Noise resonance
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If we view ourselves from a great height, it is frightening to realize how little we know about our species, our purpose and our end, I thought, as we crossed the coastline and flew out over the jelly-green sea.


Strangely enough, there are signals that exist in all mathematical purity, such as on the one hand the sinus tones that have lasted for eternities and that will continue to sound for eternities, and on the other hand signals like the Dirac Impulse, whose large but finite energy discharges itself in an infinitely short time. Between these two extremes our life is made up, in the words of Sophocles, of ‘mere phantoms, shadows of nothing’.


Das Lied schläft in der Maschine.

- Einstürzende Neubauten – “NNNAAMMM” (Bargeld 1997: 126)
Introduction: The role of noise in the music of the media age

0.1 A dominant discourse on noise in/as music

More than ten years ago, around 2005, I started researching what was to become my bachelor thesis about the work of German Industrial Music-pioneers Einstürzende Neubauten (Kromhout 2006). I became acquainted with the band in my late teens through the album Silence Is Sexy, released in 2000, and had slowly worked my way back through their catalogue toward the debut album Kollaps from 1981 (Einstürzende Neubauten 2000; 2003). Whereas the work from 2000 consists of experimental pop songs combining metal percussion, melodic bass lines, enticing deep vocals and a fair share of unusual sounds—from self-made instruments and field recordings to experimental studio practices—the earlier material introduces a much more abrasive sound world: screeching, shouting, banging, drilling, manic drumming on metal objects, gut wrenching screams, loud, distorted, metallic guitars, harsh, unwelcoming layers of dissonance. This music, sounding like nothing else, first opened my ears for all the noise that is sometimes called music and all the music that is sometimes called noise. I was hooked.

At the time, the questions I asked regarding this sound world were very, in hindsight one might even say naively, simple. Why, I wondered, do people listen to this noise? What makes it appealing or musically attractive? Why are we drawn to it? Why do we like it? In trying to answer these questions, however, what had seemed relatively straightforward became more and more opaque at every turn. Questions regarding the issue of noise invoke a host of disparate academic disciplines—from musicology to physics and from media studies to mathematics, to name a
few—and among those disciplines, the very definition of noise itself is notoriously unstable. Noise is a sonic object, a social nuisance, a physical phenomenon, a therapeutic background sound, a concept in communication theory, a musical genre, a legislative issue, an obstacle in sound engineering. Most of all, it is, as philosopher Michel Serres writes, “a black thing, an obscure process, or a confused cloud of signals—what we shall soon call a problem” (1982b: 17). Regarding this problem, my attempts in 2005 and 2006 barely scratched the surface, so those somewhat naive questions stayed. The prime reason why they did, however, was my strong impression that other accounts on the role of noise in music did not provide entirely satisfactory answers either.

In *The Aesthetics of Noise*, Danish cultural theorist Torben Sangild interprets the role of noise in music in three ways. Firstly, as “an aesthetization of violence and suffering.” Secondly, as abject sounds “that are discarded as being impure, unmusical.” And thirdly, as a kind of multiplicity that is “often used to express anger, fear and violence” (2002: 21, 25-26). For Sangild, noise is an abject, transgressive, violent, subversive sonic element that forces itself into the domain of music and mainly contributes to it by means of contrast—destroying or disrupting its clarity, harmony and regularity. Noise confronts order with chaos, harmony with dissonance, peacefulness with aggression and social cohesion with disruptive subversion. These interpretations are not uncommon for literature on the role of noise in or as music. More often than not, sound scholar Caleb Kelly writes, noise is considered “a disruptive and excessive area of sound practice” and the source for a kind of “joyful transgression” (2009: 61).1 More often than not, in the context of music, noise is regarded as the ultimate sonic Other.

Luigi Russolo’s 1913 futurist manifesto *The Art of Noise*, which is often considered the founding document of both ‘noise music’ as a genre and the theory of its relation to music, already implicitly considered noise to be separate from proper musical sound (Russolo 2004). As film and sound scholar Michel Chion argues in “Let’s Have Done with the Notion of

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1 For a concise, although somewhat German-language oriented, overview of academic literature on noise in or as music see Borsche, 2015.
‘‘Noise,’’ notwithstanding Russolo’s call for the inclusion of all kinds of noises in the music of his day, his manifesto “confirms the idea of an absolute distinction—an essential distinction—between musical sounds and noises” (2011: 244). Heralded as the saviour of music, the breaker of rules or the liberator of sound, noise is defined in contrast to what it saves, breaks or liberates: well-ordered musical sound.

Similarly, a book that is still regarded as one of the seminal accounts on the role of noise in the history of music, social economist Jacques Attali’s 1977 Noise. The Political Economy of Music describes this history as a dialectic interplay between musical order and disruptive noise. Although the latter is conceptualised as an emancipatory force, not to be excluded or discarded but to be embraced and nurtured as essential to the advancement of new forms of music, this power is fundamentally based on its ability to transgress and violate musical and social order. The power of noise, Attali argues, is therefore akin to the uncontrolled violence of murder; and like the controlled violence of ritual murder, music serves as its “channelization” (2003: 12-13). Thus, in this continuous cyclical interplay, noise disrupts well-ordered music whereupon the order of music tames disruptive noise.

Cultural theorist Paul Hegarty’s more recent Noise/Music. A History is one of the few books that deals exclusively with noise as a musical phenomenon (2008). Ordered thematically along a set of themes relevant to the history of noise as music (such as ‘electricity,’ ‘industrial,’ ‘power’ or ‘sound art’), Hegarty describes its changing role and increasing importance over the course of the twentieth century. Throughout the book, his concept of noise alternates between a primarily metaphorical reading akin to Attali’s take on noise as an agent of change, resistance and subversion, and a more phenomenological approach that considers it first and foremost as a welcome source for new musical sounds and genres. Going back and forth between these two concepts, Hegarty’s historical overview of the emancipation of noise in or as music also affirms the dominant dialectic interpretation of the relation between noise and music, chaos and order, violence and peace. Although his account adds valuable nuances to this history by differentiating between various forms of noise and different types of musical practices, for Hegarty as well, noise remains a principle
antithesis to the order of music: a marker for failure, incompleteness, transgression, disruption and subversion.²

Staying in tune with my initial interest in the appeal of noise as a musical phenomenon, however, I want to ask whether the musical noise practices envisioned by Russolo, conceptualised by Attali and described by Hegarty can really only be understood on the basis of this inherent antithetical character of noise. Can we only account for the proliferation of noise practices in contemporary musical culture within an oppositional framework based on an inherently negative definition of noise? Or is it also possible to consider the musical importance and appeal of noise as something that contributes to the world of sound and music on its own terms—as a sonic phenomenon characterised by randomness and non-periodicity? Crucially, assuming such a different role of noise implies that its presence in music does not signify, or at least not only signifies, failure, transgression and disruption. Taking on this assumption, the key questions are as follows: how would it be possible to identify, and conceptually come to terms with an affirmative, perhaps foundational role for noise in contemporary musical practices; and how would it subsequently be possible to account for the ways in which noise, as an affirmative sonic presence, makes musical sense?

² Ultimately, Hegarty writes in his conclusion, noise “is not proper, linear, meaningful. But not bad either, as noise transvalues listener and object, noise and music, hearing and listening, perception and its failure, performance and its failure, noise and its failure to be music, noise and its failure to be noise. And the transvaluation itself, only as if it could ever be. As if it really were noise, after or before, all” (2008: 200). Recently, several essays in Resonances. Noise and Contemporary Music, edited by Michael Goddard, Benjamin Halligan and Nicola Spelman intend to break with the conceptualisation of noise as failure, transgression and disruption (2013). Similarly, in Noise Matters. Toward an Ontology of Noise, Greg Hainge uses several case studies—from haikus to horror movies and from David Lynch to Merzbow—to redefine noise as a “relational process through which the world and its object express themselves” (2013: 13). For Hainge, noise is thereby something that appears with every expressive act. Cultural theorist and dubstep-DJ Steve Goodman in his book Sonic Warfare also takes noise beyond what he calls the futurist notions of “loudness & speed.” Arguing in favour of “a transdisciplinary concept of noise,” he takes noise as a form of “turbulence” and “rhythmic reservoir” (2010: 105-107). Lastly, breaking with “the binary shackles of noise as good or bad” and “the all-too-common belittling of noise as mere epiphenomenon and fleeting byproduct,” Hillel Schwartz’s monumental Making Noise. From Babel to the Big Bang & Beyond traces the importance and significance of sonic noise, including its “metaphorical bearings […] as something other than acoustic,” throughout human history (2011: 25-26, 29).
0.2 Sonic, physical and communicational noise

Because reevaluating the role of noise in music means a break with the opposition-driven discourse that remains dominant in most accounts, I suggest that developing such a revaluation could benefit from a methodological step back from the domain of music. Comparing the role of noise in music with its role in domains like information theory, communication engineering and media studies opens up new perspectives on the development of the concept of noise that, as I intend to show, could further the understanding of musical noise as well. In “Concepts and Significance of Noise in Acoustics. Before and After the Great War,” historian of science Roland Wittje describes three concepts of noise that developed in the “German scientific discourse” and roughly correspond to three “notions [...] in the German language, ‘Lärm,’ ‘Geräusch,’ and ‘Rauschen’” (2016: 8). The more or less consecutive development of these concepts between the mid-nineteenth and the mid-twentieth century can be described as a series of semantic and conceptual extensions of the notion of noise in the contexts of, first, sound and acoustics, second, communication engineering and physics and third, information and communication theory.

Geräusch, firstly, denotes a sonic concept of noise grounded in nineteenth century acoustics, most significantly German physicist Hermann von Helmholtz’s extensive experimental analysis of sound colour. On the one hand, it defines noise more or less objectively as sound consisting of primarily non-periodic frequencies. On the other hand, Wittje writes, because this emphasis on the non-periodicity of noise also marks its fundamental difference from periodic ‘musical’ sound, it laid the basis for the oppositional relation between noise and music that “continued to characterize the discourse of noise into the twentieth century” (11).

Secondly, in the last decade of the nineteenth and first decades of the twentieth century, the physical similarities between this non-periodic sonic noise and random physical disturbances that appear in the transmission channels of communication media inspired scientists, inventors and engineers to define a more general physical concept of noise corresponding to the German word Rauschen (24). To clearly differentiate
this physical concept from the most commonly used notion of noise as any unintended, undefined or disturbing sound, engineer Robert Höldrich notes, the most accurate English translation of this physical *Rauschen* is “random noise” (1995: 128).

Thirdly, this commonly used notion of noise as any disturbing, unintended or unwanted sound corresponds to the German word *Lärm*. As historians of science and technology Emily Thompson and Karin Bijsterveld describe, this notion first rose to prominence in discussions regarding noise pollution and noise abatement in the early twentieth century, as well as through modernist associations between noise, speed, power and progression—for example in Russolo’s Futurist manifesto (Thompson 2002; Bijsterveld 2008). In the context of communication engineering and signal processing, however, the combination of the objective physical concept of noise as *Rauschen* (the random movement of fluctuating particles) and this more subjective notion of noise as *Lärm* (any acoustic nuisance) inspired a *communicational concept of noise* developed in information theory in the 1930s and 1940s (Mills 2011: 123).

Spearheaded by the publication of mathematician and engineer Claude Shannon’s “Mathematical Theory of Communication” in 1948, information theory formalised the operations of communication media based on the statistical calculation of the relation between information and noise (Shannon and Weaver 1964). Significantly, it thereby no longer defines noise on the basis of its sonic or physical characteristics, but redefines it solely on the basis of its role in communication systems. In information theory, every signal that hinders or affects the clear transmission of information constitutes as noise. By treating this relativist,
statistical noise not as an external thread to the communication system, but as an internal factor that is inherent to it, Shannon’s theory shows how to calculate and potentially reduce its influence (Sterne 2012: 81). Exactly because it is considered internal to the system, however, information theory also proves that the complete reduction of communicational noise is fundamentally impossible.

Claude Shannon’s model of communication and its statistical (re)definitions of information and noise are, as his most important commentator mathematician Warren Weaver writes, “exceedingly general in its scope” and their impact can hardly be overstated (Shannon and Weaver 1964: 25). Due to the general applicability of Shannon’s model, Wittje points out, the communicational concept of noise found its way to “virtually all fields of science and engineering, and even the social sciences” (2016: 7). Even beyond the natural and social sciences, I would add, it resonated far and wide. Although Attali’s and Hegarty’s interpretations partly take on the sonic concept of noise as non-periodic sound, the model of a dialectic interplay between the forces of noise and music is clearly indebted to the communicational concept according to which noise can be statistically located, specified and reduced, but never completely eliminated.

Because of its fundamentally contextual definition rooted in mathematical statistics, the communicational concept of noise is notoriously fluid. As a consequence, literary scholar Greg Hainge argues in Noise Matters. Towards an Ontology of Noise, it “has been used to apply to everything and nothing at the same time, subject to a whole host of mutually contradictory definitions and usages, its apparently ineffable nature the result of divergent agendas rather than something proper to noise itself” (2013: 8). Hence, on the long run, Goddard, Halligan and Spelman write in their introduction to Resonances. Noise and Contemporary Music, owing to the general applicability of information theory and the communicational concept of noise, exactly the “expansion of noise ‘studies’ into multiple fields [risks] a loss of focus on, or dispersal of the relation between, noise and music” (2013: 9). Taking up on this critique and backtracking on the proliferation and expansion of noise studies into all
corners of academia, I want to return to the question regarding its role and importance in sound and music.

The discursive slippage of the communicational concept of noise notwithstanding, returning to questions regarding its role in music does not imply a return to the sonic concept of noise, as this would mean a return to the definition that inspired the discursive opposition between periodicity and non-periodicity, order and chaos, harmony and dissonance in the first place. As Wittje shows, firmly rooted in nineteenth century acoustics and a supposedly objective difference between periodic and non-periodic sounds, the sonic concept of noise implies a structural opposition between harmonious music and non-harmonious noise (2016: 10). Hence, whereas the communicational concept of noise in information theory risks being too general and relativistic, the sonic concept of noise in sound and acoustics is too specific and restrictive. By defining noise as "a vibration, either electrical or mechanical, which cannot be dissolved into periodic harmonic vibrations," however, the physical concept of noise focuses on the material basis of the physical processes in which random noise emerges (24). As such, it might provide the necessary conceptual middle ground between the relativism of the communicational concept and the essentialism of the sonic concept of noise.

As Wittje’s account of the changing concept of noise from the mid-nineteenth century onward indicates, the physical concept of noise originates in the context of late nineteenth and early twentieth century communication engineering. Notably, along with this changing concept of noise, the proliferation of musical noise practices occurred almost simultaneous to the invention and further development of technical media that transmit, record, store and reproduce physical sound. Given the close interconnection between music, media and the changing concept of noise, it seems no more than logical to assume that this contemporaneity of the proliferation of noise in musical practices and the development of technological sound reproduction is not entirely coincidental. On the basis

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4 For Helmholtz, Wittje explains, “the sensation of sound and the experience of music were interchangeable,” so the perceived periodicity of sound in contrast to the non-periodicity of noise always also implies the ideal of well-ordered music (2016: 10).
of this assumption, I suggest that a critical analysis of the role of noise in sound reproduction can provide the necessary conceptual groundwork for the revaluation of its role in music.

0.3 The noise of sound reproduction

This combination of noise, music and media brings me to the German tradition of media theory, in particular the work of media philosopher Friedrich Kittler. On the one hand, as media theorist Jussi Parikka writes, Kittler’s media theory and the traditions that followed in its wake “insisted that the ‘founding event’ of modern media is Claude Shannon’s and Warren Weaver’s mid-twentieth-century model of noise” (2011: 256). On the other hand, however, although it is clear that Kittler’s post-hermeneutic discourse analysis of technical media is highly influenced by Shannon’s redefinition of the relation between noise and information, this influence also means that German media theory, as Kittler explains in an interview with Rudolf Maresch in 1992,

[takes] noise [...] very serious. We do not just treat it as ‘the Other.’ We try to make truly differentiated statements about specific filterings of noise, not just dealing with the single command that forever abolished all noise to begin with, but with media- and time-specific selections that deal with noise to a greater or lesser extent (1992a).5

5 “Unsere Medientheorie [nehmt] das Rauschen […] sehr ernst. Wir nehmen es nicht einfach als „das Andere“. Wir versuchen wirklich differenzierte Aussagen über bestimmte Filterungen des Rauschens zu machen, also nicht den einen Befehl, der am Anfang alles Rauschen für immer abgeschafft hat, sondern medien- und zeitspezifische Selektionen anzugeben, die mehr oder minder das Rauschen bewältigen.” NB. Translations of otherwise not translated German sources are my own. The original is provided in the footnotes.
Kittler consistently situates the causes and effects of noise and signals—and the relation between the two—in the physical operations of media technological hardware. This materialist media specificity prevents the kind of conceptual slippage of analyses that apply the concept of noise, as Hainge puts it, “to everything and nothing at the same time” (2013: 8). By accounting for the fact that the mathematical reconceptualisation of the concept of noise in information theory originates in the conceptualisation of physical noise as random disturbances in transmission channels, Kittlerian media theory always approaches the issue of noise in the specific context of media technological processes. Following this media specific approach, I suggest that an analysis of the technological processes through which the specific noise of sound reproduction emerges enables a revaluation of the role of noise as a sonic phenomenon in music without sacrificing the conceptual agility of the concept of noise in information theory.

This noise of sound reproduction is what musicologist Stan Link calls “the noise of documentation and transduction” and encompasses all the ways in which the operations of technological sound reproduction affect, change and shape the physical characteristics of reproduced sound (2001: 34). Firstly, it refers to the physical noise (or random disturbances) that appears in electronic circuits and transmission channels, which can be conceptualised as communicational noise and sometimes, but certainly not always, manifests as sonic noise. Secondly, it is linear or non-linear distortion that does not qualify as physical noise because it is not random, but is still considered communicational noise and in some cases manifests as sonic noise as well. Lastly, it can even refer to interferences that do not qualify as random physical noise nor as non-random distortion but still register as communicational noise because they affect the transmission of the signal, even when they are not perceived as sonic noise.

From the earliest recordings onward, sound reproduction technologies have been confronted with the introduction of all these types of noise. As a consequence, inventors, sound engineers and musicians developed a refined sense for the many ways in which the noise of sound reproduction is both (and sometimes simultaneously) disturbing or harmful and enriching or desirable. The methodological step back from the
domain of music in favour of a media specific analysis of noise in the context of technological sound reproduction thereby establishes a conceptual middle ground between the sonic and the communicational concept of noise. More specifically, it allows for a conceptual reconfiguration of the relation between the sonic noise that is still of primary concern for questions regarding sound and music, the physical noise that appears in the channels and circuits of technical media and the communicational noise that was conceptualised in the context of information theory. Hence, this analytical approach offers a unique opportunity to develop a different, perspective on the concept of noise in general.

However, bringing this media technological reading of the role of noise back to the domain of music requires the development of a common conceptual frame in which the discourse on technical media and the discourse on sound and music can meet. Following media theoretician Berhard Siegert’s concept of “cultural techniques” as an extension of the media theoretical framework focusing on “operative chains that precede the media concepts they generate,” establishing such a conceptual common ground requires an even more radical detour toward the historical assessment and theoretical analysis of the mathematical and physical principles in which both the contemporary discourse on sound and music and the discourse on signal processing and technical media find their origin (2015a: 11).

This expansion of the analytical scope to include the assessment of the fundamental scientific framework that shaped the dominant discourse on sound, noise and media facilitates the jump back to the domain of music. Creating a conceptual connection between a media specific analysis of the noise of sound reproduction and the scientific discourse that supports the basic principles of the physics of sound paves the way for a more theoretical and metaphorical reading of the interaction between noise, music and media in the final stretch of this thesis. Ultimately, this theoretical conceptualisation of the role of noise in technological sound reproduction and its relation to the physics of sound enables the development of a more affirmative interpretation of the role of noise in
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contemporary musical practices and the way it resonates in the ears and brains of listeners.

0.4 Resonating noise between music and media

In order to properly identify the dominant discursive framework regarding the role of noise in technological sound reproduction, Chapter One opens with a historical overview spanning from the invention of Edison's phonograph to the advance of digital recording. Focussing on the interaction between the development of sound reproduction technologies and attempts to prevent, reduce or eliminate the noises and distortions they add to their output, this history traces the emergence of a persistent *myth of perfect fidelity* based on what sound scholar Jonathan Sterne in *The Audible Past* calls the ideal of a “vanishing mediator” (2003: 218). By assuming that the output of technological sound reproduction should ideally be identical to its input, this myth suggests that the noise of sound reproduction is the inherent enemy of all reproductive transparency, to be prevented, eliminated or maximally reduced at all times.

To develop a better understanding of the way this myth of perfect fidelity shapes the discourse on technological sound reproduction, Chapter Two consists of two case of technologies that explicitly confront the issue of noise in sound technology. Firstly, it deals with inventor Ray Dolby's analogue noise reduction systems of the 1960s, which are applied to actively reduce the noise of sound reproduction. Secondly, it analyses so-called 'dithering,' which is the deliberate addition of small amounts of noise to a digital recording in order to eliminate the effects of certain digital errors. Although these examples constitute seemingly contrasting attitudes toward the role of noise in sound reproduction, a detailed analysis of their operations shows how both the reduction of noise in analogue systems and its intentional addition to digital sound are ways to conceal limitations that are inherent to all forms of sound reproduction. Through this concealment, they uphold the suggestion of the ideal relation between input and output that supports the myth of perfect fidelity.

This analysis of the role of noise in sound reproduction and the myth of perfect fidelity in Chapter One and Two thereby shows how a
**conceptual logic of noise reduction** dominates the discourse on technological sound reproduction and perpetuates the discursive opposition between disturbing and disrupting noise and pure and clear music. Breaking with this conceptual logic of noise reduction, I introduce the alternative concept of the *noise resonance of sound reproduction* to reveal instead of conceal the effects caused by the structural limitations of technological sound reproduction. This concept thereby emphasises how the inevitable presence of noise indicates that the operations of sound reproduction technologies fundamentally affect and thereby change the sounds they (re)produce.

This development of this concept of noise resonance, however, requires a deeper understanding of the idealised relation between input and output suggested by the conceptual logic of noise reduction. This is why Chapter Three leaves the media specific analysis of sound reproduction technologies behind and traces the discursive origins of the ideal of infinitely precise, absolutely clear and completely noiseless reproduction that underpins the myth of perfect fidelity. It does so by focussing on what Kittler calls an early nineteenth century “method of calculation that paved the way not just for thermodynamics but also for all media of technological sound-catching, from Edison’s cylinder phonograph up to the music computers” (2013c: 171). This particular “method of calculation” is the symbolic representation of sound waves as a series of singular frequencies by so-called ‘Fourier analysis,’ including the concept of the ‘sine wave’ as the representational figure for such a singular frequency—often interpreted as the basic element of sound.

The historical and conceptual assessment of Fourier analysis in Chapter Three shows how the representation of sound as a series of clear sine waves can be conceived as an entirely periodic and therefore essentially noiseless idealisation of a sonic event. It also shows, however, that this removal of randomness and contingency mathematically requires the symbolic removal of any sense of the temporal duration of a sound signal. Hence, although Fourier analysis is able to symbolically represent completely noiseless sound spectra, the technological reproduction of sound remains inherently limited by the fact that physical sounds extend in space and develop over time. Because this development over time
introduces small amounts of contingency, randomness, transience and, indeed, noise, physical reproductions by technical media can never achieve the pure, noiseless representational clarity of Fourier analysis. Chapter Three thereby shows how, on the one hand, the conceptual logic of noise reduction is predicated on the representational clarity of Fourier analysis, whereas, on the other hand, the noise resonance of sound reproduction is based on a structural relation between the presence of noise and the temporality of sound.

After this analysis of the mathematical and physical principles underlying the symbolic representation and technological reproduction of sound, the argument could return to the media specific analysis conducted in Chapter One and Two, thereby taking up the kind of media archaeological assessment of sound, audio technology and the temporality of technical media developed by German media theorist Wolfgang Ernst. In this work, Ernst argues for the strict epistemological separation between on the one hand analyses that deal with the way human beings try to make sense of the output of technical media, and on the other hand, a type of fundamentally a-historical media archaeology that analyses the operations of technical media without taking this human agency and historicity into account. Because their operations take place on entirely different temporal levels altogether, Ernst argues, the post-human logic of technical media structurally undercuts or surpasses human physiological senses. This is why, for Ernst, their symbolic signification is no longer concerned with human sense-making at all.6

However, contrary to Ernst’s post-humanist interpretation of

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6 This thesis is developed throughout most of Ernst’s more recent work, most extensively in Chronopoetik: Zeitwesen und Zeitgaben Technischer Medien and Gleichursprünglichkeit. Zeitwesen und Zeitgegebenheit von Medien (2012a; 2012b). More specifically related to sound media, the argument is put forward in Im Medium Erklingt die Zeit and Sonic Time Machines. Explicit Sound, Sirenico Voices, and Implicit Sonicity (2015; 2016). Regarding the difference between human, culturally conditioned ‘listening’ and the media archaeological study of technical signals outside of this cultural context, he writes in the latter: “If the communicational approach to sound focuses on listening as cultural interpretation […], the media-archaeological understanding assumes an interlaced option. It concentrates neither on the socio-historical, nor the bare psychoacoustic level but on the epistemological dimension that is embedded in sonic articulation. As a result, the study of the sonic signal event can refrain from immediate cultural contextualization without being reduced to mere physical acoustics” (2016: 45).
technical media, the analyses put forward in Chapter One and Two intend to open up an analytical space that connects the communicational concept of noise dominant in Ernst’s, but also Kittler’s, type of media theory with questions regarding the role of noise as a sonic phenomenon in the context of music. This is why Chapter Four consist of a more metaphorical investigation of the way that the suggested relation between the presence of noise and the temporality of sound might contribute to how technologically (re)produced sound makes sense for human listeners. Because the analytical clarity and purity represented by Fourier analysis cannot be achieve by technical media, any process of technological sound reproduction will, as Shannon proved as well, introduce a certain amount of noise and randomness to the signal. Contrary to the ideal filter of Fourier analysis, the physical filtering operations of technical media affect and change the specific sonic characteristics of their output. By combining the analysis of the structural limitations of technological sound reproduction in Chapter Two with the relation between noise and temporality suggested in Chapter Three, Chapter Four argues that the noise of technological sound reproduction simultaneously resonates with our sense of pastness and finitude and our sense of presence in the here and now.

Finally, completing the revaluation of the role of noise in sound reproduction and bringing it back to where it originally started—the domain of music—Chapter Five puts forward a primary logic of filtering as an alternative for the idealised relationship between input and output presupposed by the conceptual logic of noise reduction. Similar to how the conceptual logic of noise reduction underpins the myth of perfect fidelity, I suggest this logic of filtering supports the noise resonance of sound reproduction. It emphases how every technical filter in the recording and reproduction chain between sender and receiver shapes the output of technological sound (re)production in specific ways. This specific impact of fundamental filtering operations on the sound of technologically produced music, I claim, produces what Kittler calls an ‘other music.’

Although by the time of his death in October 2011 he had already published the two parts of the first volume of his planned tetralogy called Musik und Mathematik, the importance of music in Kittler’s work is often overlooked (2006b). Nonetheless, music is an infrequent but persistent
theme throughout his oeuvre; and exactly the decisive role of noise connects his writings on music with his more famous work on technical media. In “Musik als Medium” in 1995, Kittler wrote: “in the nameless name of noise, an other music must [...] be invented—a music, the power of which is no longer derived from its relation to the medium of speech and its ‘meaningfulness’: pure media technology, pure control flow” (1995a: 99). More than ten years earlier, in “The God of Ears,” Kittler already suggested that this ‘other music’ will ultimately triumph (2015a: 12). In a way, my development of the concept of the noise resonance of sound reproduction should therefore be regarded as an attempt to further Kittler’s intriguing but undertheorised concept of the ‘other music’—the music of the media age.

Following Kittler’s assertion that “media studies [...] only make sense when media make senses,” I argue that in the age of technical media, studying music only makes sense when sound media make senses. The issue of the role of noise in sound reproduction, the role of all the disturbances, distortions, disruptions and interferences that cling to a signal during its transmission from sender to receiver, exactly touches upon the question how sounds produced by technical media continue to make musical senses (2006c: 55). I suggest that the sound of what Kittler calls the ‘other music,’ produced by technological filtering operations that fundamentally escape our analytical grasp, resonates with human listeners not despite but because of the inevitable noise of sound reproduction. Ultimately, I claim, this noise is not a transgressive disruption or subversive by-effect of sound reproduction technologies. By continuously affecting, changing and shaping the acoustic appearance of the world around us, it constitutes the very essence of the ‘other music’ of the media age. Besides an assessment of the role of noise in music, this thesis can therefore also be read as a more general account of the impact of technical media on the sound of music in the media age.

7 “Im Namenlosen Namen des Rauschens muß folglich eine andere Musik erfunden werden—eine Musik, deren Macht keinen Anleihen beim Medium Sprache und seinen “Bedeutsamkeiten” mehr macht: reine Medientechnik, reine befehlsfluß.”