), and translated into English if required. The analysis and interpretation process followed the IPA protocol. Each transcript was examined in detail to highlight important statements and understand the individual perspective (Smith & Osborn, 2015: 38–39). After a thorough investigation of each case and inductively creating a table of themes with verbatim quotes appropriate to the experience (Smith & Osborn, 2015: 41–49), similarities and differences across cases were iteratively and inductively identified (Smith et al., 2009: 79–109), "producing fine-grained accounts of patterns of meaning for participants reflecting upon a shared experience" (Smith et al., 2009: 38). Additional contextualising data was used to connect the recorded experiences with the theoretical contexts and further evidence outside the interviews (Smith et al., 2009: 73).

2.2 Qualitative Document Analysis (QDA)

These phenomenologically oriented interviews captured the subjective experience of metal producers in retrospect. Gaining insights into how the produced music was perceived inland and abroad required a second type of data. Music magazines have proven a fruitful source in other metal research. Especially the British *Kerrang!* and *Sound Wire* have been analysed to track discourse in national and international (see Weinstein, 2011: 48–49) metal scenes (A. Brown, 2014, 2021; Coggins, 2023; Hay, 2018; R. L. Hill, 2011; Jones, 2018). In Europe, mainstream metal magazines profoundly influenced the formation of discourse and opinion amongst fans, which was no different in Germany (Mader et al., 1998: 108–109). In contrast, college radio was the main communication channel in the USA (Gehlke, 2017: 234). Another form of data occasionally used in metal research is the *Metal Archives: Encyclopaedia Metallum* in conjunction with the music release database *Discogs*, both of which provide quantitative insights into factors such as gender representation (Berkers & Schaap, 2018) and historical genre developments (Elflein, 2017; Weinstein, 2011).

This research used similar resources to the studies cited but added German sources to the commonly analysed British media. The final corpus amounts to over 200,000 magazine pages. German *Metal Hammer* and British *Kerrang!* were two primary sources. *Metal Hammer* offers subscribers digital copies of all their issues, of which I analysed 426 issues from 1984 to 2018. Although no such digital library exists for *Kerrang!*, I managed to get hold of 997 issues from 1985 to 2006, covering the main period of the research. Via auction websites, I acquired various German metal magazines: 130 issues of *Rock Hard* (1983–2018); 24 of *Deaf Forever* (2014–

2018); 16 of *Heavy oder was!?* (1994–2010); 9 of *Iron Pages* (1988–1995); one each of *Hurricane* (1985), *Metal Attack* (1990), and *Break Out* (1995).

Magazines were the primary, first-hand historical documents (Altheide & Schneider, 2013: 7) to track the discourse (Altheide, 2000). Other journalistic sources also proved valuable for scene insights, evaluations, and interviews with musicians, managers, and record label employees, including Mader et al.'s (1998) scene overview with mainstream and underground bands up to 1988; two books on metal from the Ruhr Area (Schmenk & Krumm, 2010; Schmenk & Schiffmann, 2010); two books on the German record labels Noise (Gehlke, 2017) and Century Media (Krumm, 2012); biographies of two of Germany's leading thrash metal bands, Kreator (Bender, 2011) and Tankard (Schumacher, 2014). These journalistic sources were foundational to several publications in the portfolio (in particular, Herbst, 2019b, 2020a, 2020b, 2021b, 2021c).

The *Metal Archives* and *Discogs* were also used in some outputs to gather quantitative data on the emergence of German bands compared to other countries (Herbst, 2019b) and on the record companies, distributors, and recording professionals of the early German metal music industry (Herbst, 2021c). These quantitative data served to triangulate and add further detail to the qualitative findings obtained from magazines and other journalistic media.

Methodically, the data was interpreted using *Qualitative Document Analysis* (QDA) outlined by Altheide (Altheide, 2000; Altheide & Schneider, 2013) and Bowen (2009). This method follows the general principles of qualitative research in that it emphasises "discovery and description, including search for underlying meanings, patterns, and processes, rather than mere quantity or numerical relationships between two or more variables" (Altheide, 2000: 290). Based on documents, which are defined as "any symbolic representation that can be recorded or retrieved for analysis" (Altheide & Schneider, 2013: 5) and that is not created or influenced by the researcher (Bowen, 2009: 27), QDA is used to "understand culture, social discourse, and social change" by "studying documents as representations of social meanings and institutional relations" (Altheide & Schneider, 2013: 5). Documents such as magazines, books, newspapers, online blogs, or other documented discourse can: 1) provide historical evidence of a phenomenon under study; 2) highlight important issues; 3) complement other research data; 4) enable tracking of developments; 5) validate claims or substantiate findings through other sources (Bowen, 2009: 29–30). Documents may have limitations, such as insufficient detail or biased selectivity, but their advantages, like availability, stability, lack of obtrusiveness, and coverage, outweigh potential shortcomings (Bowen, 2009: 31–32). QDA is

particularly suited to tracking the evolution of discourse over time (Altheide, 2000) and triangulating case studies based on interview designs, as it minimises bias and establishes credibility (Bowen, 2009: 38).

As outlined in the introduction, the research evolved, and new insights led to further studies using the same method, such as extra interviews or other forms of data. Just as IPA is adaptable to such an iterative and inductive gain of knowledge, so is QDA as a systematic but "emergent methodology" (Altheide et al., 2008). According to Altheide and Schneider, "meanings and patterns seldom appear all at once … they *emerge* or become clearer through constant comparison and investigation of documents over a period of time. […] *Emergence* refers to the gradual shaping of meaning through understanding and interpretation" (2013: 16; emphasis in the original source). The notion of "emergence" is crucial to QDA. It means that new documents are added when their usefulness becomes apparent in the analysis and interpretation process— a sampling strategy referred to as "progressive theoretical sampling" (Altheide & Schneider, 2013: 56)—and that coding is similarly emergent, involving continuous discovery and comparison (Altheide & Schneider, 2013: 26, 55; see also, Berg, 1989; Glaser & Strauss, 1967). Instead of comprehensive coverage, the sampling strategy favours quality and cases that exhibit complexity, including discrepancies, of the issue under study (Altheide & Schneider, 2013: 27; Bowen, 2009: 33).

QDA studies follow a twelve-step process that includes five stages: 1) identifying appropriate documents, acquisition, and familiarisation; 2) developing and refining a protocol to guide data collection; 3) data coding and organisation; 4) data analysis and conceptual refinement; 5) reporting of findings (Altheide & Schneider, 2013: 39).

Data analysis and interpretation follow the principles of other qualitative research, especially the central role of iteration and inductive coding. It requires extensive reading and familiarisation with the material, writing summaries, adding keywords, and comparing cases (Altheide & Schneider, 2013: 71), including the flexibility to add more sources to the corpus as needed (Altheide et al., 2008). The analysis consists of both "content analysis"—organising information into categories relevant to the research objectives (Corbin & Strauss, 2008)—and "thematic analysis"—identifying patterns within data as emergent themes for analysis (Fereday & Muir-Cochrane, 2006)—in an overarching iterative process (Bowen, 2009: 32). Like IPA, QDA does not primarily intend to develop a theory with testable hypotheses but generates source-compatible descriptions that can be part of an overarching research design intended to

reconstruct historical narratives, discursive changes, and definitions (Altheide & Schneider, 2013: 27).

2.3 Music Analysis

Methods used in the social sciences and humanities, such as qualitative interview designs and document analyses, can be employed in music research to study musical practices and the reception thereof. These methods can facilitate a better understanding of how music was produced and with what intentions. However, the musical product and listening experience still need to be included. Therefore, this research utilised methods better suited to music, such as the analysis of musical artefacts through listening and computer-aided visualisation and data extraction, as well as practice-led approaches.

As this research portfolio focuses on record production, only studio recordings were considered. Recorded live concerts, possibly providing more performative features and differences from other musical cultures, were outside the scope of the research due to inferior audio quality and the many additional variables in a performance situation. Besides, in the long tradition of popular music research, the record is regarded as the definite, autographic (Goodman, 1976) version within most popular music genres, including rock and metal (Belz, 1967; P. Clarke, 1983; Gracyk, 1996; Théberge, 1997; Zak, 2001).[1] The studio record, holding deliberate aesthetic intentions and meanings generated during production, is preserved as a historical document (Moylan, 2020; Zagorski-Thomas, 2014; Zagorski-Thomas & Frith, 2012; Zak, 2001).

Music analysis aims to understand possible meanings. As Allan F. Moore puts it: "To analyse a popular song is, of its very nature, to offer an interpretation of it, to determine what range of meaning it has, to make sense of it" (2012: 5). Although analysis has long been synonymous with structural analysis (A. F. Moore, 2012: 3), in popular music, the produced sound is often the "primary text" (A. F. Moore, 2001), and analysis should thus "illuminate how the recorded song works, and what it communicates" (Moylan, 2020: 12). This endeavour is not a return to the unreflective positivist attempt to analyse the meaning the composer, artist, or producer intended to convey but rather to understand how music creators can influence interpretation and how culture is inscribed in a record (Zagorski-Thomas et al., 2019b: 2).

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[1] Other authors such as Auslander (1999), Frith (1996), and Pattie (2007) have advocated for greater relevance of performance in popular music research.

The research portfolio was interested in two aspects: 1) the deliberately crafted sound aesthetic of a record production (Moylan, 2020; Zagorski-Thomas, 2014); 2) the performances as captured on the recording, based on a mixture of recorded documentation and manipulative edits (Danielsen, 2010c; Mynett, 2017). Hence it considered the growing body of work in the academic fields of the art of record production (Zagorski-Thomas et al., 2019a; Zagorski-Thomas & Frith, 2012) and performance studies in classical (E. Clarke, 2004; Cook, 2013) and popular (Danielsen, 2010a, 2012; Hannan, 2018) music. Applying recognised and empirically tested theories in these fields, such as ecological perception (E. Clarke, 2005; J. Gibson, 1979), embodied cognition (Johnson, 1987; Lakoff & Johnson, 1980), and metaphorical cognitive processing (A. F. Moore, 2012; Walther-Hansen, 2020; Zbikowski, 2002), allows capturing the meaningful essence of auditory experience. Analytically, close listening (Corey, 2017; A. F. Moore, 2012; Moylan, 2020; Walther-Hansen, 2020) is supported and empirically underpinned by computer-assisted means of visualisation (e.g., spectrograms, arrangement views in DAW) and other acoustic feature extraction (e.g., tempo maps) (Cook, 2009; McAdams et al., 2004; Müller, 2015). While such data extraction approaches do not capture the listening experience, they sharpen close listening (Cook, 2009: 222–223) and detect detail that "may have cultural significance when contextualised" (Brackett, 2000: 29), that is "responsible for so much of music's meaning" (Cook, 2009: 226) and that are characteristic of musical styles (McAdams et al., 2004: 160). Cook contends that performance "is an art of telling detail— detail that falls between the notes of musical texts and the words of literary ones" (2013: 3), and the same is true for record production. Such a detail can be appropriately captured and understood in a cultural context by computer-aided close listening and feature extraction (see Herbst, 2020c). Since sounds and performances are challenging to compare across tracks due to the multitude of influencing variables, musicological music analysis has been extended by a practice-led research approach in Herbst (2020d) that allows for the comparison of German, British, and US-American production styles through simulation, bearing in mind the limitations of such an experimental scenario.[2]

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[2] The cited output introduces practice-led research and discusses its limitations concerning the comparison of different sonic signatures.

3. Commentary on Publications

This commentary and some content in the articles are broadly divided into three areas, with some overlap. That is due to the need to supply certain information for the individual outputs to make sense. Peer review also, in some instances, required and introduced repetitions of what had been found previously. In the following, I provide literature reviews on the three areas before presenting the main findings and reflections on the relevant outputs.

3.1 Section A: Sonic Signatures and Performance Idioms

The research's primary aim was to investigate whether and how metal music from West Germany differed from metal from other parts of the world during the genre's two formative decades. This research interest was concerned with the music's sonic characteristics—its sonic signature—examining technological, aesthetic, and performative aspects to determine differences in comparison with other geographical and cultural regions. Two research areas were of central importance: 1) sonic signatures; 2) culture and place-specific features of recorded popular music at a time of increasing globalisation, with a focus on metal music.

3.1.1 Sonic Signatures

The distinctive sound of music, artists, producers, or technology has always been of interest to popular music scholars but rarely the primary focus of research, with Succi (2021), Davis (2009), Zagorski-Thomas (2014), Seay (2016), and Moylan (2020) being notable exceptions. In his extensive literature review on sonic signatures, Succi (2021) finds indications that research primarily focuses on three areas: technology and its use; places such as studios; professional roles like the producer, including collaborative creativity. Yet, if relevant, other contextual variables, such as the recording and entertainment industries or the specific aesthetics and power relations in popular music genres, are also considered (Succi, 2021). This list of topics suggests that research on sonic signatures is most closely related to the research field of the art of record production, an impression confirmed by the following literature review.

In the rare case that a definition of sonic signatures can be found in the literature, then their descriptions vary, with some authors using the term interchangeably with others, such as "signature sound" (Zagorski-Thomas, 2014: 66) or "timbral signature" (Moylan, 2020: 283). In addition, sonic signatures are sometimes divided into subcomponents like "rhythmic", "dynamic", and "motivic" signatures and may contain "cultural signatures" (Exarchos, 2019; Tan, 2011). Analysing the influence of the AKAI MPC sampler on hip-hop aesthetics, Exarchos

(2019) highlights, for example, the sampler's distinct rhythmic swing characteristics and its unique quantisation templates and timing idiosyncrasies, essential to the music's groove and live feel. Moreover, the sampler's affordances lend themselves to motivic signatures, which are reflected in the distinct way individual hits are isolated and combined to create characteristic drum breaks (Exarchos, 2019). Furthermore, Tan's (2011) analysis of acoustic mimesis and sonic exoticism in the theatre play *Tambours Sur La Digue* suggests that oriental instrument timbres and melodic or rhythmic motifs can mark sounds and performances as non-Western but can nevertheless be integrated into a Western arrangement.

Sonic signatures are used to describe sound properties at various levels (single sound sources to full multi-tracks) or of different activities (e.g., performing, engineering, composing) and actors (e.g., performers, engineers, producers). Zagorski-Thomas (2014: 38, 67–68) defines sonic signatures as the sound of a record producer; a specific technology with its colourations and use; the sonic space, recording studios, and record labels; musical styles and performance/programming characteristics; geographical locations and historical periods. Moylan (2020: 283) similarly defines a signature as characteristic of performers, engineers, or producers but also of musical styles or individual songs. He argues that a signature can be so limited as to characterise a single song or so broad as to encompass an entire career.

On a record, sonic signatures are composed of several elements that create a holistic impression and an identifiable fingerprint of all musical actions and resources employed in its creation, enabling listeners to recognise the song, artist, producer, or technologies after only a brief listen (Moylan, 2020: 390, 395). Moylan's (2020) holistic understanding of sonic signatures concurs with other scholars. According to Covach (2009: 23), sonic signatures allow assumptions about where, when, and by whom music was recorded, audible information that he sees as separate from the song or its performance. Similarly, Osborn and Osborn (2019) treat sonic signatures as the sum of all production decisions, including songwriting and arrangement. They argue that record production is no longer a matter of documenting the performance; instead, it is about producing an artistic but artificial product (see also Moorefield, 2010), with artists and their producers increasingly creating a sound world that constitutes a primary aesthetic component of an album (see also Hawkins, 2002; A. F. Moore, 2001).

Although the term sonic signature is used slightly differently between scholars, all describe signatures as "unambiguous connections between a sound and its cause" (Zagorski-Thomas, 2014: 66). That is why sonic signatures are of central interest to the study of record production, seeking to understand how creators of music in recorded form can influence interpretation

(Zagorski-Thomas et al., 2019b: 2). Davis thus regards sonic signatures as a "common strand of the field of Musicology of Production [an alternative term for the art of record production], trying to reconstruct the production process as a means to interpret i.e. the artist's/producer's intentions, audience receptions and other contextual factors such as production conditions" (2009, n.p.). He sees the study of signatures as a forensic analysis used to determine how a record was constructed, requiring a distinction between documentation and artifice (Davis 2009).

According to Moylan, recorded music is the result of deliberate decisions: "Given the high degree of control and scrutiny available in the production process, we should believe that what is sonically present on a record is what was intended, even if seemingly arbitrary or flawed" (2020: 11). Although this view disregards the possibility of cultural influences (Bates, 2016; Meintjes, 2003) and creative coincidences (S. Bennett, 2018; Zak, 2001), many scholars have focused on the affordance of staging in record production, especially regarding the deliberate creation of sonic space (Lacasse, 2000; A. F. Moore, 2012; Moylan, 2002; Zak, 2001). To give some examples, Zak (2001: 84) argues that the lack of vocal reverb on Anthony Kiedis's voice in "Under the bridge" (Red Hot Chili Peppers, 1991) places the singer into the listener's personal environment to enhance emotional response. Lacasse (2000: 193–194) similarly points out, relating to Alanis Morissette's "You oughta know" (Morissette, 1995), that the dry vocal sound is intended to express inner thoughts and feelings, supporting the lyrics about the end of a romantic relationship. The effect of staged virtual spaces has since been analysed and theorised in depth by William Moylan (2002, 2020) and Allan F. Moore (2001, 2012), with Moylan approaching the analysis from an engineering perspective and Moore from a perceptual perspective.

Another strand of discourse on sonic signature highlights deviation from the norm. Moylan (2020: 418) argues that uniqueness, often resulting from a disregard for convention, appeals to listeners precisely for this reason. He sees such a deviation in the musical composition or production, as both tend not to keep to the conventions of audio engineering or genre and style. This view accords with Zagorski-Thomas, who emphasises that producers with a signature sound "consistently do something dramatically different from 'common practice' in whatever period and genre they worked" (2014: 67). These differences could relate to the placement of microphones and musicians to create dense spatial textures, as in the case of Phil Spector and his 'wall of sound' aesthetic, or to the approach to audio processing, with Zagorski-Thomas citing Joe Meek's extreme dynamic range compression as an example (Zagorski-Thomas,

2014: 67). Specific studios and musicians can also contribute to a signature sound, as evidenced by Phil Spector's records that feature a distinct acoustic fingerprint even though it was always the same ensemble (Funk Brothers) and studio space (Snakepit) being captured (Zagorski-Thomas, 2014: 67). Utilising technology is yet another way to deviate from the norm. Zagorski-Thomas (2014: 67–68) refers to Trevor Horn and programmer J. J. Jeczalik, who set themselves apart from other artists in the 1980s through meticulous attention to detail and the use of Fairlight digital samplers and synthesisers. Original sounds and approaches distinguish artists, making them more attractive and yielding commercial returns. While Zagorski-Thomas' examples demonstrate deviations that stay within the sound world of the Global North, Shuker (1994: 68) and Tan (2011) emphasise the economic potential of exotification and sounds which differ from the global pop norm.

Research in popular music and the art of record production highlights the role of the record producer. Consequently, the discourse on sonic signatures tends towards (over-)emphasising the producer's contribution to the record, exemplified by works such as Moorefield (2010), Cunningham (1996), Chanan (1995), Zak (2001), or Moylan (2020). To quote Succi, "for the most part, it is the producer out of the studio personnel that is attributed to a sonic trademark" (2021: 22). According to Moylan, the producer's "sonic personality" (2020: 284) spans multiple projects and artists, which is seen differently by Jarrett, stressing the existence of the "invisible producer" (2012), and Carter (2005), asking for a more nuanced consideration of the producer's role (see Burgess, 2013: 9–19; Herbst & Holthaus, 2017; Martin, 2014), as projects can vary considerably depending on budget, type of collaboration, and aesthetic intent.

The producer's dominant role is primarily due to their oversight, especially in personnel, finances, artistic direction, or audio engineering matters. Yet, as Howlett (2012: 190) points out, the producer cannot control every aspect of production, as there could be financial constraints limiting access to preferred studios, technologies, and session musicians. Moreover, record labels and commissioning artists may impose their own requirements. All these factors affect artistic freedom and colouration through studio rooms and equipment, as well as workflow, and set a mark on a producer's sonic signature (Succi, 2021: 18).

The collaborative nature of production is another reason why the producer only partially determines the sonic signature of a record. Ethnomusicologists Bates (2013, 2016), Porcello (1998), and Meintjes (2003) highlight sonic signatures as the result of social interactions, a claim supported by record production scholars like Carter (2005), Davis (2009), McIntyre (2012), and Thompson (2019). While the nature and extent of collaboration vary between

genres, including genres like metal, where the producer unifies many creative and technical roles (Mynett, 2017; Thomas, 2015), some degree of collaboration is still required in most commercial productions (Herbst & Mynett, 2021a, 2021b). In genres where recorded performances are involved, if only vocals in the context of an electronic arrangement, the audio engineer contributes creatively to the product and leaves a sonic fingerprint (Thompson & McIntyre, 2019; Zak, 2009), whether classified as an "art mode engineer" (Kealy, 1979) or taking on a more service-oriented role. Historical examples of sonic signatures originating from production teams and companies are Motown, Stax, and PWL (Zagorski-Thomas, 2014: 69).

Research on sonic signatures strongly focuses on recording equipment, especially analogue gear. Zagorski-Thomas (2014: 68) stresses in his introduction to signatures that analogue and digital recording technologies differ sonically, with analogue equipment particularly tending to have distinct colouration, mentioning Neve and SSL mixing consoles, Fairchild and Urei compressors, and Neumann and AKG microphones. Gottinger's (2007) PhD thesis is one of the earlier studies to examine the sonic signature of analogue recording equipment in detail, documenting how harmonic distortion imparts a unique colouration and, thus, a sonic signature. Austin Moore's (2017) PhD thesis builds on Gottinger's work and provides a detailed case study of the signature of the Urei/Universal Audio 1176 FET dynamic compressor. In later publications, Moore (2019, 2020) describes the sonic colouration of analogue mixing consoles, compressors, equalisers, and pre-amplifiers, which lend their signature to the recorded sound and influence the decision-making process in the recording, mixing, and mastering stages of production. While Moore emphasises harmonic distortion for the unique characteristics of analogue devices, Winer (2012: 282) stresses other audio parameters, such as the equaliser's filter bandwidth. However, even if scholars in the field of record production generally accept the sonic signatures of analogue equipment, judgement and discourse are clouded by mythology and other factors such as social distinction. According to Crowdy (2013: 152), the sonic signature may be so subtle that most people, including musicians and recordists, can hardly perceive it. He argues that "sound aesthetics [are] effectively acting as a proxy for other areas of opinion and value" (Crowdy, 2013: 152). This view is consistent with Kaiser's (2017) claim that analogue recording hardware acts as a marker of social status and prestige and O'Grady's (2019) argument that, even though not sounding significantly different, analogue gear is treated as strategic capital.

Another strand of research dealing with technology examines signature gear and audio effects. Meynell's (2017) PhD thesis analyses and compares the sonic signatures of The Beatles

and The Byrds through practical re-enactment, showing how equipment and recording techniques used in 1966 created unique, staged soundscapes. Brett (2020) analyses the sonic signature of Prince's rhythm programming. While noting that Prince's artistic signature is a mixture of recording and playing techniques, he emphasises the role of gear and application of technology, citing as an example the elongated, reverse-reverberated sound used as kick and snare samples (Brett, 2020: 257). Another signature sound frequently highlighted in the literature is Phil Collin's gated snare drum sound, emblematic of the arena drum aesthetic of the 1980s (Brett, 2020: 256; Moylan, 2020: 265). Further examples include guitarist Santana's signature guitar tone from a Mesa Boogie amplifier (M. Latour, 2018) and producer Trevor Horn's original use of digital instruments and recording technology in the 1980s (Warner, 2003). In addition, Brockhaus (2017) documents the emergence and evolving popularity of pop music's major signature sounds between 1960 and 2014.

Related to signature recording technology is the use of ambience and space. As Succi puts it, "the acoustic signature is another sonic characteristic of a recording that cannot be eliminated" (2021: 22), at least in productions with recorded performances or ambiences. The literature on record production highlights the importance of studio acoustics for the sonic signature of influential producers, such as Sam Philips, Phil Spector, George Martin, Brian Eno, Tony Visconti, or Trent Reznor (Chanan, 1995; Cunningham, 1996; e.g., Moorefield, 2010; Schmidt Horning, 2013; Zak, 2001). Entire books are dedicated to the unique (sonic) characteristics of recording studios in certain countries like the UK (Massey, 2015), particular cities such as New York (Simons, 2004) or Philadelphia (Seay, 2012, 2016), or the connection between place and sound (Connell & C. Gibson, 2003). Other research shows that reverberation technologies have a unique signature alongside natural spaces and can achieve canonical status precisely because of their distinctive signatures (Sterne, 2015: 123). For example, Seay's (2012, 2016) detailed analysis of the 'Philly Sound' produced at Sigma Sound Studios suggests that the characteristic signature stems from both the studio's acoustics and an EMT 140 plate reverb device combined with a pre-delay.

According to Bates, reverberation has "this unique sonic signature, making the space immediately identifiable to the listener" (2013: 25), which remains even when removed from its original context and being audio processed. As Moylan (2020: 346) argues, this unbroken connection between ambience and place persists in recorded and produced music because the sonic signature of environments cannot be separated from the timbre exciting it; the two aspects blend in perception. Gottinger (2007: 107) goes so far as to claim that sonic space has a stronger

effect on the recorded sound than the timbral signature of the equipment used. However, Sterne (2015: 119) contends that the relative impact of ambience depends on context because ambient signatures are more pronounced in recorded than in live music. In addition to the specific acoustic signature of a recording space, such sonic spaces are, for Théberge, "charged with social and cultural associations" (2018: 325), making space a multi-dimensional and information-rich component of the overall sonic signature of a production. Sterne (2015: 112) elaborates further that production practice has evolved from selecting a recording environment for its acoustics in order to shape sonic spaces through a combination of altering physical spaces, microphone choice and positioning, technologically created reverberation, and manipulations in post-production so that space is increasingly used as a signature.

A much-discussed area is the sonic signature of instruments and an artist's performance style, with the two potentially influencing each other (see Herbst & Menze, 2021). Théberge reiterates the importance of ambience, noting that the commonly included built-in reverb device in guitar amplifiers suggests that "every instrument sound should possess its own unique acoustic signature" (2018: 333). Several examples indicate that equipment and performance style must align for a sonic signature to form. As Thomas and King (2019: 499) state, Black Sabbath's unique guitar signature comes from Tony Iommi's power chord playing style and use of an overdriven Laney LAB100L amplifier. Melinda Latour explains Eric Clapton's signature "woman tone" with the guitar's reduced treble frequencies through the tone potentiometer and the open position of the wah-wah effect pedal to emulate a "full-throated, fat sound of a female blues singer" (2018: 222). Likewise, she sees equipment as partly responsible for Santana's signature style because the sustain allows for signature techniques such as "raising the guitar's on-board volume control at the end of a note to subvert the natural decay of sound and instead either sustain or swell the tone" (M. Latour, 2018: 216). Other signatures are purely performative; for example, Waksman (2018) observes the signature legato lines of guitarist John McLaughlin, and Susan Miller (2020: 11) describes the performative energy of Cuban charanga dance music recorded in 1960s New York as a specific sonic signature.

Any discussion of sonic signatures must consider the musical genre, given the vast number of sound aesthetics that differ significantly in popular music. Genre and subgenre influence the choice, role, and importance of instruments, with some genres being defined by the characteristics of one or a few sonic elements. Walser (1993: 41) has claimed, somewhat oversimplified and outdated from today's perspective, that any musical performance involving dominant distorted guitars must be classified as metal or hard rock, and conversely, any music lacking this

sonic signature cannot be considered metal. Zak (2001: 143) notes that musical style influences the recording and production of a record, which is illustrated in genre-specific production manuals (see, e.g., Mynett, 2017; Snoman, 2019). Furthermore, subgenres within a genre exhibit different sonic signatures resulting from compositional, performative, and productional conventions, as has been shown for metal music (e.g., Herbst, 2017; Herbst & Mynett, 2021a, 2022; Hillier, 2020a; Marrington, 2017; Mynett, 2019) and hip-hop (Exarchos, 2019; Katz, 2010; Wragg, 2016). Conformity to genre-specific sonic signatures is also linked to perceptions and issues of authenticity (Morey, 2009; Succi, 2021; Zagorski-Thomas, 2010).

Sonic signatures are rarely discussed explicitly in popular music research despite their relevance to many music discussions, including aspects of production, performance, and composition besides human actors and non-human resources and their interaction, as theorised by actor-network theory (B. Latour, 2007). Sonic signatures are composed of multiple components, and each one can be understood as a specific signature, such as performative, rhythmic, motivic, dynamic, ambient, or cultural. Succi rightly concludes that,

> there is no single definition of sonic signatures and that there is no currently set framework for creating one either. Sonic signatures are multifaceted agents […] The concept of sonic signature in record production is one that cannot be defined in one single, 'universal' way. Instead, it is dependent on several determining factors and on the context in which it is applied. What the research will agree on is that a sonic signature is an identifiable characteristic in the sound of a piece of recorded music, which originates from different aspects. (2021: 17)

The present literature review supports this view; sonic signatures are constructed from a complex web of production conditions and decisions that give clues about their creators and the conditions under which a record was made. Such indications include references to time, place, and space, and possibly other social and artistic aspects such as culture, ethnicity, and artists' identities and styles. However, some sonic signatures are challenging to decipher, and even experts can be wrong. Hence a multi-faceted research design combining artefact analysis with interviews is recommendable (Davis, 2009; Morey, 2009). For a better understanding, more research focusing directly on sonic signatures and using various methods is needed. Especially the role of genre requires further investigation because it is central to musical style (composition, arrangement, performance, production) and reception by listeners who may or may not be part of the sociocultural scene. Although sonic signatures are omnipresent in popular music, few research projects consider them in the first place or treat them rather implicitly.

3.1.2 Place and Culture-Specific Sounds

Culture-specific sounds and various forms of place in popular music have recently gained renewed interest, exemplified by Routledge's "Perspective on Popular Music" book series. This series contains collected editions on individual countries, including Germany (Seibt et al., 2020), Sweden (Björnberg & Bossius, 2016), Spain (Martínez García & Fouce, 2013), Turkey (Gedik, 2017), and Korea (Shin & Lee, 2016). However, *place* is not limited to *nation*, as scenes, subcultures, and communities deserve equal interest. Whether the focus is on nationhood or other meaningful scenes, research commonly draws on Anderson's (1994) theory of "imagined communities", which defines communities as social constructions with invented practices, discourses, beliefs, and myths shaped by material conditions, such as community or country-specific media, music production networks, and live music scenes (O'Flynn, 2007: 21). According to Anderson, such communities are defined and legitimised by myths of the past that the community itself creates, a process Hobsbawm and Ranger (1992) call "invented traditions". Despite the inaccurate or biased use of the past, these altered or invented traditions are meaningful and serve a social purpose within the community (Spracklen, 2017a: 407). In Cohen's (1985) theoretical framework, this invented or "symbolic community" constitutes belonging and exclusion, social hierarchy, values, and meaning (see also Spracklen, 2017b: 105). These symbolic boundaries are important to the social experience of members of a community (Cohen 1985) and form "some kind of averaged viewpoint, a collection of stereotypes and myths" (Spracklen & Henderson, 2013: 236) used to distinguish between insiders and outsiders (Elias & Scotson, 1994), be it a music-related community or a nation (Colley, 1992; D. Miller, 1995; O'Flynn, 2007).

Biddle and Knights (2007) observe a double development in their introduction to the collected edition *Music, national identity and the politics of location*. On the one hand, postmodern thinking has emphasised and embraced the permeability of boundaries and globalised cultures; on the other, there has been "recourse to a 'new traditionalism', a tendency to cite and situate identities as based in a certain kind of 'rootedness' in ethnicity, race, linguistic communities, the local and so on" (Biddle & Knights, 2007: 5). Their observation of an increasing interest in the study of nations, communities, and other symbolic places or boundaries, which they describe as an "idealization of place" (Biddle & Knights, 2007: 2), is shared by other scholars. John Connell and Chris Gibson, in their comprehensive monograph *Sound tracks: Popular music identity and place*, similarly note a "fetishization of localities" (2003: 110) as a reaction to alienation in the wake of globalisation. They argue that musicians draw inspiration

from the local to emphasise the authenticity of place and belonging and that the entertainment industry readily advertises and sells the niche to an international market (Connell & C. Gibson, 2003: 11). According to Karjalainen (2018: 29–30), this development is a consequence and cause of the dwindling Anglo-American hegemony in the global pop music market, where the 'Other' is romanticised and marketed as subversive and authentic. What sells is diversity and recourse to culture and country (Karjalainen, 2018; O'Flynn, 2007; Shuker, 1994), utilising "strategic essentialism" (Connell & C. Gibson 2003: 124) to react to the increased "consumer demand for more diverse products, the rise in commercial status of sub-cultural affiliations and styles, and the decline in homogeneous mass marketing of products" (Connell & C. Gibson, 2003: 113). For these purposes, the recording industry has mythologised the local and exaggerated its real or imagined musical and extra-musical features through labels and branding. As Karjalainen (2018: 20) argues, "country- or place-of-origin references are used […] to boost meaningful connections to recognized (and generalized) cultural narratives and national stereotypes, or as representative markers of a particular local scene – or scenes". For him, such textual or other medial narratives are essential for listeners to perceive a sound as culturally encoded, suggesting that rather than musical styles differing drastically between places and cultures, differences are heightened for strategic and commercial reasons. In this vein, O'Flynn (2007) argues that countries do not have a unique sound but that mediating discourses trigger such perceptions.

No consensus exists on how place and musical characteristics are related. The literature frequently vacillates between rejecting a deterministic relationship between place and culture and noting that particular production and reception networks are formative for a specific sound or scene. For example, Connell and C. Gibson argue that "[s]implistic, place-bound depictions of the genesis of a sound and scene are rarely adequate" (2003: 105) but give numerous examples of places with distinct characteristics that have shaped the music produced in those locations. Discussing the signature Motown sound, they explain that the "[c]ultural origins for a scene or style can often be traced to particular groups of musicians, producers and audiences—specific contexts from which a 'sound' develops and disseminates" (Connell & C. Gibson, 2003: 111). This view is consistent with Karjalainen (2018) and Dunn (2004), who highlight local production conditions, such as a core of influential musicians, collaborative projects, rehearsal spaces, shared equipment, common concert venues and fan tastes, a limited number of recording studios and personnel, access to specific technologies, as well as record labels and concert promoters as shaping the sound of a place. As per Connell and C. Gibson:

> In one sense the uniqueness of local music scenes is straightforward; music is made in specific geographical, socio-economic and political context […] People make music within communities without creating (or wanting to create) a distinct 'local' sound, but learn from and work with each other, sharing bills and practice venues, and even musicians and songs, not so much as a subculture, but simply as people who enjoy the same music. (Connell & C. Gibson, 2003: 90, 115)

When musicians, audiences, or subcultures are particularly active and produce distinct music, a sonic signature can develop that is identifiable and recognisable in national and transnational media landscapes (Connell & C. Gibson, 2003: 101–102). So, it is not surprising that signature sounds have emerged in dynamic places like Nashville country (Théberge, 1997: 193), California rock (Butler, 2018), Philadelphia soul (Seay, 2012, 2016), Bristol hip-hop (Wragg, 2016), Canterbury progressive rock (Draganova et al., 2020), and Gothenburg melodic death metal (Dunn, 2004; Hillier, 2018). Sometimes the sound of a place becomes synonymous with the sound of a country, as is the case with Swedish death metal and Gothenburg metal (Hillier, 2018). A genre can also become associated with a country, such as Jamaican (dub) reggae (Veal, 2007) or English beat (Massey, 2015). However, as Connell and C. Gibson (2003: 105) point out, these place-bound sonic associations usually refer to a limited period, even if the associations remain in cultural memory.

The literature is similarly undecided about place or culture-specific musical performance idioms. On the one hand, essentialist generalisations are to be avoided; on the other, research points to differences. Studies on historical music performance note national differences in instrumentation and orchestration, tempo modulation, rhythmic and metric rigidity, and melodic phrasing (C. Brown, 1999; Dorian, 1981; R. Hill, 1994; Kallberg, 2004; Lawson & Stowell, 1999). And even though national styles are considered outdated in classical music research (O'Flynn, 2007: 19), popular music studies have highlighted place and culture-specific performance characteristics, especially groove and feel. Some are country-dependent, and others are intertwined with further sociocultural factors like race and ethnicity. A study by Johansson illustrates country-specific performance idioms, showing that in Scandinavian folk music, "slight variations and graduations in phrasing, timing and articulation are in fact crucial to identifying the style overall, as well as the subgenres within it, and to evaluating the quality of the performance" (2010: 72). This finding concurs with previous empirical research suggesting that unconscious temporal variations are part of a musical culture's dialect (Bengtsson et al., 1968). Danielsen's work on groove, especially African American soul music (Danielsen, 2006, 2010a, 2012), is an example of cultural and ethnic influences on performative expression. Some scholars, including Danielsen (2010b) and Iyer (2002), consider micro-temporal variations and

the resulting feel and groove qualities equally important to other musical parameters, such as tone, pitch, and dynamics.

3.1.3 Place and Culture-Specific Sonic Signatures in Metal Music

Metal music studies scholarship, just like its parent field of popular music studies, comes mainly from a cultural studies tradition where musical characteristics are an understudied area, particularly in terms of production and details of sound quality and meaning (Herbst & Spracklen, 2021). Consequently, place and culture-specific sonic signatures are rarely discussed, whereas ethnomusicological research and studies on place and space, as well as issues of identity and gender, are ubiquitous. The following overview summarises place-specific musical features in metal to establish the context for this research on metal music from West Germany.

The New Wave of British Heavy Metal (NWOBHM), an umbrella term for traditional heavy metal bands from the UK between 1979 and 1981, is the most prominent example of a place-based label. It contributed significantly to the spread and diversification of metal in the second half of the 1980s (Weinstein, 2011). There is a broad consensus that the NWOBHM label was created by media figures for marketing purposes, with Geoff Barton of *Sounds* magazine commonly credited with popularising the term (Wiederhorn, 2013: 93–95). As a strategic media creation, the label encompassed bands from a limited geographical area and period but did not differentiate between the bands' musical characteristics that varied considerably. While some bands emphasised melody, others used rhythm-oriented punk elements (Wiederhorn, 2013: 73–74). According to Weinstein, "each band tended to be rather unique" in their musical or lyrical style, but they shared a "general heavy metal sensibility, along with youthfulness and a strong emphasis on visual elements" (1991: 44). Some other publications, however, point to more characteristic musical features. In a detailed musicological analysis, Elflein (2010) characterises Iron Maiden's style as follows: a transparent ensemble sound with details of phrasing being intelligible; a mid-frequency-focused guitar sound; a present bass guitar; a drum sound mixed into the virtual space's background; a live ensemble sound with few audible overdubs; twin-guitar harmonies; a galloping rhythm; virtuosic guitar solos. Elflein is not the only scholar treating Iron Maiden as a model band for the entire movement. Walser (1993: 12) characterises the NWOBHM with catchy songs, sophisticated production techniques, and high technical standards for the period. Hillier (2018, 2020b) breaks down the style in more musicological detail: third harmonisation in the guitars; the bass guitar being played in a higher register and taking a melodic role; compositions based on chord progressions, often in the Aeolian mode;

ubiquitous guitar solos and guitars moving fluidly between melodic and harmonic roles; a clean production style. He does not see the galloping rhythm as characteristic of the whole movement but as specific to Iron Maiden (Hillier, 2018: 7–8). Metal journalist Christe (2004: 35) suggests that multiple guitars allow for greater musical complexity and sophisticated songwriting. While compositions usually revolve around three chords, songs are developed through harmonic modulations, tempo changes, guitar solos and fills, and frequent atmospheric changes (Christe, 2004: 35). Anthropologist and metal journalist Dunn (2004: 111) echoes this view, highlighting complex song arrangements and a high degree of musicality as features of the NWOBHM. Overall, the NWOBHM is characterised by structural and performative features but less by production aesthetics.

Metal from the USA, the genre's place of origin alongside the UK (Walser, 1993; Weinstein, 1991, 2011), is less often characterised musically and sonically, possibly due to the large geographical area and variety of styles. Of particular historical importance is the San Francisco Bay Area, where influential thrash metal bands originated in the 1980s, such as Metallica, Slayer, Exodus, Testament, Death Angel, and Possessed, all mixing NWOBHM with punk and being instrumental in the development of thrash, death, and black metal (Fellezs, 2016). Little research exists on the musical and sonic characteristics of these bands, so most details are found in band biographies, for example, those on Metallica (McIver, 2014) and Slayer (McIver, 2010) or producers like Rick Rubin (J. Brown, 2009), as summarised by Herbst and Mynett (2023). Journalistic literature like Dunn's (2004: 112) highlights the fusion of NWOBHM's complexity and melody with the speed of punk to create a raw and primitive underground sound that matched lyrics about atrocities and injustice.

There is also considerable research on metal from Scandinavian countries like Sweden, Norway, and Finland. Norwegian black metal is recognised as having an original sonic signature, which Hagen (2016) and Reyes (2013) documented in detail, to be summarised as a low-fidelity aesthetic resulting from the deliberate use of simple recording and production equipment and intentionally abrasive audio processing. According to Karjalainen (2018), Finnish metal has a less distinctive sonic signature but is often embellished through medial storytelling to evoke associations of melancholy, gloominess, and sorrow (Karjalainen, 2016: 221). He suggests that Finnish bands were reiterating myths to sell their music, and so took part in creating these associations, either intentionally or because of their socialisation in the 1970s and 1980s when Finland was less globalised (Karjalainen, 2018: 24).

A considerable amount of research exists on metal music from Sweden, especially death metal, which competed with US-American metal for global popularity in the 1990s. This rivalry between death metal produced in the hotspots of Tampa and Stockholm has already been addressed by Kahn Harris (2007). He observes a highly distorted, punk-influenced, and basic death metal style at Tomas Skogsberg's Sunlight Studios in Stockholm that is in stark contrast to producer Scott Burns' transparent sound at Morrisound Studios in Tampa, which conveyed the complexity of US-American metal (Kahn-Harris, 2007: 105–106). Hillier (2018, 2020b) has recently analysed the sound of Swedish death metal, identifying the musical and production features of metal from Tampa and Stockholm, as well as from Gothenburg, where a new, more melodic style of death metal emerged. Other relevant publications include Dunn's (2004) exploration of death metal scenes, Purcell's (2003) ethnographic study of American death metal, Ekeroth's (2019) semi-academic, ethnographic historical documentary of Swedish death metal, and Mudrian's (2016) journalistic history of death metal and grindcore. The early sound of Swedish death metal produced at Sunlight Studios was characterised by: low guitar tuning (C or B standard); heavily distorted, mid-range heavy guitar sound created by a Boss HM-2 or DS-1 overdrive pedal inserted in front of an already distorted amplifier; relatively slow and groove-oriented riffs; sloppy performances; deep, growled vocals (Ekeroth, 2019: 155; Hillier, 2018: 12–13; Mudrian, 2016: 94; Purcell, 2003: 20–22). In contrast, the Tampa sound was clean and precise, with only slightly down-tuned but sonically scooped guitars performing complex rhythmic riffs in close synchronisation with the drums (Dunn, 2004: 114; Kahn-Harris, 2007: 105–106).

The new sound of Swedish death metal from Gothenburg, emerging in the mid-1990s, was more melodic and presented another production aesthetic. According to Hillier (2018), bands wanted their new sound to differ clearly from the older Stockholm signature by accentuating melodic elements, especially in the guitars, which also required adjustments to the production style, realised by Fredrik Nordström at Studio Fredman (Hillier, 2018: 12; Kahn-Harris, 2007: 106). In order to convey the melodic elements, the guitar sound was produced with less distortion and greater emphasis on intelligibility, which, for Hillier (2018: 12), is the distinguishing element between the old and new Swedish death metal styles. Another difference highlighted in the literature is the introduction of clean vocal lines and guitar parts (Dunn, 2004: 115), as well as the inclusion of classical instruments such as cello, violin, oboe, and piano plus folkloristic elements like traditional melodies or lyrical content (Hillier, 2018: 11). In their study of place and sound in popular music, Connell and C. Gibson refer to Swedish

music as "culturally anonymous" (2003: 124–125) and placeless because of its international impression (see also Kahn-Harris 2007: 108). Metal literature disagrees on whether there is a Swedish metal sound. While Swedish metal is an established label (Ekeroth, 2019) and scholars like Hillier (2018) note a recognisable sound, others such as Dunn (2004) reject a close relation between place and sound. It is not that there is no sonic signature for metal from Tampa or Gothenburg, but as Dunn argues, place and scene should not be confused. He opposes a deterministic relationship between a place and the sounds produced in it but still acknowledges scenes with distinct sounds. Agreeing with Connell and C. Gibson (2003), he sees scenes contributing to a coherent musical style that may be recorded and produced in the same studio by the same personnel. The human actors and production conditions create the signature, while the place itself is relatively irrelevant and arbitrary.

Another theme in research on Scandinavian metal is Viking metal. It was popularised in the late 1980s (Heesch, 2010; Helden, 2010; Trafford, 2013) by the Swedish band Bathory, who integrated Viking themes and imagery in their music, artwork, and live performances. Most research, however, neglects musical features, as it mainly focuses on mythology, invented traditions, and imagined communities (Deeks, 2016; Heesch, 2010; Helden, 2015; Hoad & Whiting, 2017; Lucas et al., 2011; Manea, 2016). Scholars point out that Viking metal is defined by themes and concepts rather than musical characteristics, partly because Viking metal encompasses various subgenres of metal (Deeks, 2016: 139; Manea, 2016: 82). There are still some sonic and other musical signifiers described in the literature: nature sounds and atmospheric samples to evoke associations with pagan lifestyle and to create authenticity (Deeks, 2016: 140–141; Trafford, 2013); national language, regional dialect, acoustic folk instruments, and melodies to produce otherness and authenticity (Deeks, 2016: 143ff, 148ff, 160ff); stacking of instruments in unison or thirds (Kazdan, 2017: 271–272); harmonic imbalance between lead and rhythm guitars (Kazdan, 2017: 272); simple harmonic progressions that follow tonic, subdominant, dominant structures, using power chords (Kazdan, 2017: 273); metric shifts to create uncertainty or slow tempo groove riffs (Kazdan, 2017: 271; Phillipov, 2012: 122).

A limited amount of research exists on metal from the Netherlands. Berkers and Schaap (2017) point out how targeted government support in the form of subsidised concerts and vocational courses in 'heavy metal music production' made Dutch metal a global export success. Early Dutch metal with a label was 'Nederdeath'. It emerged as a national version of international death metal, but it lacked a perceptible sonic signature because the bands differed considerably, some resembling Tampa metal (Berkers & Schaap, 2017: 63, 70). More recently,

Holland has become more associated with female-fronted symphonic metal due to the paucity of (popular) bands with a distinct and coherent sound (Berkers & Schaap, 2017: 70). However, the authors—media scholars and sociologists—do not unfold how this sonic signature is defined musically.

Researchers have also found metal music to be inspired by past cultures or empires in addition to place-specific sonic signatures of contemporary countries. Pichler (2017) discusses Mesopotamian metal through a case study of the Israeli, Amsterdam-based band Melechesh, who play 'Assyrian black metal', arguing that recourse to an imagined historical community helps to overcome modern frictions of regional groups. Boyarin (2019) studies the US-American band Nile, who draw their inspiration from the ancient Near East's music, lyrics, and artwork, mainly from Egypt and Mesopotamia. Despite the sound of both bands featuring a distinct sonic signature, neither Pichler nor Boyarin do elaborate on the musical (ethnic) elements used to create it. The same is true of research on metal's inspiration from ancient Greece, sometimes labelled 'Hellenic metal' (Patterson, 2013: 88–90; Spracklen, 2014: 193). Swist notes that Greek history and poetry (Swist, 2023) inspire metal tropes and costumes—the same as Roman history (Swist, 2019)—but does not investigate musical features. The scholars' disciplines of history and medieval and classical studies may explain the omission of musical details in the examples discussed.

There are also cases showing that the sonic signature of a single band is generalised to an entire culture of origin. An apt example in metal is Brazilian Sepultura; they began with a placeless sound but gradually infused Brazilness and artistic persona into their sound, so now their sonic signature represents Brazilian culture, as Kahn-Harris (2000) argues. Brazilian scholar Avelar (2003) adds that the band's style has constantly changed due to growing up in a dictatorship that censored and repressed art and coping with racial discrimination in metal. He agrees with Kahn-Harris that early Sepultura releases conformed to US-American thrash and death metal standards to negate the country's rich musical heritage in order to defy the dictatorship (Avelar, 2003: 332). Janotti (2020) further highlights that even though US-Americans produced early Sepultura records—including Scott Burns at Morrisound pivotal to the Tampa sound (Janotti, 2020: 159; Kahn-Harris, 2000: 19)— international standards had to be adopted for success in the global market. He argues that Sepultura could only realise their signature 'Brasilidade' sound by accepting comprises. Interestingly, according to Kahn-Harris (2000: 13–14), Sepultura's formative work produced in Brazil is placeless. In contrast, their

later work, when they had relocated to the US and recorded with US-American producers, overtly displays indigenous features and collaborations with the Amerindian Xavante people.

Unlike other place-bound metal labels, the musical elements of Sepultura's 'Brasilidade' signature are much more detailed. In keeping with international metal standards, Sepultura sang in English but with a strong Portuguese accent (Kahn-Harris, 2000: 17), an impression reinforced by the rhythmic complexity of vocal articulation, which reduced intelligibility in a rhythmically and sonically complex arrangement (Avelar, 2003: 337). In later, overtly Brazilian-sounding releases, their vocal compositions were more frequently infused with African-derived call and response patterns (Avelar, 2003: 339). Similarly conforming to their Brazilian musical heritage, Sepultura's approach to rhythm became, in Avelar's words, increasingly authentic or "unmistakably Brazilian" (2003: 333). In particular, the band's rhythm section accentuates Afro-Brazilian polyrhythmic structures and syncopation (Avelar, 2003: 337, 339). While not employed on every track, the traditional rhythm instrumentation in metal of drum kit, bass, and electric guitar is complemented by traditional percussion instruments such as surdo, djembe, and berimbau (Avelar, 2003: 338; Kahn-Harris, 2000: 21–22). Regardless of instrumentation, Sepultura weave traditional Brazilian rhythmic patterns such as samba, bossa nova, and soca into their Brasilidade sound (Avelar, 2003: 340; Janotti, 2020: 158), influenced by their musical socialisation in samba schools and traditional music ensembles (Avelar, 2003: 336; Kahn-Harris, 2000: 22). As Avelar notes, Sepultura are thus "unmistakably 'Brazilian' musicians" (2003: 342), irrespective of their striving for an international sound at the beginning of their career. For Janotti (2020: 157), this rhythmical lightness and relaxed feel elbows with metal music's characteristic heaviness (Mynett, 2017) but creates a distinctive signature.

In summary, there is relatively limited research on the sonic signatures of metal music from the perspectives of music and music production, especially not with a focus on places and cultures instead of genres. Research on metal from Germany is even scarcer. What little exists seldom addresses sonic features explicitly or only for a single band, first and foremost Rammstein (Burns, 2008; Elflein, 2015; Kahnke, 2013; Reed, 2007). The present research set out to fill this gap.

3.1.4 Original Research on the Sonic Signature of West German Metal

The literature presented before gave an overview of existing research on sonic signatures, mainly from the perspective of record production, and place and culture-specific sonic

signatures in popular and metal music, but largely lacking musical and production-oriented inquiry. The length of the literature review should not distract from the fact that relatively little research focuses on place/culture-specific signatures, notwithstanding the abundance of popular music scholarship and the burgeoning field of metal music studies.

What adds to these desiderata is that very little research dedicates to metal music from the Federal Republic of Germany. Hence this research portfolio sought to answer the relevant research questions stated in the introduction:

- What did early German metal producers and musicians make of their inspirations from the Anglo-American scenes?

- Did early German metal develop differently in comparison with UK and USA metal?

- Was there a 'Teutonic' sonic signature that distinguished German metal? If so, how did it differ from the dominant sound of UK and USA metal?

- What were the artistic and commercial intentions of German metal artists and producers, and what strategies did they employ?

- How was German metal music received in Germany and abroad? How did stereotypes and expectations shape perception and action?

In the following, I answer these research questions based on my portfolio of publications. The answers are kept brief for clarity and to avoid repetition of publications containing the details.

What did early German metal producers and musicians make of their inspirations from the Anglo-American scenes? Did early German metal develop differently in comparison with UK and USA metal?

Early metal from West Germany was influenced by the Anglo-American originators of the genre and by domestic rock and proto-metal bands, especially the Scorpions (since 1965), Accept (since 1976), and Running Wild (since 1976). This dual inspiration has been maintained in the development of German metal, with bands still drawing inspiration from older domestic bands and honouring them, just as foreign bands from many parts of the world—no longer solely the USA and UK (Herbst, 2019b).

The research suggests that early German bands and their producers had different influences. Musicians were metal fans who played in metal bands. They mainly had access to foreign metal releases through active tape trading because the music industry, especially in metal music, was only fully globally connected from the early 1990s (Herbst, 2021c). Like any other metal fan, musicians traded with fellow metalheads in other countries. Furthermore, there is

evidence of band members trading tapes across different countries with other musicians, exchanging music, artistic ideas, and attitudes (Krumm, 2011). German musicians were thus relatively independent of official distribution channels and imports and familiar with music released by British and US-American bands (Herbst, 2019b).

Unlike band members, the interviewed German producers were neither metal fans nor familiar with the genre's musical styles and production aesthetics back then (Herbst, 2019b, 2021a). As rock producers, they earned a living working across genres. Due to the sudden proliferation of metal music in Germany (Herbst, 2019b, 2021d), especially following the two-day festival "Pop Rock in Concert" in 1983 (Elflein, 2017; Mühlmann, 2008; Schmenk & Krumm, 2010), there was a great demand for producers willing and able to realise the growing number of recording projects and releases. Although numerous engineers, producers, and studios contributed to a vast production network (Herbst, 2021d), the scene revolved around several individuals and facilities initially unfamiliar with metal (Herbst, 2019b, 2020e, 2021a). A few producers—often with their own studios—began to specialise in metal and made a career out of it while developing with bands that gained national and international popularity (Herbst, 2019b). As the interviews indicate, producers discussed the artistic visions with their bands, analysed the sound aesthetics and production techniques of foreign releases, and developed individual production approaches, which were partly inspired by international and partly by domestic role models (Herbst, 2019b, 2020b, 2020e, 2021a).

Bands like Helloween, Gamma Ray, Kreator, and Sodom soon had international successes, and their original German style and sound began to inspire bands outside the waning dominance of the Anglo-American sphere, especially in Europe, South America, and parts of Asia, foremost in Japan (Herbst, 2019b; Herbst & Bauerfeind, 2021). It did not take long for West German metal to surpass UK metal in the number of bands and releases, establishing a brand and vaguely recognisable sonic signature of German or Teutonic metal (Herbst, 2019b, 2020a, 2020d). As early as the late 1980s, the German metal press complained about the abundance of domestic metal releases that made the market increasingly unmanageable, with the consequence that high-quality releases became difficult to identify (Kühnemund, 1988; Penzel, 1989). In those days, though, the music diversified from speed metal to thrash, heavy and power metal (Herbst, 2020a). International developments also influenced metal in Germany, giving rise to popular subgenres like death and black metal in the 1990s. Exceptions aside (e.g., death metal band Morgoth or black metal band Nagelfar), only a few bands playing the newer, global forms of metal became as successful internationally as the first wave of German metal, which

was an original interpretation of metal music of its time (Herbst, 2019b, 2020a, 2020b, 2020e, 2021a): traditional heavy, thrash, and power metal.

As far as the production context is concerned, the original research and existing literature disagree on whether and to what extent German metal was disadvantaged compared to Anglo-American metal. While the interviewed producers agree on a comparable production infra-structure (Herbst, 2021a), the literature suggests that the problem lies more in the poor reception of German metal (Herbst, 2020a, 2020b). The producer interviews and the analysis of journalistic media indicate that Anglo-American audiences were reluctant to accept metal from Germany because it stemmed from outside the dominant sphere and sounded different. Only a few bands, like Helloween, Kreator, and Sodom, were accepted precisely for this difference, while most other bands were rejected (Herbst, 2020a, 2020b). Nevertheless, German metal's originality and otherness, providing an alternative to the dominant Anglo-American metal, was well-received in other parts of the world. Whereas from an international perspective, US-American metal has maintained its dominance since its inception (Herbst, 2019b), British metal gradually lost its market shares, first to Central European countries like Germany, followed by Australia and Japan, and ultimately to other parts of the world (Weinstein, 2011). It is beyond the scope of this research portfolio and commentary to quantify these developments. In conclusion, it is safe to say that the Federal Republic of Germany has risen to a major country for metal music with its numerous successful bands, international festivals, and recording professionals booked by bands and record companies worldwide (Herbst, 2021c).

Was there a 'Teutonic' sonic signature that distinguished German metal? If so, how did it differ from the dominant sound of UK and USA metal?

The reception of sonic signatures bears some resemblance with the reception of authenticity. According to Allan F. Moore (2002), the question cannot be whether or not something is authentic. Rather, authenticity is relative to subjective perception and contextual variables. Sonic signatures are similar because reception depends on and is shaped by auditory schemata and subject expertise, as music technology scholars like Moylan (2002) and Schmidt Horning (2004) have pointed out. Recordists may be more receptive to nuances of sound, and even then, experience with a particular genre will influence their perceptual abilities. Musicians can distinguish details of their instrument's tone, performance, and expression but less so of other instruments while still possibly perceiving nuances better than non-musicians. Cultural influences or characteristics may similarly be more apparent to listeners who have been socialised

differently within and outside a specific culture. Listening perceptions also change over time. As Berger and Fales (2005) note, what was once perceived as heavy in metal is unlikely to be so a few years later.

Given this complexity and the subjective and contextual factors, the question of whether there is a unique sonic signature in German metal can only be answered with "it depends". The research design focused on the production side, so it cannot answer whether and to what extent listeners are capable of perceiving sonic signatures. As previous listening tests on guitar distortion suggest (Herbst, 2018, 2019a), related listening tests would be needed to distinguish between: fans and non-fans; musicians, recordists, and non-experts; cultural and geographical contexts. However, it would still be unclear to which extent the appreciation or rejection of music based on its sound aesthetic depends on a particular culturally encoded signature because further factors are involved: mediated storytelling (Karjalainen, 2016, 2018); artwork; costumes; myths; symbolism (Spracklen, 2020). Journalistic metal media and the conducted producer interviews still suggest that sonic signatures do matter, as reflected in record sales and fan discourse (Herbst, 2020a, 2020b, 2021a; Herbst & Bauerfeind, 2021). Fans seem to have an implicit and possibly vague idea of how metal from Germany should sound. This mental image is rarely described explicitly and likely differs considerably between fans. Further research is needed to particularly study the metaphorical sonic representation more broadly (see Walther-Hansen, 2020) and of place and culture-specific labels in metal and popular music.

Musicians were not the primary research interest of the research either, so conclusions were drawn mainly from interviews in journalistic media. These suggest that musicians have a conceptual idea of how music from a particular place and time should sound, as a special issue of German *Rock Hard* (vol. 342, 2015) on German metal shows by way of example. There appears to be an implicit understanding of what characterises the sound of US power metal or German thrash (Herbst, 2019b). However, as journalistic interviews do not allow for a representative picture, making generalisations is impossible.

The interviews conducted with producers of different generations paint another but no less complex picture. The professionals have different views on whether there are or have ever been culture-specific sonic signatures in metal music and how a German metal signature would be defined (Herbst, 2019b, 2020e, 2021a). The differences and correlations are not clear; some disagreements appear generational, while others are purely subjective and based on personal beliefs or professional experiences. Karl Bauerfeind thinks strongly in categories that reflect a symbolical realm with clear ideas or rules about how metal from certain cultural areas should

sound. This framework informs his productions and guides his collaborations with artists and record companies (Herbst & Bauerfeind, 2021). Other producers like Harris Johns are undecided, acknowledging culture-specific idiosyncrasies while avoiding generalisations (Herbst, 2020e, 2021a). Yet others like Siegfried Bemm reject a deterministic relationship between cultural origin and sonic signature despite pointing out the differences observed when collaborating with musicians from different countries (Herbst, 2019b, 2020e, 2021a). These uncertainties and ambiguities are also evident in newer generations of German metal producers. They seem sceptical of an all-encompassing culture-specific sonic signature yet simultaneously acknowledge distinct characteristics (Herbst, 2020e).

The fact that producers, musicians, and journalistic writing agree on specific features like rhythmic feel and ensemble synchronisation, with German metal being considered rigid and tight (Herbst, 2019b, 2020a, 2020b, 2020c, 2020d, 2020e, 2021a, 2021b), suggests the existence of a distinct sonic signature of German metal or reflects cultural stereotypes and medial embellishments (Herbst, 2020a; Herbst & Bauerfeind, 2021). However, since it is impossible to separate perceptions of sound, myths, stereotypes, and symbolism for the many bands, the stylistic and technological evolution of the metal genre and the various contextual factors, the research portfolio cannot answer the question conclusively whether one or even more sonic signatures of German metal exist.[3] Within the framework of the portfolio, an approximation of the sonic signature of traditional German metal in the two formative decades could nevertheless be made (Herbst, 2019b, 2020a, 2020b, 2020c, 2020d, 2020e, 2021a, 2021b; Herbst & Bauerfeind, 2021):

Drums

- German drum mixes focused on the kick drum, while USA and UK drums emphasised the snare drum. Performatively, German drummers tended to play the snare directly on the metric grid to support the kick drum or slightly ahead of the grid so as not to mask the important kick drum. By contrast, British and US-American drummers tended to play the snare more 'laid back'.

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[3] For example, the interviews conducted suggest that progressive German metal by bands such as Helloween and Blind Guardian differs from the more traditional, straightforward 'Teutonic' metal with simple rhythms and structures in the tradition of Accept by bands like Grave Digger.

- Many German productions, especially in the power metal genre, were characterised by the sound of continuous double kick that was typically not broken up for rhythmic accentuation, groove, or variety but instead formed a constant bass foundation. Drastic processing was applied to eliminate differences in sound between the two bass drums or feet. Although there were exceptions, the drumming was straightforward and functional rather than ornate and syncopated.

- German drum sounds had pronounced bass and treble frequencies, whereas British, and to a lesser extent US-American, drums tended to emphasise midrange frequencies, creating a wooden sound. In contrast, German drums were thunderous due to audio processing that produced a scooped frequency response, large shells, and low tunings of the kick, snare, and toms.

- The kick drum was generally tuned very low and processed further to emphasise the low-end and create the acoustic equivalent of a cannon shot through a mixture of deep direct sound and long ambient decay, subject to the availability of sonic space afforded by the song's tempo and arrangement (Mynett, 2017). The kick's relative volume in the mix was loud.

- The snare drum in German productions was usually tuned low—with a centre frequency around 130 Hz and sometimes using an extra deep snare—and featured a loud snare wire rattle to produce a powerful sound with a high-end crack reminiscent of a pistol shot. This snare aesthetic was influenced by the two most influential German proto-metal bands, the Scorpions and Accept.

- Usually, large tom shells were used to create deep and powerful timbres, combined with low tunings and double-ply heads.

- Sample reinforcement of drums has been practised since the beginnings of German metal. Unclear is whether German productions differed from UK and USA productions; likely, this practice varied greatly between bands and production personnel.

- Most early German metal productions were recorded and edited to a click track, while British and US-American artists and producers were more reluctant to do so or used these tools more sparingly. Many German producers paid attention to a precise internal alignment of all drum instruments and a tight ensemble synchronisation, resulting in a precise and rigid sound.

Guitars and Basses

- Models by the German guitar amplifier manufacturer Engl contributed to the sonic signature of German metal, especially the Straight model (manufactured between 1985 and the mid-1990s). It differed from the common metal amplifiers of the time (e.g., British Marshall and Laney, US-American Mesa Boogie and Peavey) in tonal character and distortion behaviour due to its highly distorted but defined tone that can be described as even, cold, and sterile. Helloween and Gamma Ray guitarist Kai Hansen popularised the Straight model. Owing to an effective marketing campaign, many German metal bands soon adopted Engl amplifiers.

- Due to Engl's pronounced low-end and the dominant kick drum in the mix, the bass guitar often played a supporting role without a strong sonic identity.

- Because of the power line, guitar and bass distortion had a slower spectral fluctuation behaviour in Europe (50 Hz) than in the USA (60 Hz). The power line also affected hardware audio processors that introduced harmonic distortion, such as compressors.

- Guitar riffs were performed with downstrokes whenever possible to achieve a controlled and powerful sound. Performances were artificially fabricated through audio editing to ensure this sonic characteristic when a player could not reach the required speed.[4]

- Guitar solos tended to be virtuosic, precise, and without bluesy phrasing and expression, following the template of the proto-metal band Accept and their adaptation of classical melodic motifs.

Vocals

- There was a great variety of vocal styles in the different subgenres, but no engineering and production approach was likely unique to German metal.

- German productions often had a recognisable vocal accent and non-native lyrics, depending on the singer. The lyrics were generally sung in English and nearly always with an imitated US-American accent.

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[4] US-American metal bands like Metallica are known for their downstroke picking. Whether German bands used the affordances of audio editing to a greater extent to enhance their performances remains unknown. Considering the effort and budget Metallica put into their productions (see Herbst & Mynett, 2023), one may doubt that German producers had similar means to improve performances.

Recording Studio Environment

- Most international metal releases by German bands were recorded in only a few studios owned by producers (e.g., Harris Johns, Siegfried Bemm, Kalle Trapp, Ulli Pösselt) and musicians (e.g., Kai Hansen, Sascha Paeth). Wisseloord (NL) was among the rare foreign studios popular with producers (e.g., Karl Bauerfeind). The acoustics of these recording spaces did not share a sonic signature with their respective peculiarities, but they still influenced the sound of German metal.

- Early West German metal producers had access to the same recording and production technologies as their colleagues in the USA and UK, meaning they were already working under globally standardised or at least comparable conditions (see Zagorski-Thomas, 2012). The equipment differed from studio to studio and did not contribute to a uniform sonic signature. Instead, studio owners created sonic signatures through their production style. Producers not owning a studio typically rented facilities to achieve specific sonic results in the recording, mixing, and mastering phases.

- Drums on German metal releases were relatively ambient to increase their perceived size and power. This sound was achieved in controlled, small to medium-sized live rooms, and by blending the direct sound with microphone captures from reflection chambers made of reinforced concrete walls. These reflections brightened up the dark, full-sounding drums with large shells and low tunings. RA.SH in Gelsenkirchen and Hansen Studio in Hamburg, both former World War II bunkers with thick concrete walls, were often chosen for this effect. Other metal studios were popular for a very different sound, such as the warm and wooden acoustics of Karo Music Studios in Brackel and later in Münster.

- All productions relied heavily on overdub recordings. Live recordings were highly uncommon, and of the ones taken, only the drum performances were usually kept. In contrast, several influential bands from the USA (e.g., Slayer and Machine Head) and the UK (e.g., Iron Maiden) are known to record (partly) live as part of their signature (Herbst & Mynett, 2021b; Mynett, 2017: 32).

Other Aspects Relating to Production Aesthetics

- Overproduction was hardly seen as a problem because German metal drew its appeal less from groove but from a powerful, full, and big sound. It was not an issue if productions sounded sterile and clean.

- Production approaches and aesthetics were traditional and conservative, rarely experimental.
- The high level of synchronisation and alignment between instruments and the emphasis on similar rhythmic accents rather than complementary rhythms between instruments made the productions punchy (Fenton & Lee, 2019) and heavy (Mynett, 2017).

This list of sonic features is derived from conducted (producer) interviews and musicians' interviews in journalistic media and metal media. These sources present, however, considerable subjective disagreement between the features and the very notion of a culture-specific sonic signature (Herbst, 2019b, 2020e, 2021a). Then, the original interviews focused on producers, so production-relevant features such as audio engineering and performance qualities were captured in greater detail than would have been the case with musicians, probably emphasising aspects of songwriting and performance.

When returning now to the question of whether German metal has a sonic signature, the answer is a tendentious yes, with a big but remaining. There is sufficient evidence to suggest that metal from West Germany initially sounded different from British and US-American metal and other parts of the world. Without intending to be essentialist, the musical socialisation of German musicians may have contributed to certain performative and expressive idioms, especially in terms of rhythmic alignment, precision, and inter-instrumental synchronisation (Herbst & Bauerfeind, 2021). The resulting rigid impression was highlighted by all interviewed producers, regardless of their general reservations about a German metal signature (Herbst, 2019b, 2020e, 2021a), which is also consistent with interviews in metal journalism and media discourse (Herbst, 2020a, 2020b). This impression seems to have served as inspiration for a symbolic milieu based on past (invented) traditions in Germany and preceding states and empires in Central Europe, especially the Prussian kingdom and the Weimar Republic, as well as the rich heritage of classical music as opposed to African American idioms like the blues (Herbst, 2021b; Herbst & Bauerfeind, 2021). Producer Karl Bauerfeind built on the stereotypical German rhythmic and expressive features and broader musical and cultural mythology that provided mental images and sonic associations, which he extended in his production aesthetic by emphasising supposed German idiosyncrasies (Herbst & Bauerfeind, 2021). The interviews suggest that other first-generation German metal producers may have done the same without realising it (Herbst, 2019b, 2021a). Producers and bands have continued and developed this aesthetic in keeping with tradition and nostalgia. However, production styles and musical

features became internationalised and homogenised over time through standardised practices, heterogeneous and multinational line-ups and production staff, besides a shift from the recording to the editing and mixing stages (Mynett, 2017; Thomas, 2015; Thomas & King, 2019; Turner, 2009), diluting the initially distinct sonic signature of German metal (Herbst, 2020a, 2020e, 2021a).[5] As the research indicates, some modern bands and producers consider this old signature obsolete. For first-generation metal bands and producers, however, it has become a brand and aesthetic that satisfies the nostalgic desires of their older and newer fans. Sticking to the established sonic signature ensures a constant source of income in a globalised metal music industry, where traditional music may seem antiquated (Herbst, 2020e).

Genre is another factor to take into account. The interviews and musical analyses suggest that stylistic and sonic conventions of metal subgenres have a stronger bearing on a music's sound than its geographical or cultural heritage. Therefore, bands from different parts of the world playing the same subgenre may sound more alike than bands from the same socio-geographic area (Herbst, 2019b, 2020a, 2021a).

Another point to consider is the geographical scope of culture or place-based metal labels and their associated sonic signatures (Herbst, 2019b, 2020a; Herbst & Bauerfeind, 2021). A wide variation is apparent in the geographic definition of labels like 'Teutonic metal', which encompasses Germany, all German-speaking countries (Germany, Austria, Switzerland), and Central Europe, excluding the UK (Herbst, 2020a). The differences between Central European countries range from small to pronounced, especially in the period studied—the 1980s and 1990s—before the European Union was founded in 1993, with Europe still divided by a hard East-West border and the (aftermath of the) Cold War (1947–1991). Apart from tacit differences in everyday life in Eastern and Western countries and their effect on cultural production, as Zaddach (2018b) and Okunew (2021) show in their research on East German metal, countries in Europe have distinct musical histories and traditions that may have had a long-lasting impact on metal musicians as late as the end of the twentieth century.

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[5] Rather, as recent research by Herbst and Mynett (2021a, 2021b) suggests, producers and engineers try to develop their unique approaches to producing metal within the acoustic and aesthetic limitations of the genre to create their own marketable professional signature.

How was German metal music received in Germany and abroad? How did stereotypes and expectations shape perception and action?

The reception of rock music from West Germany has historically differed inland and abroad. Some bands found recognition abroad, whilst others did not. As early as Krautrock in the 1960s and 1970s, releases were more generally accepted abroad if they were original, deviated from Anglo-American hegemonic norms, and conformed to German stereotypes, such as man-machines focusing on technology (Adelt, 2012, 2016). Copies of British or US-American bands were rarely accepted, even though record labels tried to establish pastiche artists. One of them was Faust, a band that, even though making a musical impact abroad, failed commercially (Herbst, 2022a). In Germany, overly experimental bands were rarely accepted, and often neither were mere copies of Anglo-American bands, as audiences preferred the foreign originals (Herbst, 2020b).

As metal developed in Germany in the 1980s and 1990s, this earlier pattern continued, yet it became more nuanced. German fans supported German metal, perhaps not only for being part of the same domestic scene but also because local releases, concerts, and festivals made it more available (Herbst, 2019b, 2020b, 2021d). Nevertheless, metal from Britain and the USA was generally preferred for its quality and reputation due to internationally known artists like Metallica, Slayer, and Iron Maiden (Herbst, 2020b). What also contributed to the general preference of German metal fans for foreign releases (Herbst, 2020b) was the vast number of German releases, many of which the metal press judged to be of inferior quality (Herbst, 2021d).

Internationally, keeping to the tradition of appreciating foreign originality if it stood out positively from Anglo-American norms continued for a while. As analysis of the music press suggests, Anglo-American metal fans and journalists, although principally sceptical of German releases, were willing to accept them if they were of high quality and original (Herbst, 2020a). In the 1980s, many German metal releases were just labelled 'speed metal' in Germany and the UK—other terms were used in the USA—and foreign reception differed between substyles later called 'power metal' and 'thrash metal'.

European power metal was defined mainly by German Helloween, who were well received in the UK, USA, and many other parts of the world. According to the metal press, their appeal lay in their sense of melody and arrangement, following the tradition of earlier German and Central European classical composers—a trademark and attribution from which the German proto-metal band Accept benefited even before Helloween's arrival (Herbst, 2020a, 2020b). This connection was perhaps more of an embellished imagination based on historical

perceptions of German music because Helloween contained few elements of classical music (Herbst, 2020b). Fellow power metal bands, some with a more traditional heavy metal sound, such as Running Wild, Grave Digger, or Rage, were not perceived in this tradition but seen as bland copies of Anglo-American bands with less appealing German features that fit the stereotypes: competent but conservative or even reactionary; unimaginative lyrics sung with an audible accent; lack of expressive feeling in the compositions and (barely present) groove (Herbst, 2020a, 2020b). Bands like Grave Digger, Victory, Thunderhead, and Sargant Fury tried to make their sound palatable to global audiences by imitating Anglo-American stylistic features and sometimes even employing an English native-speaking singer. However, their attempt was largely unsuccessful because it was perceived as unoriginal and considered a second-rate copy (Herbst, 2020b). Hence some bands disbanded, while others focused on their home scene and other European and Asian markets, where their sound gained more recognition (Herbst, 2020b).

German thrash metal was perceived differently abroad. The early releases of Kreator, Sodom, Destruction, and Tankard also had to overcome scepticism and reservation, yet they eventually convinced even an Anglo-American audience with a sound resembling US-American thrash but with a more extreme approach (Herbst, 2019b, 2021a). It is not entirely clear whether the stereotypical German features in the sound did not shine through because thrash metal is influenced by punk and because some musicians were barely able to play their fast parts or whether the appeal of the extreme musical and visual aesthetic overshadowed the bands' origin. From both the producer interviews conducted and the analyses of journalistic media can be concluded that not sounding too obviously German has helped German thrash bands gain worldwide recognition (Herbst, 2019b, 2020a, 2021a). German thrash, once highly influential on, for example, Swedish extreme metal that itself became a global export success in the 1990s with (melodic) death metal and black metal (Ekeroth, 2019), has endured, with especially Kreator and Sodom still enjoying worldwide popularity and headlining international festivals. By contrast, in the tradition of Helloween and Grave Digger, power metal soon lost its ground in the Anglo-American scenes due to its conservative approach (Herbst, 2020a, 2020b). Perhaps for nostalgic reasons, its popularity increased again in recent years. In other parts of the world, including Central Europe, South America, and Asia, power metal's popularity has been unbroken ever since its inception, bringing German bands of the first, second, and later generations modest to considerable success (Herbst, 2020b).

The findings suggest that acceptance abroad depended on how German bands dealt with their Germanness. Like earlier popular music that was highly successful by deliberately marketing an image based on exaggerated German stereotypes, as done, for example, by Kraftwerk, Accept, Einstürzende Neubauten, and Die Krupps (Herbst, 2020a), later rock and metal bands like Rammstein took on this tradition to appeal to a global audience (Herbst, 2020a, 2021b; Herbst et al. 2022). By contrast, bands unintentionally coming across as German were far less attractive, of which there is ample evidence. For their origin not to negatively affect their perception in Anglo-American markets (Herbst, 2020a), bands had to either sell the local (Shuker, 1994: 68) or be culturally anonymous (Kahn-Harris, 2007: 108).

In terms of cultural stereotypes, the research conducted documented how these have developed over four centuries of music history (Herbst, 2020a). It finds more or less valid historical reasons why some features, mostly related to tempo and rhythmic expression, have been and still are considered typically German (Herbst, 2020a). These trademarks were transferred to German popular music—metal and other genres—in the international perception (see also Adelt, 2016; Littlejohn, 2009; Schiller, 2014, 2020; Stubbs, 2014). However, the findings indicate that, as is the nature of stereotypes (Helms & Phleps, 2014), these perceptions were simplified, and divergent developments were ignored because they did not conform (Herbst, 2020a). In early metal discourse, stereotypical views of German bands were widespread, especially in the British press (Herbst, 2020a; Herbst & Bauerfeind, 2021). As metal globalised and Germany became one of the many music-producing countries, the stereotypical depictions diminished (Herbst, 2020a). Besides globalisation, changing production conventions have likely contributed to less attention being paid to a band's origin and the cultural stereotypes associated with them. With the increasing practice of recording and editing metal music to a metric grid, quantisation, and artificial enhancement through programmed instruments and sound components (Herbst & Mynett, 2021a, 2021b; Mynett, 2017; Thomas & King, 2019), musical characteristics traditionally perceived as German have become part of the genre's aesthetics, causing much of the sonic signature of metal music from Germany to disappear (Herbst, 2020a).

3.2 Section B: The Recording Industry and Business

Studying popular music requires considering its production and economic conditions (Negus, 2001, 2010; Toynbee, 2000). This section reviews the relevant literature on the recording industry, especially the role and evolution of major and independent record companies in general

and for metal music, before summarising the infrastructural constraints of metal music in the Federal Republic of Germany.

3.2.1 The Recording Industry

Many popular music scholars treat the recording industry only in passing or neglect it altogether, notwithstanding its central importance. That may be because cultural studies has traditionally concentrated on cultural appropriation, bricolage, and subversion rather than the power exercised in production. That is not meant to say that no literature on the recording industry exists. On the contrary, there is a growing number of manual-style publications by professionals (e.g., Fitterman Radbill, 2017; Halloran, 2017; Hull et al., 2011; Passman, 2014; Wacholtz, 2017; Weissman, 2017). But it is beyond the scope of this commentary to give a comprehensive overview of such literature, spanning how the recording industry works, from songwriting to mastering, release channels and consumer media technologies, including economic, technical, legal, historical, and aesthetic aspects and everything in between. Besides, a small number of studies explain the recording industry and focus on the work and importance of record companies. Of particular note is the work of Negus (1999, 2001, 2010), which provides a comprehensive introduction to the workings of the recording industry and its importance to popular music.

Negus argues that record companies and their affiliates should not be regarded one-sidedly as instrumentalists who exploit and manipulate artists, impose constraints on them, and limit their creativity (see also Golding & Murdock, 1996). Instead, the professionals should be recognised as cultural mediators who generally support artists and musical scenes while naturally being bound by the broader constraints of a capitalist system (see also Hennion, 1983). Negus goes to great lengths to dismantle the widespread notion of the 'industry as the villain' and false juxtapositions in popular (Hesmondhalgh, 1999; S. Lee, 1995; Mall, 2018; Strachan, 2007), rock (Negus, 2001: 18) and metal music (Kahn-Harris, 2007; Messick, 2020; Spracklen, 2019), such as creativity/art vs commerce, free will vs determinism, or liberating vs constraining (see also Mall, 2018).

In contrast to Negus, much of the later scholarship has continued the anti-capitalist and culture industry-critical stance of German music sociologist Theodor W. Adorno (1991) and highlighted the ethical and creative superiority of independent labels over major record companies. Independent companies are understood to:

- have played a historical role in the development of niche and mainstream music genres, including soul, rhythm and blues, punk, and metal, by supporting newcomer artists and taking commercial and aesthetic risks (Hull et al., 2011: 187–190; Messick, 2020; Netherton, 2017; Waksman, 2009: 156–157, 186);

- support regional scenes, especially outside the dominant music production locations, through decentralisation and scene-appropriate infrastructure for production and consumption (Netherton, 2017; Waksman, 2009: 186–187);

- tend to interfere less in the creative aspects of music production, understand and serve consumer needs, and use less restrictive contracts (Messick, 2020; Negus, 1999: 177);

- have a closer relationship with their signed artists and support them in their creative endeavours (Messick, 2020; Negus, 2001: 143–144);

- allow fans to become semi-professional or professional for a while, breaking down boundaries and democratising music-making (Waksman, 2009: 187);

- have good intentions as they are part of and work in the interest of the community, support good causes (e.g., political/activist), put passion above profit, and stand against 'the industry' by siding with the artists and fans they also usually belong to (Messick, 2020; Negus, 2001: 16–17; Strachan, 2007).

Despite this bias towards independent companies, most studies acknowledge a more complex situation (see also Mall, 2018). Some alleged benefits of indie labels are an illusion willingly accepted by fans. Also, independent companies must adapt to the capitalist system to stay in business and serve the artists and the community alike (Negus, 2010: 43; Strachan, 2007). Besides this simplistic black-and-white distinction, individual companies face persistent changes because the industry is in constant flux (Mall, 2018; Negus, 1999: 36). Moreover, no clear distinction exists between major and independent labels. While they differ in their budgets, infrastructures, and networks, Mall (2018) argues that the different positions of major and independent companies regarding profit orientation, conformity, and diversity are mainly idealistic and vary significantly between individual companies and points in time. Many major labels have set up independent sub-labels to serve smaller subgenres or scenes (Negus, 1999), and countless independent labels have been bought and incorporated into larger companies (Weissman, 2017: 9), as was the case with the influential German metal label Century Media, which became part of Sony Music in 2015. Another reason for the lack of clear distinction is that many independent labels rely on major labels for distribution (Weissman, 2017: 15–16)

and focus on the artist and repertoire aspects of the business (Wells, 2017: 185–187) or nego-tiate licence deals to sell in other parts of the world and acquire new markets (Hull et al., 2011: 291; Negus, 1999: 59, 2001: 17).

Previously, it was noted that research in the field of metal music studies comes from cul-tural studies and the humanities rather than music-related disciplines. That is probably why little research directly addresses the genre's business matters. Weinstein (2011: 49–50), revis-iting her influential earlier work, points out that extreme metal bands historically released their music through independent companies, whereas major labels supported classic metal bands. She elaborates that independent labels were important for international distribution due to their re-licensing and importing records and signing bands from countries that, before developments in recording technology made production more affordable, had underdeveloped metal indus-tries. Messick (2020) captures the experiences of contemporary independent metal label own-ers between hobby and making a living from it, including the aspirations and risks involved. Kahn-Harris (2007: 125–126) briefly reflects on the problematic relationship between the cul-ture industry and the global metal scene; professional structures are needed for quality releases, concerts, festivals, and international distribution, while often, the companies and artists' overly profit-oriented spirit goes against the genre's prevailing anti-capitalist views (see also Hjelm et al., 2011). An example is given by Spracklen (2019), who states in a case study of the Swe-dish progressive death metal band Opeth that they faced accusations of selling out after chang-ing their style toward 1970s progressive rock and abandoning growled vocals, heavily distorted guitars, and fast drumbeats. In a similar vein, Netherton (2017) argues that making metal music can no longer be separated from entrepreneurial activity. Business aspects are becoming more closely linked to music, a necessary connection that metal fans preferred to ignore in the past.

These academic texts are complemented by a small number of journalistic and biographic books on influential independent metal labels: US-American Metal Blade (Slagel, 2017) and Megaforce (Zazula, 2019); British Neat (Tucker, 2015) and Peaceville (Halmshaw, 2019); Ger-man Century Media (Krumm, 2012) and Noise (Gehlke, 2017). By their very nature, these books provide insight into the country's production infrastructure, international relations, and the workings of these labels, however (non-)authentic they may be, but cannot compensate for the lack of research on metal record companies in general or on German metal.

3.2.2 Original Research on the Business of Producing Metal in West Germany

The research investigated metal's beginning in the Federal Republic of Germany from a production perspective, including the commercial and structural conditions of the scene. Two questions guided the research, which will be answered briefly in the following.

What were the artistic and commercial intentions of German metal artists and producers?
What strategies did they employ?

Based on producer interviews and a critical analysis of metal media, the research concludes that mainly teenagers and young adults motivated by their passion for music developed formative German metal (Herbst, 2019b, 2021a). As journalistic media has pointed out, most bands casually signed contracts with larger independent metal record companies like Noise or Steamhammer or the numerous small enterprises without legal advice (Gehlke, 2017; Krumm, 2012; Schmenk & Krumm, 2010; Schmenk & Schiffmann, 2010; Schumacher, 2014). Bands and record labels disagree in retrospect about whether the conditions were fair. For example, one of the early metal bands, Rage, still claims to have been exploited by Noise and not adequately supported (Gehlke, 2017: 167–170). However, the interviews and journalistic literature on German metal (Gehlke, 2017; Krumm, 2012; Schmenk & Krumm, 2010), in most cases, suggest that the young bands benefitted from having a record deal, being able to record and releasing albums, and playing concerts inland and abroad. With a few exceptions like Helloween, most bands could not make a living from metal. A prime example is the thrash metal band Tankard, the most often cited hobby band, although they belong to the four classic Teutonic thrash bands (Herbst, 2021c). Consequently, bands did not tend to be pompous and strive for fame. They played underground concerts in Germany and neighbouring countries and performed at school graduation parties or other occasions when their record labels arranged it. Even if bands hoped to earn money with their hobby, it had little bearing on their musical activities (Herbst, 2019b, 2021a).

German metal bands were inspired by fellow German artists writing and recording music, mixed with foreign influences. In general, they had no strategic plan of what music would sell best or gain them global recognition (Herbst, 2019b, 2021a). Not even Helloween, once they had entered foreign charts after the success of their two *Keeper of the seven keys* albums (1987, 1988), did sell out. Some tensions arose from the growing economic value that let guitarist and original singer Kai Hansen leave the band. British Sanctuary Records, a subsidiary of major label EMI, expanded the band's management, and the band was encouraged to record with

British rock producer Chris Tsangarides (Gehlke, 2017). However, these economic pressures did not move Helloween's style into more commercial realms. Quite the contrary, their internationally produced and marketed follow-up to the two *Keeper* albums, *Pink bubbles go ape* (1991), was stylistically highly uncommercial and flopped worldwide (Gehlke, 2017). Neither were most other German bands, despite international influences, interested in adapting their style to foreign conventions. As the producer interviews suggest, the artists did not consider imitating Anglo-American artists, paid little attention to income, and realised that copying other music was pointless (Herbst, 2019b, 2021a). They preferred developing not just a collective German style but a distinct band style. Previous discussions have shown that this style was often rejected and ridiculed abroad (especially in the UK). Nevertheless, some bands kept to their original style and made it in the international market due to their original style (Herbst, 2020a, 2020b).

Bands that blatantly copied foreign styles and sounds (Digger, Victory, Thunderhead, Sargant Fury, Bonfire) usually failed and returned to their original style, which brought them some success in Germany and Central Europe (Herbst, 2020b). Among the few artists succeeding through imitation is Doro Pesch, who began in the German band Warlock (1982–1988) and entered the US-American market with solo albums created in collaboration with Kiss bassist Gene Simmons and acknowledged producer Joey Balin.

As mentioned before, bands keeping to their originality or performing a stereotypical image of Germanness had better chances of lasting success abroad than those that imitated foreign styles or unintentionally came across as German. No band performed Germanness more successfully than Rammstein, as other studies show (Burns, 2008; Herbst et al., 2022; Kahnke, 2013; Littlejohn & Putnam, 2013; Reed, 2007; Schiller, 2020). Formed in 1994 by musicians who grew up in the former German Democratic Republic, Rammstein were neither part of the first generation of German metal nor socialised in the West with its thriving rock and metal scenes. The original research of this portfolio analysed Rammstein's sonic signature, which is essential for their artistic image and commercial appeal (Herbst, 2021b). The commercial purpose behind the carefully crafted sonic signature is selling to a foreign, mainly British and US-American audience by exaggeratedly conforming to German stereotypes. However, the findings suggest that some German trademarks are an illusion because Rammstein's productions conform to international production standards, combined with a few selected sonic elements, especially rhythmically and in the vocals (Herbst, 2021b). Making this sound part of their artistic concept, Rammstein have achieved their goal of selling a German-sounding but

quintessentially international sound to an international audience. This concept has brought them global success for almost three decades.

Overall, Rammstein do not fit in the general picture. Commercial aspirations rarely ruled bands of the first generation in West Germany. Few exceptions aside, only those who created an original sound could assert themselves internationally.

What were the structures of the German recording industry, and how did they affect metal production?

The German recording industry was firmly controlled by major labels after the Second World War, whilst the UK and USA (Negus, 2001: 7–12) dominated the international popular music market, not only due to better production structures and well-known artists but also because of binational business arrangements that benefitted record companies and artists in both countries (Negus, 2001: 10). Before the wake of Krautrock in the late 1960s and early 1970s, which established an infrastructure for countercultural popular music (Herbst, 2022a), independent record companies, recording studios, and recording staff were almost non-existent in Germany. Krautrock's infrastructure reached into the 1980s when the electronic pop of the *Neue Deutsche Welle* (new German wave) emerged, and also German metal drew on it to a certain extent. Although only a few of the studios and recording experts were directly involved in developing German metal—Scorpions' producer and record studio owner Dieter Dierks being a notable exception—it benefitted from the cultural, infrastructural, and legal achievements of popular music in the 1960s and 1970s (Herbst, 2021d). Music management was no longer the state's monopoly, independent record companies had shown they could be successful nationally and internationally, and the public was open to subcultural musical products created by semi-pro-fessionals and interested amateurs (Herbst, 2021d, 2022a).

During the time of metal's proliferation in the 1980s, it was an underground phenomenon driven by a DIY ethos that led to the emergence of metal-specific record labels, journalistic media, and fan clubs, as well as improvised record productions (Herbst, 2021c). Biographies of metal record labels suggest that making a profit was challenging. While US-American labels like Metal Blade (Slagel, 2017) or Megaforce (Zazula, 2019) and bands like Metallica suc-ceeded, British labels like Neat (Tucker, 2015) and Peaceville (Halmshaw, 2019) struggled to break even, and so did their signed bands. According to Negus (2001: 135–136), average pro-duction costs in the UK in the 1980s and 1990s were about £100,000, and a hundred thousand copies sold was considered a success. In Germany, the situation was still worse with smaller

budgets for metal productions, varying between a few thousand to about a hundred thousand German Marks (DM) for high-profile productions, according to the producers interviewed[6] and reports in journalistic media. Sales figures in Germany were usually between ten and thirty thousand; few albums by top bands like Helloween reached a hundred thousand and the national charts. As evidenced by books on the two influential record companies, Noise (Gehlke, 2017) and Century Media (Krumm, 2012), record labels funded the production, marketing, and (international) touring and recouped their costs before paying the artists in accordance with industry practice (Hull et al., 2011). Except for Helloween, hardly any band received a monthly salary from a record company. The majority were only paid occasionally with incoming royalties. Hints about a similar practice in the UK come from the autobiography of Peaceville founder Paul Halmshaw (2019). Small to medium budgets also affected the production resources. German metal was predominantly produced in affordable German studios by German recordists; only a handful of bands, like the power metal spearheads Helloween and the thrash metal outlet Kreator, could afford to produce abroad (Herbst, 2021c). However, the interviewed producers agreed that Germany was not a disadvantage as a production location; the resources were of international standard, and the recordists could deliver international quality (Herbst, 2019b, 2021a).

The research shows how a select few independent record labels (Noise, Steamhammer, Nuclear Blast, Century Media) were crucial for the international development of metal, supporting German and foreign artists (Herbst, 2021d). While this is well documented in journalistic media (e.g., Gehlke, 2017; Krumm, 2012), the size and character of the production network are often overlooked. The findings confirm that the metal labels mentioned before had a dominant role, as did influential producers like Harris Johns and studios like his Music Lab (Herbst, 2021d). The findings also reveal many other studios and engineers, some of whom were not specialised in metal or were semi-professionals. The results further show that many small, independent record companies discovered and nurtured promising bands, enabling some to move to more influential labels and become (semi-)professionals. Production, marketing, and touring budgets and revenues were low for most of these small labels, so they had to file bankruptcy within a few years before being bought up and integrated into the larger independent record companies (Herbst, 2021d).

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[6] As some of this information is too sensitive and/or does not contribute to the overall argument, it is not included in the publications.

The research finds evidence that the German production scene was less commercially driven and more community-oriented in international comparison. As in other cultures, including the USA and UK, the metal music industry was developed by amateurs with passion but little industry experience (Herbst, 2021d). Bands rarely aspired to be signed by major or foreign labels, preferring to stay with one of the bigger German independent labels. The German labels, in turn, collaborated nationally and internationally to best possible support their signed artists. This ethos of domestic labels equally appealed to German and foreign bands, many of whom were or still are supported by German companies (Herbst, 2021d).

3.3 Section C: Heritage and Cultural Preservation

German metal has grown since its inception and enjoys constant popularity despite the changes in popular music, such as the diversification of genres and the emergence of electronic music. Metal's formative years are seldom considered part of German national culture, although it is a heritage that may deserve to be preserved. Two studies in this research portfolio investigated the heritage value of German metal, exploring producers' views about studios worthy of heritage (Herbst, 2021d) and their audio preservation practices (Herbst, 2022b) from a record production perspective. The following sections first review relevant literature and subsequently summarise the main findings of the two original studies.

3.3.1 Heritage Studies

Cultural heritage is a broad field of study with publications from various disciplines, particularly cultural studies. It is increasingly explored in popular music, focusing on personal identity, popular artists and institutions, and themes like nostalgia. In his article on rock music as heritage, Andy Bennett (2009: 479–480) outlines different strands of heritage: music magazines; documentaries on festivals or bands; hall of fame museums; tribute bands; live shows or recordings of popular albums; re-releases and special issues of music for a retro clientele. Brandellero and Janssen (2014: 229) propose another classification: museums and archives to preserve and exhibit popular music's material culture; digitisation as a preservation method; institutional recognition of heritage; private bottom-up initiatives; local marking and preservation of valued places related to musicians or music scenes. The cited authors agree that heritage is not clearly defined and open to interpretation, often involving conflicts and negotiations between individuals, institutions, and government bodies. Roberts and Cohen (2014) address this issue of power and recognition and offer a critical framework for authorisation that

distinguishes between officially authorised, self-authorised, and unauthorised musical heritage. They outline how heritage can evolve through processes of legitimisation as well as productive and consumptive actions. Such a flexible framework reduces the traditional distinction between high and low heritage, with popular music, especially genres like rock and metal, seldom given high importance (Baker, 2017; A. Bennett, 2009; A. Bennett & Janssen, 2017). Nevertheless, some authors still see heritage as institutionally hierarchical (Brandellero & Janssen, 2014: 225).

Various strands of research examine strategies to circumvent this institutional hierarchy. One much-discussed strategy is do-it-yourself preservation and exhibition, where a group of volunteers collect artefacts to create repositories for culture, preserve, and potentially display them in some form (Baker, 2016; Baker & Huber, 2013). These projects are often self-authorised but sometimes collaborate with companies or local authorities (Baker, 2016; L. Roberts & Cohen, 2014). As they lack the capital and power of established institutions (Baker, 2017; A. Bennett, 2009), niche areas of heritage interest tend to be their focus. Bennett notes concerning rock music that DIY heritage practices aim to "address the commercial bias of the major record labels by attempting to reposition hidden or forgotten artists and their music back into the frame of rock historical consciousness" (2009: 485), thus expanding the mainstream canon to include distinctive artists otherwise overlooked. Bennett goes on to argue that such DIY preservation is not limited to fans but often involves independent labels like British Songworks, which specialise in the "re-issuing of deleted albums and the issuing of previously unreleased material by less well-known artists associated with the progressive, folk and jazz-rock fusion styles of the late 1960s and early 1970s" (2009: 483–484). Another notable example in the context of this research portfolio is the Home of Metal exhibition and heritage project that "aims to brand Birmingham and the Black Country as the birthplace of the heavy metal genre because of the range of bands originating in the region that have made a defining contribution to the genre such as Black Sabbath, Judas Priest, Led Zeppelin and Napalm Death" (Horrocks, 2015: 192). As Horrocks explains, "Home of Metal can thus be seen as an attempt to remedy the lack of recognition of the region's heavy metal music heritage" (2015: 192). It is a collaborative heritage project initiated by individuals, which moved beyond self-authorisation status over time and is supported by metal musicians (Black Sabbath), metal radio stations (Midlands Metalheads), museums (Birmingham Museum & Art Gallery), universities (Birmingham City University), public funders (Arts Council England, Heritage Fund), and musical instruments manufacturers (Laney).

A related area of research looks at community archives that, like DIY projects, intend to rectify marginalisation (Flinn et al., 2009) and are more diverse than government-led archives (Flinn, 2010). Community archives differ from DIY projects because the members involved may be unaware that their joint work actually constitutes archiving (Baker & Alison, 2013: 516). Some of the challenges the literature described (Baker, 2017; Flinn, 2007; Flinn et al., 2009; Flinn, 2010) are overdependence on key archivists, lack of funding, and uncertainty about who controls or owns the archive. Scholars point out that community archives are increasingly online for cost-effectiveness, greater geographic accessibility and reach, and the opportunity to foster discussion and participation (A. Bennett & Strong, 2018; Flinn, 2007). Problems identified include an unsystematic nature, limited archiving functionality, loss of interest, copyright infringement, and external control by companies like Facebook (Baker, 2017; Brandellero & Janssen, 2014). Nevertheless, online archives and related activities can create imagined communities meaningful to individuals for social or nostalgic reasons (Brandellero & Janssen, 2014; Strong et al., 2017).

Research on popular music heritage has emphasised the inherent link to consumerism and material artefacts (Baker & Huber, 2013; Strong et al., 2017) besides cities and national events (Strong et al., 2017). The focus is generally on popular artists and less on artefacts of production, apart from vocal microphones and instruments. Little research has examined recording studios as heritage sites. Gibson and Connell (Connell & C. Gibson, 2003; C. Gibson, 2005; C. Gibson & Connell, 2005) belong among the few to consider the cultural value of recording studios in their study of place and music. The authors focus on mythology, as studios are places where popular records are made behind closed doors with little public insight into the creative process. These places' musical and creative influence on music productions are critically studied, drawing mainly on journalistic interviews and reports; ultimately, the prevailing mythological view of magical places is confirmed (see also Bates, 2012; S. Bennett, 2016). Yet, the discourse rarely covers German studios but (West) Berlin's Hansa Studios, where David Bowie, Iggy Pop, U2, and Depeche Mode have recorded (C. Gibson, 2005). Research on (former) recording studios as museums is scarce; a notable exception is Samantha Bennett's (2016) study on Abbey Roads.

3.3.2 Audio Preservation

Given the paucity of interest in recording studios and other areas of music production as heritage, it is hardly surprising that audio preservation is a neglected area in popular music studies.

Audio preservation includes various activities to preserve the physical or digital audio master of released records and, ideally, materials created during music production. Professional societies like the International Association of Sound and International Archives (IASA), the Association for Recorded Sound Collections (ARSC), the Recording Academy's Producers', and Engineers' Wing, and the Technical Committee of the Audio Engineering Society (AES) have released practical publications and research dedicated to audio preservation. These professionals and scholars highlight that mediums containing audio recordings will deteriorate and be damaged beyond usability and restoration in the foreseeable future, meaning that historical artefacts of (popular) music are lost forever (Casey, 2015). According to Casey, the "problem can be effectively summarized with a few keywords: large numbers, obsolescence, degradation, high research value, and short time window" (2015: 14). The two core problems are degradation, the deterioration of physical media (and loss of digital media), and the obsolescence of technology, which prevents data migration from old to new media.

The relevant literature stresses that digital and optical media either function or do not and that little can be done to recover missing information (Casey, 2015; Hans & Koster, 2004; Holland, 1999a, 2004b; Rumsey, 2012; Wheeler, 2002). Physical media like analogue tape also suffer from degradation, especially binder hydrolysis, mould, fungus, and shedding oxide. However, they can often be temporarily restored for two to four weeks by baking the tapes at a temperature of 130 degrees Fahrenheit for eight to ten hours in a convection oven. Audio quality can nevertheless be degraded, such as the loss of high-frequency information or alterations in the stereo image (Hepworth-Sawyer & Hodgson, 2017; Holland, 2004a, 2004b; Kaltseis & Hubauer, 2012; Rumsey, 2012; Wheeler, 2002). Holland (1999b) estimates that 85 per cent of master tapes from the 1970s and 1980s were already unplayable twenty years ago. Aside from the symbolic value of the original (analogue) artefact, digital backup copies are inherently inferior due to their reduced frequency and dynamic range and the artefacts produced by analogue-to-digital conversion. Under these circumstances, it is impossible to create lossless formats that would ensure high resolution in future releases, allowing hi-fi audio connoisseurs to enjoy music close to the original mastering studio experience (Casey, 2015; Hepworth-Sawyer & Hodgson, 2017; Holland, 1997a, 1997b; Pellizzari, 2015). The literature further points out that preserving the original multi-tracks of the recording and mixing stages is also problematic. But rather than degenerating, the multi-tracks have rarely been saved and archived since the 1980s because artists were no longer obliged to hand them over to record labels (Holland, 1999c). Furthermore, data was often destroyed or overwritten to save storage

or lower production costs (Holland, 1997a, 1997b), and digital production led to software incompatibilities and producers' reluctance to share this sensitive production data (Rumsey, 2012). Tapes were also lost for other reasons: fires or floods in record company vaults; deliberately destroyed tapes; mislabelling; technical incompetence (Holland, 1997a, 1997b, 2004b; Rumsey, 2012; Vanbergen, 2005).

In conclusion, although audio artefacts should be considered cultural heritage worthy of preservation, research in popular music and cultural studies has widely neglected this field and its implications. In the words of Stella and Chester, "[s]toring and restoring these artifacts is integral to keeping cultural memory or the impact of an historical event alive" (2015: 60). Holland (2004b: 56) likewise argues that record companies must be equally understood as corporate and cultural institutions. Record labels' approach to preserving and storing musical material and how engineers and producers have documented their preservation practices in the studio requires further research.

3.3.3 Original Research on Heritage and Audio Preservation in German Metal

Parts of this research portfolio focused on aspects of heritage in two regards. Based on interviews with German metal producers and studio owners, it first explored the notion of recording studios as museums, including what they could look like, what their value might be, and what problems in realising them may occur (Herbst, 2021d). Second, it examined audio preservation practices in early German metal productions as experienced and practised by the same producers (Herbst, 2022b). These two studies were guided by two research questions that are answered in the following.

How have early metal productions been preserved as heritage? What value do recording studios and other artefacts created in metal music production have for their producers?
The two studies and interview statements in other publications of the portfolio suggest that the recording industry was overwhelmed by the sudden interest in metal in the 1980s and 1990s (Herbst, 2019b, 2021a, 2021d, 2022b). The number of bands grew exponentially, and so did the need to record and release albums in rapid succession, with yearly releases expected. Most metal music was released by independent metal companies founded and run by fans with little experience in the industry (Herbst, 2021d). Label employees occupied themselves spotting talent, organising record productions and concerts, and building international business

relationships and distribution channels. With this flood of releases, archiving production arte-facts was, understandably, of low priority.

The interviewed producers were among the most active recording specialists in the flour-ishing German metal scene. They made it clear that their busy schedules often prevented them from taking photos, short video clips, or other notes to document their work, neither for docu-mentation nor remembrance purposes (Herbst, 2021d). Only a few of the already small number of collected production documentation remained because they were lost or destroyed over time. In most cases, the only artefacts left are the released records, guest books, and photos. While some producers regret the lack of documentation, others have no sentimental attachments to material artefacts symbolising productions. Producers may have different views about the value of photos, videos, and other memorabilia, yet all respondents agree that the released record is the most important result of their professional work. The various artefacts involved in produc-tion are primarily of personal value to the artists but of little overall value in the big picture (Herbst, 2021d). Whether or not recording studios are heritage worthy of preservation is there-fore disputed. Siegfried Bemm sees cultural value in a recording studio like his Woodhouse because of its history and vintage equipment, whereas Harris Johns and Karl Bauerfeind reject the prevailing notion of studios as romantic and magical places (Bates, 2012; S. Bennett, 2016; C. Gibson, 2005) because they see them as mere production resources.

The situation is more nuanced concerning audio preservation. The three producers had different experiences working with German and foreign record companies, and their ap-proaches to preservation varied (Herbst, 2022b). In order to avoid data loss, they went to great lengths to create backups during production. However, precarious budgets forced them to reuse the analogue multi-track tape reels for other productions so that the record labels only received the final master tape. The producers occasionally kept duplicates or even the original tracks in their vaults, which is not an ideal storage space for such sensitive media. As the interviews suggest, record companies sometimes lost or destroyed recorded media, or the producers were asked to preserve them if they wished. They usually did not mind doing so, but the material had to be disposed of when they moved or closed their studios. Regarding obsolescence, the research indicates that the interviewed producers regularly backed up and kept older technolo-gies for accessing and migrating data but eventually were overwhelmed with such a time-con-suming commitment (Herbst, 2022b). Of the lost multi-tracks, it can thus be assumed that only a few had been archived in the first place. Master tapes from the first two decades of German metal music are threatened by decay, and many can no longer be restored.

4. Original Contributions to the Field

This research portfolio and associated commentary directly contribute to popular music studies, metal music studies in particular, and the art of record production. It is the first comprehensive study of metal music production in the Federal Republic of Germany in its two formative decades (the 1980s and 1990s) and subsequent consolidation. Following an overarching comparative, mixed-methods and mixed-data methodological approach, the specifics of German metal production and the music's sonic signature are related to preceding metal cultures in the UK and USA, as well as to other cultures on which research exists (see literature reviews). In addition to investigating the specifics of early German metal, the research contributes to academic discussions on the relationship between place and music, methodological approaches to the study of sonic signatures and performance idioms, music business, audio conservation, and cultural heritage. The main contributions of the research portfolio and commentary are:

- a detailed case study on the formation of metal in the two formative decades in the Federal Republic of Germany, addressing a distinct lack of research on metal from *West* Germany (contribution to *metal music studies*);

- a detailed, holistic, and complex analysis of sonic signatures based on interviews, music media, and music analyses that complements the limited literature on sonic signatures, which mostly treats them in passing (contribution to the *art of record production*);

- a thorough analysis of the relationship between place and place-associated sounds, adding musicological and music-technological perspectives to the existing cultural studies-based literature (contribution to *popular and metal music studies* and the *art of record production*);

- the documentation of the music production network of early German rock and metal music, including the economic conditions and creative endeavours in the scene (contribution to *metal music studies*);

- two pioneering case studies discussing the heritage value of recording studios and the complexities of preserving audio recordings and other production artefacts (contribution to *popular music and heritage studies* and the *art of record production*).

In addition to these direct contributions to knowledge about the subject of German metal music and its production, the research portfolio and commentary have the potential to function as a

role model for future research in several respects. Metal music studies may benefit from the methodological rigour and empirical foundation of this research portfolio. The methodology developed specifically for analysing rhythm and timing may prove useful in performance research. Last but not least, popular music research can gain from the techniques described for facilitating auditory analysis by modifying the music's stereo image and frequency content (Herbst, 2020c).

In recent years, metal music scholars have reflected on the field's young history, its growing recognition in academia, its quality standards, and how to progress it further through high-quality scholarship (A. Brown, 2011, 2018; DiGioia & Helfrich, 2018; Herbst & Spracklen, 2021; R. L. Hill, 2021; Savigny & Schaap, 2018). Savigny and Schaap argue that to advance metal music studies beyond fan writing,

> we need to move forward both methodologically and theoretically […] we need to take stock and reflect on the rigour that we apply to this work […] metal studies can be and should be underpinned by rigorous theoretical and methodological analysis of metal music and its culture. In doing this, we move away from simply normative and anecdotal approaches (Savigny & Schaap, 2018: 550)

This claim is shared by other scholars (e.g., R. L. Hill, 2021). Savigny and Schaap further contend:

> As academics, it is our task to ensure that our data and methods of analysis are valid, transparent, reliable and – if possible – reproducible. As such, we can claim accountability. This does not mean that we should have a singular methodological approach – we think this would actually harm the field – but that we should uphold a high standard for methodological rigour and be critical when we see peers neglecting this. (Savigny & Schaap, 2018: 553)

Only by ensuring this methodological rigour and critical stance, so the authors (Savigny & Schaap, 2018: 550), can metal music studies find recognition beyond the immediate field in established disciplines like sociology, cultural and media studies, or political science.

I concur with this view (see Herbst & Spracklen, 2021) and believe that the empirical nature of this research portfolio, comprising multi-methodical research design and interdisciplinary investigation, is an example of what rigorous research in metal music studies can look like—without claiming that the approach taken is universally the best or most appropriate for every research subject and question. Elsewhere (Herbst & Spracklen, 2021), I have also called for more attention to music-related disciplines such as musicology and music technology, which are currently barely represented in metal music scholarship. The quantity and quality of this research portfolio contribute to metal music studies by addressing issues of music

production approaches and conditions like recording infrastructures, sonic signatures, musical aspects of place-based metal labels, creative intentions and strategies in metal music creation, and the heritage value of recorded music and artefacts of its creation. Equally important, the very presence of this research may alert other researchers to direct their focus on the intersection of metal music and music production.

5. Conclusion

This research portfolio examined the two formative decades of metal music in the Federal Republic of Germany in the 1980s and 1990s from a production perspective, focusing on three areas: 1) the sonic signatures of German metal compared to foreign productions (mainly from the UK and USA); 2) the business and recording infrastructure of German metal production; 3) the heritage and cultural preservation of recorded metal music in Germany. The research utilised an empirical mixed-methods and mixed-data design to reach more robust conclusions through triangulation.

Regarding the three areas of research interest, the portfolio has shown the difficulties involved in determining the sonic signatures of German metal and distinguishing it from metal from other places due to the complexity of the musical, technological, and extra-musical elements involved and other significant factors, such as subjectivity, stereotypes, and myths. In the middle of the twentieth century, rock music production in West Germany faced disadvantages compared to Great Britain and the United States. However, a gradually developing recording industry made German rock and metal production competitive on the international market in the late 1980s. By then, several metal bands had gained international recognition, and international artists began hiring German recording studios and producers for their original approach to the genre. Not only did metal music from Germany leave a mark on the metal genre, but Germany also continues to be a relevant country for metal music with popular bands and festivals and recognised recording experts.

Research such as that conducted in this portfolio contributes to preserving the history and documents the distinctiveness of German metal through analysis. As metal develops globally and explores new stylistic features and production approaches complying with the music industry that is constantly changing, it seems appropriate to consider how its cultural heritage can be preserved. Regarding production artefacts, the research suggests that much of the archiving and preservation has been in the hands of producers, who have taken on duties that are typically the responsibility of record companies. Yet, relying on individuals is risky and can only continue for some time, especially since the first generation of recordists is now in their sixties and seventies. Beyond, artefacts will not be available forever, so further action is needed to capture them.

This research portfolio is the first comprehensive study on metal music from the Federal Republic of Germany. It must be considered as a starting point for understanding the particularities of this metal scene. The research focused on record production, a hitherto understudied

area in metal music studies, and contributed to knowledge in several areas, including sonic signatures; imagined communities; music and place; music labels; scene formation and development; the business of record production; musical heritage; audio preservation. The necessary narrow scope and high level of detail required the research to focus on some aspects of production while neglecting others. For example, the chosen methodology, although multifaceted, limited the data to the views of a small group of mainly German producers and written journalistic media. Potential biases in these two data sources aside, the views and perceptions of metal fans could only be anticipated.

This portfolio drew on a range of disciplines. It was, however, firmly rooted in musicology and the art of record production and thus primarily addressed issues relevant to music production. Further research is needed to add the audience's perspective and evaluate and differentiate the findings and theories developed in this portfolio. Interpretations from cultural or media studies perspectives would complement the present findings and close still-existing gaps in knowledge. With a particular case study on German metal, the portfolio and commentary nevertheless make a significant contribution to scholarship in the fields of popular music studies, metal music studies, and the art of record production, as it provides detailed analyses and empirical data that can function as a role model and point of comparison for subsequent studies. Given the relative lack of research in all three areas—place-based sonic signatures, the recording industry in metal music, and the heritage of metal music—future popular music research will be able to build on the portfolio's findings. Metal music studies will particularly benefit from this research, as it has largely neglected the domain of record production so far (Herbst & Spracklen, 2021).

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