UNIVERSIDADE
LUSÓFONA

CENTRO UNIVERSITÁRIO DE LISBOA

Escola de Comunicação, Arquitetura, Artes e Tecnologias da Informação

Mestrado em Produção e Tecnologias do Som

SONIC MATERIALISM vs AUDITORY CULTURE.

IS THERE (STILL) A PLACE FOR SONIC MATTER IN AUDITORY CULTURE?

Dissertação apresentada a provas públicas para a obtenção do grau de Mestre em Produção e Tecnologias do Som, orientada pelo Professor Doutor João Manuel Marques Carrilho.

Ricardo Nuno Oliveira de Sousa, nº 22100556

2024

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VERSÃO FINAL

Dissertação defendida em provas públicas na Universidade Lusófona, Centro Universitário de Lisboa no dia 7/3/2025, perante o júri, nomeado pelo Despacho de Nomeação n.º: 155/2025, de 13 de Fevereiro de 2025, com a seguinte composição:

Presidente: Prof. Doutor José Manuel de Figueiredo Gomes Pinto,

Arguente: Prof.ª Doutora Paula Gomes Ribeiro (Universidade Nova de Lisboa)

Orientador: Prof. Doutor João Manuel Marques Carrilho.

Este trabalho também foi orientado pelo Prof. Doutor Luís Cláudio Ribeiro

Ricardo Nuno Oliveira de Sousa, nº 22100556

2024

The Cat only grinned when it saw Alice. It looked good-natured, she thought: still it had *very* long claws and a great many teeth, so she felt that it ought to be treated with respect.

'Cheshire-Puss,' she began, rather timidly, as she did not at all know whether it would like the name: however, it only grinned a little wider. 'Come, it's pleased so far,' thought Alice, and she went on. 'Would you tell me, please, which way I ought to go from here?'

'That depends a good deal on where you want to get to,' said the Cat.

'I don't much care where ——— ' said Alice.

'Then it doesn't matter which way you go,' said the Cat.

'——so long as I get *somewhere*,' Alice added as an explanation.

'Oh, you're sure to do that,' said the Cat, 'if you only walk long enough.'

Lewis Carrol, *Alice in Wonderland*

À minha filha e aos meus pais, que me ligam ao mundo.

Agradecimentos

Aos meus pais, a quem devo tudo.

À minha filha, que comigo navega altos e baixos, frustrações e alegrias.

Ao Professor Doutor João Carrilho, presente desde o momento em que surgiram as primeiras ideias, constante na orientação, encorajamento e confiança, a quem deixo uma palavra especial de gratidão pelas partilhas e passos dados em conjunto. Igualmente agradeço ao Professor Doutor Luís Cláudio Ribeiro, pelas várias contribuições incisivas e importantes para o foco e concisão do trabalho.

Aos professores, colegas, amigos e exploradores do real e do imaginário com quem me cruzei ao longo da vida que têm o talento, a graça e a coragem de continuar a saber cultivar a curiosidade.

Obrigado.

Resumo

Esta tese explora as tensões entre o materialismo sónico e a cultura auditiva, questionando o significado das concepções ontológicas do som no seu estudo contemporâneo. Salienta a dupla identidade do som como fenómeno físico e experiência culturalmente mediada e aborda a problemática da sua definição enquanto objeto de estudo.

Ao examinar debates filosóficos em torno de interpretações fisicalistas e fenomenológicas do som, a investigação sublinha as nuances entre as perspetivas objetivas e as perceções subjetivas. Explora também os fundamentos filosóficos do materialismo sónico, o papel do afeto aural na formação da ressonância emocional e social, bem como a integração da cognição incorporada na compreensão do impacto do som na experiência humana.

Ao criticar as hierarquias sensoriais que privilegiam as epistemologias visuais, o trabalho propõe uma redefinição do 'pensamento sónico' como abordagem de investigação e interpretação que une as dimensões materiais, perceptivas e incorporadas do som. Pela reflexão crítica e consideração da natureza interdisciplinar do seu estudo, o som é posicionado como uma força cultural e uma ferramenta epistemológica vital. O potencial transformador dos estudos do som para remodelar a investigação nas ciências humanas é realçado, gerando novas perspetivas sobre a interação entre materialidade, perceção e significado num mundo cada vez mais mediado e saturado de som.

Palavras-chave: Estudos do Som, Materialismo Sónico, Cultura Auditiva, Cognição Corporizada, Pensamento Sónico.

Abstract

This thesis explores the tensions between sonic materialism and auditory culture, questioning the significance of ontological conceptions of sound within its contemporary study. It foregrounds sound's dual identity as a physical phenomenon and a culturally mediated experience and addresses its problematic definition as an object of study.

By examining philosophical debates surrounding physicalist and phenomenological interpretations of sound, the investigation underlines the strains between objective perspectives and subjective perceptions. It also explores the philosophical foundations of sonic materialism, the role of aural affect in shaping emotional and social resonance, as well as the integration of embodied cognition in understanding the impact of sound on human experience.

Critiquing sensory hierarchies that privilege visual epistemologies, the work proposes a redefinition of 'sonic thinking' as a framework for research and interpretation that bridges the material, perceptual and embodied dimensions of sound. Through critical reflection and consideration of the interdisciplinary nature of its study, sound is positioned as both a cultural force and a vital epistemological tool. The transformative potential of sound studies to reshape research in the humanities is emphasised, generating new perspectives on the interplay between materiality, perception, and meaning in an increasingly mediated and sound-saturated world.

Keywords: Sound Studies, Sonic Materialism, Auditory Culture, Embodied Cognition, Sonic Thinking

Abreviaturas e símbolos

- AI – Artificial Intelligence
- CCT – Contemporary Cultural Theory
- CCTM - Classical Computationalist Theory of Mind
- CLT – Construal Level Theory
- EMP - Embodied Mind Philosophy
- OOO – Object Oriented Ontology
- SMPA – Sense-Model-Plan-Act
- S&TS – Science and Technology Studies

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I. THE PROBLEM AND ITS BACKGROUND

I.1. Introduction

The processes through which a sequence of changes in air pressure values is detected by the human auditory system and transformed into a conscious experience that is pregnant with meaning, deep emotions, immense affective potential, decoded into language, and made sense of is a mysterious and fascinating phenomenon. Although sound has already been extensively studied and approached from many angles, the way its powers are interpreted and understood remains ambiguous and far from complete. How is it decoded by the nervous system? How is it interpreted by our cognitive processes? Why does it have emotive power? Why are these affective processes and effects translated in similar ways in most individuals? How do we make sense of it? How do we produce meaning from it? What role do culture and environment play? The questions are many, if not endless.

The complex nature of sound as a scientific and perceptual phenomenon remains unresolved. Still not entirely rationalised, sound exists in a liminal space bounded by measurable physics and ineffable human experience, in which a paradoxical dichotomy emerges between the objective quantification pursued by science and the irreducible subjectivity of consciousness. The qualia of sound remain scientifically unexplained, contained within the frontiers of the mind, and yet to be confronted by contemporary science. Conversely, the pressure waves described by the physicist cannot capture the profound mystery of auditory perception. The essence of sound lies in an unresolvable tension between physical reality and the conscious perception that arises from it (Carrilho, 2019, pp.195-196).

Even if the ripples of its phenomenological complexity and affective power permeate many aspects of human life, transcending mere auditory perception and weaving themselves into our social, cultural, and emotional fabrics, the study of sound has long been situated in the periphery of the academic and cultural landscape. Despite its significance, sound has historically been associated with subjectivity and emotion and relegated to a secondary status, frequently overshadowed by objectivity and rationality-focused visual paradigms, often privileged as more direct or reliable conveyors of meaning in the arts and sciences.

Nevertheless, the field of Sound Studies has gradually emerged as a vigorous interdisciplinary endeavour that has, in its globality, attempted to address the mosaic of sound's

complexities while considering its role as both a perceptual phenomenon and a cultural construct. However, notwithstanding its rapid growth, it remains an evolving discipline still seeking to clarify fundamental questions—both about its scope and focus as a research domain and about the place of the sonic in human experience, production of knowledge, and socio-cultural structures. Despite this, sound studies' pertinence as a potential instigator and facilitator of repositioning sound at the core of humanistic inquiry has grown significantly between technological shifts and evolving cultural perspectives on sensory experiences. As sonic discourse becomes increasingly central in amid the overwhelming proliferation of digital media and technology in everyday life, understanding its material, social, and ontological dimensions proves to be increasingly relevant and even necessary.

At the same time, cultural studies have undergone an auditory turn accompanied by a rebalancing of the relevance attributed to abstract reasoning in favour of embodied experience, a notion that has resonated with contemporary academic thought. In this context, several perspectives have emerged in the attempt to map the intersections between sound's materiality and its perceptual impact on human experience. This process has been marked by a fundamental divide which has been the source of extensive discussion in the field. The argument focuses on the dualities that emerge when investigating sound as either an objective phenomenon or a subjective experience. This analysis leads to the identification of the philosophical implications that arise from each standpoint. Essentially: can ontological existence be attributed to sound independently of perception, or should it be understood within the boundaries of its phenomenological manifestation in auditory experience? This context has established a unique pathway for investigating sound's capacity as a meaning architect, affects carrier, and challenger of visual-centric modes of knowledge production.

In this scenario, this thesis explores the existing tensions between the current conceptualisations of sonic materialism in sound studies and the counterarguments that challenge their validity and applicability within the present understanding of auditory culture. The central question is therefore stated: "Is there (still) a place for sonic matter in auditory culture?" Its primary purpose is to induce a reflexive process and critical examination of the strains between physical and experiential conceptions of sound—from vibrations in a medium to emergent perceptions shaped by embodied cognition and acoustic ecology—, materialist philosophical perspectives on the sonic, and how sound simultaneously functions as an entity of cultural significance.

More than reaching definitive conclusions, the aim is to draft a problematic-defining conceptual map while simultaneously seeking progress in disclosing the processes through which sound operates not only as a physical phenomenon but also as a conduit for cultural meaning and affect. Examining sound's material, perceptual and affective dimensions allows for deepening the understanding of its roles. It reveals how sound contributes to the modelling and conditioning of human cognition and emotional experience and foregrounds its significance in relational processes in sonic and media arts and, more broadly, in culture and communication. Moreover, by investigating the relevance of both realist and phenomenological conceptualizations of *sonic matter* in contemporary debates against the backdrop of a visually dominated cultural landscape, this argumentation seeks to counteract the established hierarchy of the senses, repositioning sound as a central object of enquiry.

The planned methodology is based on principles of qualitative research, which integrate an analysis of the issues under investigation. A synthesis of the relevant theoretical concepts is undertaken to characterise the discussion across its different dimensions. The approach is multifaceted, and supported by the interpretation, correlation, and application of concepts derived from the literature, as well as by the study, contextualisation, and characterisation of empirical, philosophical and artistic perspectives. This is followed by a critical examination of counterarguments.

Considering these general guidelines, the text is then structured into three main sections:

1. Knowledge and Meaning Production in Sound Studies and Auditory Culture

   The section initially contextualises the historical emergence of sound studies as an academic discipline while emphasising the difficulties in defining and positioning sound as a legitimate object of study. It discusses the interdisciplinary nature and inherent complexities of the field and the challenge of interpreting sound's ontology and materiality taking into account its physical, perceptual, and cultural dimensions. Drawing on Sterne, Kahn, and Lavender's research, the analysis explores the evolving theoretical and methodological dynamics of the domain.

   Following this overview, the discussion reflects on scientific and philosophical debates that surround different definitions of sound. The frameworks presented refer to multiple dimensions: physical vibration, phenomenological experience, non-cochlearity, and emergent perception shaped by cognitive and embodied processes. Research by Gaver, Pasnau, O'Callaghan, Scruton, and Riddoch is cited.

The analysis then explores the role of sound in cognition and meaning-making, examining the longstanding tensions between Cartesian dualistic thinking and more holistic models of embodied cognition and their continued influence on our understanding of sonic phenomena. This exploration is centred on Grimshaw and Garner's interpretation and proposed perceptual model of embodied acoustic ecology.

2. Sonic Materialism vs. Auditory Culture

   Building on the notions explored in the previous section, a consideration of the philosophical and theoretical tensions between the two frameworks is presented. Considering Sterne, Campbell and Lavender's views, the debate centres on whether sound possesses an independent ontological status or is inherently tied to perception and cultural meaning-making. Where sound is imbued with ontological irreducibility, Deleuze's ideas are introduced as a potential pathway to transcend the limitations of discursive, symbolic, and representational strategies in research.

   Influential writings, including the materialist perspectives of Goodman, Hainge, Cox, and Voegelin are analysed, exploring notions of vibration, non-representational modes of understanding, and conceptualisations of phenomenological sonic matter within the broader framework of affect theory. The role of affect is emphasised, and the interaction of sound's materiality with human emotions and subjective experiences is examined, mainly considering the views of Deleuze & Guattari and Thompson & Biddle.

   Additionally, the perspectives introduced are subject to critique by Kane, Schrimshaw, Goh, and Thompson, and the subsequent reply by Cox, followed by Campbell's counterpoint. In this context, their limitations are identified, and trajectories are proposed to reconcile differences and empower the discourse.

   The argument is centred on the interaction between sound's material and perceptual dimensions and on interpreting its operation and conceptualisation as an ontologically independent entity and a cultural force within contemporary sensory and philosophical frameworks.

3. Sonic Thinking | On Sound as an Object of Study

   The section summarises critical insights from earlier chapters in relation to the main research question and examines their implications for sound studies. It also underlines the challenges encountered during the investigation and underscores their significance for the vitality and significance of the field.

‘Sonic Thinking’ is then presented as a broad methodological framework that transcends traditional academic boundaries, treating sound as both an object of enquiry and an investigation tool while opening perspectives for possible unexplored future directions and advancement of research.

Holger Schulze reimagines sound studies proposing a multidimensional approach that emphasises embodied, spatial, and imaginative dimensions of auditory experience; he argues for understanding sound as a dynamic, context-rich phenomenon that extends beyond logocentric analysis. In parallel, Bernd Herzogenrath proposes a radical reconceptualization of sonic thinking that challenges visual-centric Western epistemology by presenting sound as a vital form of knowledge and interaction with the real. The sonic is positioned at the intersection of philosophy, art, and science as a cornerstone of interdisciplinary exploration where artistic practice is treated as a legitimate mode of research. This perspective emphasises embodied cognition, viewing sound and artistic production as integral processes of understanding reality that capture its fluidity and complexity.

Both approaches are introduced as potential facilitators of a reshaping of knowledge production processes and disruptors of sensory hierarchies. Sound studies is hence situated as a vibrant and evolving field of study with transformative potential in understanding the human experience and its positioning within culture and media.

This structure aims to position sound as a vital element in knowledge production by examining its function and relevance in human perception and culture. To increase awareness and deepen our understanding of sound's materiality, cultural influence, and critical function in shaping the human condition.

The text reflects the guidelines of the APA norm in its 7th edition.

II. ARGUMENT AND DISCUSSION

II.1. Knowledge and Meaning Production in Sound Studies and Auditory Culture

II.1.1 A Still Elusive Endeavour

The study of sound has long been considered an emerging field in a continuous—albeit prone to perennial incompletion—emergence process, perhaps not deemed relevant to enough people in enough disciplines to justify and declare a consolidation of its study. Perpetually subordinated to the dominance of the visual, linked with emotions and subjectivity in contrast to the objectivity and rationality of sight and perceived as somehow more innate and less construed or elaborated as a means of conveying information — essentially, fundamentally subordinate to our connection or relationship with the world and to prevailing or dominant methods of comprehending it (Hilmes, 2005, p. 249). However, and perhaps somewhat surprisingly, given how seldom it is mentioned, sound is positioned at the crucial nexus of nature and culture.

> *"(...) "history of sound" already embodies a hard-to-grasp but necessary paradox of nature and culture (...). At its core, the phenomenon of sound and the history of sound rest at the in-between point of culture and nature." (Sterne, 2003, p. 10)*

The delineation of the domain of investigation is not typically an obstacle encountered by historians, anthropologists, geographers, musicologists, and media academics, as their areas of study are generally well-understood and comprehended within and beyond the academic community. However, when it comes to sound-related study, possible—and probable—nebulosities arise from the inherently multidisciplinary nature of the subject matter and the varied significances that sound assumes in the interests of a diverse array of scholars who focus on the auditory realm. These, including ethnomusicologists, geographers, sociologists, literary, urban and media theorists, are united primarily by a keen interest in sound, whether as a central focus of their research or as a significant component of it. This manifold and innately interdisciplinary aspect of enquiry and investigative focus on the auditory has been consolidated under the term 'sound studies' (Bull, 2019, p. xviii) in what is, to this day, a dynamic, continuous, and still ongoing coalescence.

Despite the recent rapid growth of the field, it is still a relatively new domain in rapid transition culturally, methodologically, and theoretically. As with numerous disciplines still in their nascent stages, accurately determining their defining terms' precise origins and initial

utilisation can pose considerable challenges. We can, in any way, try to situate ourselves and refer to some especially relevant aspects and authors who have contributed to the maturing process of this area of study.

Once upon a time, before the advent of sound reproduction technologies, *"sound existed only as it went out of existence"* (Sterne, 2003, p. 1), an ephemeral shadow of itself as it appeared and immediately dissipated into corpuscularity. After an eternity of impermanence, the character and finitude of this fleeting existence were only altered by the arrival of technological advances which gave rise to phonographs, then telegraphs, telephones, and radios. Suddenly, time and space were no longer the guillotines of aural propagation. Voices were unbound from bodies and the sense of hearing turned into a time machine and a receptor of lightspeed aural probes as sound arrived from the past and instantaneously from beyond the horizon.

Even if still relying on old forms of transport to move sounds over great distances, the advent of phonography played a pivotal role in fostering a proliferation of profound contemplation about sound and nurturing the development of auditory imagination. For the first time, under the aegis of the audio recording, the possibility of invoking voices both present and past arose, as if re-presenting a phantom, articulating a promise of the conquest of mortality (Hubert Greusel[1], as cited in Dyson, 2009, p. 47). Through this summoning of a presence from other times and places into the setting of the hearing moment and the merging of that atmosphere in the present with the three-dimensional, existential, and apparent ontological presence of the preserved voice or melody, the recording could, paradoxically, *"take the sting out of death by emanating death;"* (Dyson, 2009, p. 47).

Though the photograph's authenticity in representing reality had been questioned, the recording appeared to circumvent the negative connotations associated with technological mediation. Thomas Edison asserted in 1878 that the stylus had the capability to recreate or replicate sound waves, ensuring that no crucial properties were lost in reproducing the auditory sensation as though emanating from the initial origin. The immersive nature of sound, its three-dimensionality, established a precedent at that time for the functional transparency of the technological apparatus in audio production, supporting the notion that three-dimensionality superseded the aspect of mediation, thus generating *"a space that is beyond technology and culture"* (ibidem).

[1] Edison's biographer.

The phonograph fundamentally changed the auditory landscape and marked the beginning of the use of sound as a tool for historical memory. Early phonographic technologies evolved from instruments designed to aid the hearing impaired to devices central to industrial applications and cultural preservation. Their role expanded rapidly, evolving into commercial and creative products that redefined modes of communication, sound production and music consumption (Ribeiro, 2021, pp.95-97). As both a scientific tool and a driver of the entertainment industry, its dual purpose underscores phonography's foundational role in shaping modern auditory culture.

Telephony, however, marked a novel era in sound, encompassing more than mere conversation (Kahn, 2013, p. 3). In its wake, our collective desire for connection, cooperation and intimacy manifested a euphony of signals driven by the electrons pulsating through the wires and cables that carried the cadences of human expression. The telephone, along with its integrated technological system, possessed an unparalleled capability to convert minuscule quantities of energy into audible sound due to, at its heart, the microphone, a humble device, which in this process becomes an oracle, a lens, not just for the audible, but a portal to the nuances of human emotion, a carrier of knowledge, a bridge between the seen and the unseen, capturing the echoes of the human soul.

Its venal paths, the wires, once mere conduits, metamorphose into antennas[2] resonating with larger energetic environments, both atmospheric and underground, sensing earth currents and reaching towards the cosmos, capturing not only the mundane chatter of human voices but also the supraterrestrial whispers that traverse the expanses of the universe. In this, they[3] transcend their mundane roles, becoming nexuses not only of human discourse but also channels for communion with the sidereal symphony. Listening to the ether thus becomes an act of unity, an endeavour where the human spirit aligns itself with the celestial vibrations. In the silence between words and the pauses within breaths, the astral rhythms can be discerned, a heartbeat echoing through the interconnected yarns of existence. In this telephonic dance with the firmament, humanity transcends its terrestrial confines, touching the sublime essence that permeates the universe.

[2] In a process Kahn calls *inductive radio*. Furthermore, he coined the term *Aelectrosonic* to denominate sounds created by natural electromagnetic activity which were granted musical and aesthetic status, in the same way of *Aeolian* sounds that were produced by wind.

[3] The wires.

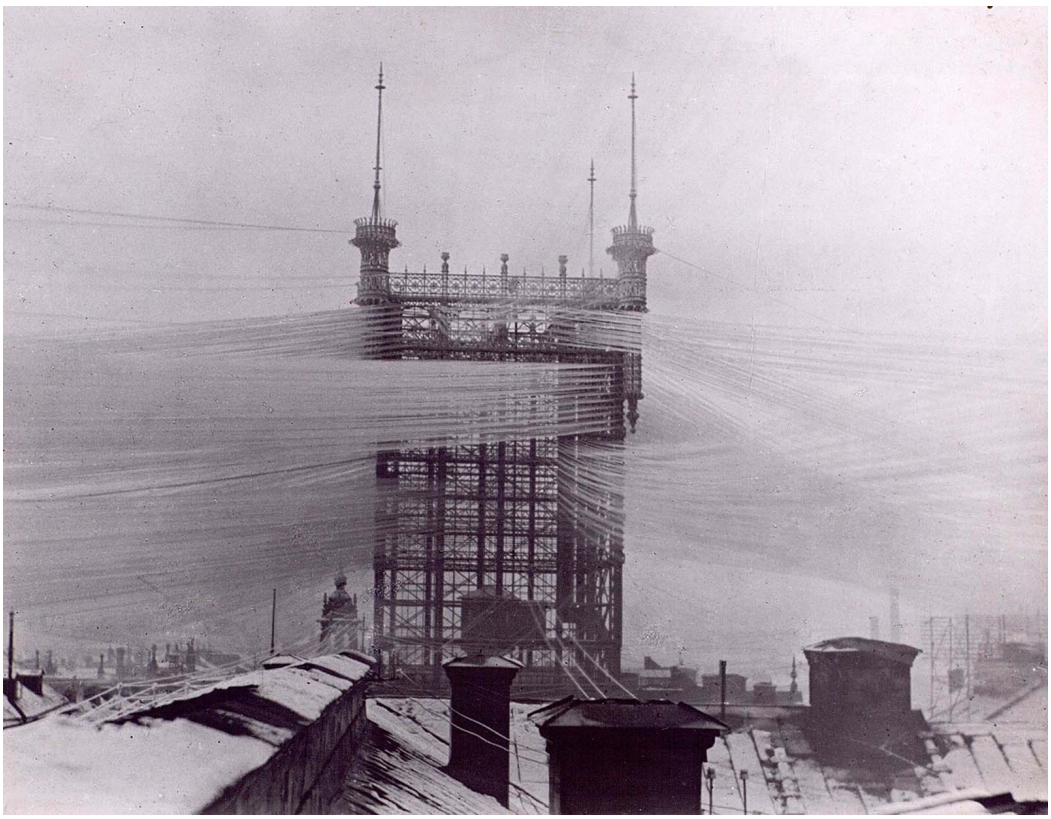

Figure 1. The old "Telefontornet" telephone tower in Stockholm, Sweden, with approximately 5500 telephone lines c. 1809.

The engagement with the electromagnetic cosmos by way of the aural dimensions of natural radio may even, already then, have been experienced aesthetically, if not by telephone operators or radio scientists, perhaps by naturalists, more prone to associating these novel sounds with those present in the natural world, far from the then dominant musical institutions and discourses (ibid, p.4). This type of aesthetical experience of environmental sounds was not new then and can be read as early as in the writings of Henry David Thoreau and other naturalists (ibid, p. 7), in a form that, seen from the perspective of the present day, resembles the conceptualization, already at the time, of a proto-sound-object[4], as well as the use of natural radio as an element in the production of artworks.

The development of a plausible yet inconspicuous interface between reality and artifice, the real and the replicated, has, to this day, remained a consistent focus of media technology. Like a divine communication conduit, it has been essential to create—and subsequently disavow—a mechanism that *"channels, delimits, transduces, and sanitizes"* (Dyson, 2009, p. 47) the materiality it conveys. These interfaces, articulations between media boundaries and

[4] A notion that will be introduced and revisited in this text.

couplings, encompass both technical and conceptual elements — comprising of cables, circuits, switches, and so on, as well as transcendent realms like the ether, the universe, or the fundamental vibration, to which the technical frameworks and infrastructures are conceptually attached, and through which the presence of technology is veiled. In aural discourses, the technical and conceptual connections facilitate a closeness between sound, listener, and technology that blends the origin and its technical replication (ibidem).

It was precisely the technological possibility made available by sound recording that constituted the key for opening an ontological domain until then limited by conceptions of visual and linguistic representation. Friedrich Kittler alleged that recorded sound gave access to *"the perceptible plenitude of matter that underlies all representation, a material core that is not a fundament but a primordial flux out of which all signals and signs emerge and into which they inevitably recede."*[5] (Cox, 2018, p. 3). Central in the construction of sonic ontologies, this reasoning will be readdressed further in this text.

II.1.1.1 Turning to the sonic

This transformative period of intellectual growth unfolded during the latter half of the 1870s and, together with the uproar of modernity that transpired throughout the whole of the nineteenth century, had a profound impact on the social and cultural world from which these technologies materialized, manifesting extensive changes in the fundamental nature of sound, human hearing, and its listening practices, paradigms and conceptualisations (Sterne, 2003, p. 2). Even earlier, in the middle of the eighteenth century, sound itself had become an object and a domain of thought and practice instead of being conceived and instantiated within the cases of voice and music, as had been the case until then. From then on, hearing was gradually remodelled as a physiological process based on physics, biology, and mechanics. Auditory perception was enhanced in the service of science and rationality. Steadily and consistently, sound, hearing, and listening were reimagined, objectified, commodified, and industrialised up to the present, where they have become foundational to modern modes of knowledge, culture, and social organisation (ibidem).

As an interdisciplinary academic field, sound studies began to unfold in the latter part of the 20th century, driven by a cultural movement of musicians, composers, sound artists,

[5] In Cox's interpretation Kittler is referring to the Lacanian "Real".

scholars, and attentive listeners focused on and receptive to the creative potential of auditory content through sound recording, playback, and transmission. This generated a field of enquiry spearheaded by anthropologists, musicologists, historians, and cultural theorists who focused on sound as a cultural and temporal difference marker while attempting to examine its cultural, historical, philosophical, and social implications (Cox & Warner, 2017, p. 16). In parallel, throughout the century, avant-garde musicians, artists, and writers addressed these shifts in sonic culture and used them as the foundation for wide-ranging philosophical reflections. Writers addressing sound in philosophy, aesthetics and design similarly signalled historical change to reason their sonic interests. Music scholars also focused on sound and technology to grasp the immense cultural changes in that period (Sterne, 2012, p. 3). Simultaneously, sound art emerged as a significant area of creative endeavour, showcased at major global museums and galleries. At the same time, other formerly marginal sonic and auditory explorers like Luigi Russolo, John Cage, Pierre Schaeffer, Pauline Oliveros, R. Murray Schafer, Maryanne Amacher or Éliane Radigue are now recognized as ancestors and influences by a remarkable number and variety of musicians and producers working outside the borders of classical, jazz, rock, and dance music (Cox & Warner, 2017, p. 16).

Although the precise term ‘sound studies' may not have been widely employed until more recently, several literary and scholarly works have explored the significance of sound in diverse contexts, and in this process, translated, documented, analysed, and, in parallel with artists, creators and other social actors, established the foundations of what is now considered in its globality an *auditory turn*[6] in contemporary culture. Reflecting in their whole the increased significance of audio culture as a simultaneous site for analysis and medium for aesthetic engagement, these early works are examples that established the framework for developing sound studies as a distinct area of investigation (Ikoniadou, 2017, p. 252). Nonetheless, the official establishment of sound studies as a recognized academic discipline is a more recent phenomenon, and the field continues to evolve with contributions from scholars in various areas, including cultural studies, musicology, anthropology, and communication studies. However, a precise domain characterisation has not been easy to achieve.

> *“(...) ambiguity extends on down to the name for the field. Is it sound studies or the study of sound culture, sonic culture, auditory culture or aural culture?” (Sterne, 2012, p. 3)*

[6] Considered to have occurred since the mid 00’s.

Referring to the introduction to the first edition of the anthology *"The Auditory Culture Reader"* (Bull & Back, 2003) by Michael Bull and Les Back, Grimshaw-Aagaard (2019, p. 17) alludes to the implicit concession by Bull and Back that there was, at the time, still no clear definition of sound studies as a discipline, as the authors express their aspiration for the anthology's chapters to collectively present a cohesive and comprehensive representation of the ideal trajectory and scope of *"what sound studies should look like."* The anthology further demonstrates that, regardless of what the term 'sound studies' should encompass, it does not solely focus on the study of sound itself, being instead more appropriately characterized as 'auditory culture', as indicated by the title of the anthology, and made evident through the diverse range of contributions that explore various subjects such as listening practices and the role and significance of sound in culture and society. In this same context, Grimshaw-Aagaard refers to what was, according to his knowledge, the first concise explanation of the field of sound studies, constituting what is, in his understanding, the initial articulation of its kind, presented within the pages of *Social Studies in Science* in 2004 by Trevor Pinch and Karin Bijsterveld:

> *"Sound Studies is an emerging interdisciplinary area that studies the material production and consumption of music, sound, noise, and silence, and how these have changed throughout history and within different societies". (Pinch & Bijsterveld 2004, p. 636).*

This initial definition reflects Pinch and Bijsterveld's acknowledgement of the difficulties faced by scholars of different disciplines[7] when addressing issues in the field of new technologies and music. While working[8] on some aspect[9] of what Pinch and Bijsterveld themselves name *'auditory culture'*[10], the scholars involved agreed on the inadequacy of their standard respective disciplinary approaches when used in isolation, after facing topics that "*seemed impossibly large and complex with very little known"* and realizing that *"areas of music technology and vast areas of listener experience remain completely uncharted"* (ibidem).

Sound studies' development took place due to shifts in culture and technology but also because of modifications to how disciplines are structured and how ideas are held. Like visual

[7] Ethnomusicology, history, anthropology, cultural studies, sociology, and S&TS.

[8] Specifically, in an international workshop named *"Sound Matters: New Technologies in Music"*, held at the University of Maastricht, the Netherlands, in November 2002.

[9] Namely technological innovations in the production and consumption of music that included new instruments, new means of manipulating and controlling sound in the studio and new forms of technologically mediated listening.

[10] In what seems already like an echo of Bull and Back's previous use of the term.

and material culture research, the field bloomed when scholars in diverse disciplines recognized the interconnectedness of their work, understanding that a singular approach to sound is insufficient, prompting interdisciplinary collaboration for a comprehensive exploration of auditory experiences (Sterne, 2012, p. 3). This convergence of various academic fields generates a diverse array of topics of intellectual investigation whose importance and relevance are dependent and fundamentally linked to the diversity of the auditory experience.

In essence, defined by Jonathan Sterne as *"a name for the interdisciplinary ferment in the human sciences that takes sound as its analytical point of departure or arrival"* (Sterne, 2012, p. 2), sound studies constitutes a multifaceted domain of investigation that incorporates the scrutiny and analysis of the functions of sound, both as an auditory phenomenon and as a cultural, societal, and historical construct. In this, the complex nature of sound is investigated, considering its creation, transmission, reception, and interpretation, whilst also contemplating its ramifications and impact on various facets of human experience. Drawing upon a diverse range of disciplines such as musicology, anthropology, sociology, cultural studies, and media and communication studies, it explores how sound shapes and is influenced by cultural, technological, and socio-political contexts.

Examining a wide range of subjects from sound's aesthetics and semiotics to sound's influence on identity, power structures, and collective memory, this field frequently integrates theoretical frameworks that tackle issues about aurality, sonic ecologies, acoustemology[11], and the politics of listening. Also, by, and in addition to, its breadth and diversity, the study of sound generates a plethora of theoretical, methodological, and cultural quandaries involving ethnographic fieldwork, archival research, sonic analysis, and critical theory, to investigate the intricate tapestry of sonic experiences and their cultural significance.

At its core, fundamentally concerned with comprehending how sound functions as a meaningful facet of human existence, sound studies attempt to produce insights into the auditory dimensions of communication, representation, and cultural production, as well as, through its interdisciplinary approach, contribute to a deeper understanding of the relationships between sound, society, and culture.

[11] The term "acoustemology" was coined by anthropologist Steven Feld in the early 1990s. He introduced the concept to combine "acoustics" with "epistemology".

The gradual surpassing of these challenges will, in their maturing process, hopefully, help define future directions of investigation. However, despite the recent exponential expansion of the field, it continues to be regarded as a comparatively fledgling discipline as the nature of sound remains a topic of inquiry in academia and beyond.

II.1.1.2 The space between the world and our knowledge of it [12]

The concept of the 'object' within a particular discipline can be interpreted in two ways. Firstly, referring to the subject or entity the discipline aims to investigate and study in the external world. Secondly, on the purpose or objective that the discipline seeks to achieve by focusing on this particular object. (Mowitt as cited in Lavender, 2017, p. 245). In the present case, these two interpretations intersect and resonate within the uncertain and unstable territory of the disciplinary object, as referred both in the previous and following paragraphs.

Given this premise, the question thus arises: What is the object of Sound Studies?

Before addressing the question, it is important to note that the characterizations and argumentations presented so far have avoided placing sound itself as the focus and object of study. This is perhaps somewhat surprising as it might seem plausible to assume that the answer is contained or implicit in the question. The object must precisely be 'sound-itself', as the very word is part of the term 'sound studies'. That is, however, not the case (Grimshaw-Aagaard, 2019, p.18). Instead of constituting an endpoint, conceptually, 'sound' has emerged as a robust and indispensable tool for accessing and comprehending the world, effectively guiding inquiries to a point beyond its own essence (Kahn, as cited by Sterne, 2012, p.6). Kahn further alludes to *"a very nebulous notion of methodology, but also something that kicks in before methodology."* (ibidem), which leads Sterne to state what he defines as a 'first principle', that clearly grounds a cornerstone of the thinking in this area of study and research; in the field of sound studies, there is no inherently superior set of methodologies. Instead, investigations[13] into sonic phenomena are guided by an aiming curiosity, expressed through a symbolic, figurative, descriptive, nonliteral, or sometimes even metaphorical approach that spans different sonic comprehension and application areas. These areas are intertwined with varied questions, difficulties, fields of

[12] (Lavender, 2017).

[13] Sterne uses the term *'sonic imaginations',* establishing a parallel to Anne Balsamo's *technological imaginations*, a keyword used in her chapter in the *Sound Studies Reader* Anthology from 2012, and refers to a process of "*rework(ing) culture through the development of new narratives, new histories, new technologies and new alternatives"*.

aural study, environments, spaces, and historical circumstances. Although the choice of method is significant, it should arise from the specific questions posed and the fields of knowledge involved, rather than dictating the course of inquiry itself[14].

Should sound studies then engage its objects or research questions only contextually, adopting a strategy similar to cultural studies as specific locations rather than as complete entities that can be fully understood using one method or a combination of methods, or whose political or cultural importance is predetermined by our existing knowledge of sound, politics, or culture? And, returning to the initial query, what then is the focus of our study and the object of sound studies?

Our most straightforward and immediate question is perhaps the most difficult one. Are we referring to a phenomenon in the physical world? A vibration propagating in a given medium as an ontological component of a more expansive understanding of nature or the real? Is it possible to examine sounds 'in themselves' or as a component of a vibrational field that is its own object? Or does 'sound' relate to an occurrence outside our ears that we then perceive as sound, thus leading to the auditory phenomenon becoming the focus of study rather than 'sound-in-itself'? (Lavender, 2017, p. 245) Must the cultural examination of sound always be predicated upon the standpoint of individuals? Is it plausible to describe sound autonomously from the perspective of the individual articulating it? (Sterne, 2012, p.7) These apparently ethereal interrogations hinder even the most elementary attempts to define 'sound' and to determine how one learns to conceive or comprehend it.

However, this type of questioning represents merely the inception of our challenges and is immensely problematic. Following Lavender's reasoning, admitting we take the latter route and take sound as an object of our perception, we should then question the nature, capacity, scope, and limits of our sensorial apparatus and how it relates to conceptual thought. In case we follow the former path, our difficulties increase significantly as what sound 'is' is far from being a consensual matter in sound studies, even if there may be, within certain constraints, some shared conceptions of what the function of this discipline should be. Possible answers to these questions and investigations have far-reaching consequences for the objects and methods of sound studies (Sterne, 2012, p.7).

[14] This is a central aspect in the field of Artistic Research and will be readdressed later in this text.

> *"'even the most basic attempts to define one of the field's central concepts, "sound",' have forced sound studies to take up 'abstract questions' of an ontological, epistemological, and methodological nature" (Lavender, 2015, p. 411)*

> *"Despite its increasing institutional status and recognition as a distinct disciplinary field, we still often find works in sound studies attempting to reformulate the very terrain of their enquiry from the beginning. The most fundamental question remains radically open – what is the status of sound in sound studies?" (Campbell, 2017, p. 362)*

Let us briefly consider and address the wide debate as to what sound is. The implications are vast.

Sound, defined as widely as:

> *"a public object of auditory perception." (Nudds & O'Callaghan, 2009, p. 26),*

> *"a significant model for thinking and experiencing the contemporary condition" (LaBelle, 2010, p. xvii),*

> *"a vibration that is perceived and becomes known through its materiality." (Novak & Sakakeeny, 2015, p. 1),*

> *"an emergent perception arising primarily in the auditory cortex and that is formed through spatio-temporal processes in an embodied system." (Grimshaw and Garner, 2015, p. 1)*

> *"an immemorial material flow to which human expressions contribute but that precedes and exceeds those expressions."[15] (Cox, 2018, p. 2)*

remains elusive in its capacity to be fully grasped.

We can safely affirm that most sound studies scholars would agree that sound is a vibration happening within the limits of auditory range that propagates through a medium. Should we then infer that the study of sound belongs to acousticians rather than sound studies that analyse the use and effects of sound artefacts throughout history and in society and culture? (Grimshaw-Aagaard, 2019, p.18). This duality has long been discussed and is the source of a certain level of unease around using the term sound studies. Sterne, p. ex., referring to Michael Bull and Les Back, suggested the use of 'auditory culture' to underline the degree to which he considered sound to be a sensory problem, following Trevor Pinch and Karin Bijsterveld's

[15] aka the concept of the sonic flux - (Cox, 2018, p. 2)

situating sound studies as an emanation of what they named 'sensory studies' (Sterne, 2012, p.7).

Yet, other critical paths into sound studies assume sound's physicality and consider its cultural capacity while focusing on its ontology. One particular area of study draws upon the research conducted by Gilles Deleuze to establish a philosophical perspective on sound that is grounded in naturalism. This shift towards an ontological approach in the field of sound studies – the 'ontological turn' [16] –, which stands in opposition to the previously dominant linguistic approach in the humanities – the 'linguistic turn' –, directly challenges the significance of investigating auditory culture, audile techniques[17], and the technological mediation of sound. Instead, it emphasizes exploring universal aspects concerning the nature of sound, the human body, and media (Kane, 2015, p. 3).

This reasoning's prominent initial expression has probably been Christoph Cox's seminal article *"Beyond Representation and Signification: Toward a Sonic Materialism",* where the author critiques the theoretical frameworks traditionally applied to sound art. Published in the *Journal of Visual Culture* in 2011, Cox argues that sound art has been inadequately theorized due to the dominance of semiotics, psychoanalysis, poststructuralism, and deconstruction. These theories, primarily developed for textual and visual arts, allegedly fail to encapsulate the unique nature of the sonic. His reasoning is broad and multidimensional, having already been disputed and subject to critique[18]. We will return to it later in this text.

Beyond all possible interpretations, we should emphasize, as Sterne does, the complexities of studying sound and the implied and unavoidable navigation of various layers of knowledge, politics and cultural influences. Attempting definitions of 'sound' is not a neutral process, as each choice implicitly carries certain theoretical and methodological positions. In this context, production of knowledge in sound studies can be considered a challenge on at least three fronts: epistemologically, in its demand for straightforward methods for understanding and communicating sound; also, in how to deal with diverse, potentially contentious and conflicting

[16] Authors include Frances Dyson, Christoph Cox, Steve Goodman, and Greg Hainge.

[17] Defined by Jonathan Sterne as *"a set of practices of listening that were articulated to science, reason, and instrumentality and that encouraged the coding and rationalization of what was heard."* (Sterne, 2003, p. 23) ".

[18] For example, by Brian Kane in the cited article, Marie Thompson or Annie Goh in the *Sounding/Thinking* issue of *Parallax*.

cultural and political perspectives; and finally, in its social component, unavoidably shaped by power dynamics (Sterne, 2012, p.8).

Aligning with Sterne's observations and underlining the significance of its interdisciplinary nature is Murray Schafer's perspective of soundscape studies as *"the middle ground between science, society and the arts"*, a notion that reflects the field's unique position, where scientific inquiry, societal impact, and artistic expression intersect. In both perspectives, the study of sound involves not only understanding auditory phenomena but also navigating the complex social and cultural frameworks that influence our approach to sound (Bull, 2019, p. xviii).

> *"Murray Schafer, for many the leading voice within sound studies (he referred to it as soundscape studies), argued that "the home of soundscape studies will be the middle ground between science, society and the arts"* (Bull, 2019, p. xviii)

Sound studies, in its continuously expanding scope, seeks to clarify these and many other questions by examining its various facets and attempting to approach a notion of its essence. Is sound an object, an event, or a phenomenon to be experienced? By exploring the complex relationship between history, culture, and mediation, its endeavour aims to shed light on sounds' elusive objectivity. Therefore, a proper account of the depth of these arguments is crucial for an initial characterization of the main branches of our conceptual framework and approximation of a possible initial definition of our object of study.

II.1.2 What is sound?

II.1.2.1 Physicalisms and Phenomenologies

Even though there may be only one dominant and widely accepted scientific definition, there are several philosophical conceptions of sound in the Western tradition (see figure). Different attempts have been made to provide exhaustive and comprehensive descriptions of these definitions (including (Pasnau, 1999), (Nudds & O'Callaghan, 2009) and (Casati et al., 2020)). In the present argument, the focus will be on the ones considered more persistent, interesting, valid, actual, and central to the matters now discussed, always assuming that the use-value of each definition is inherently dependent on the specific context in which it is considered.

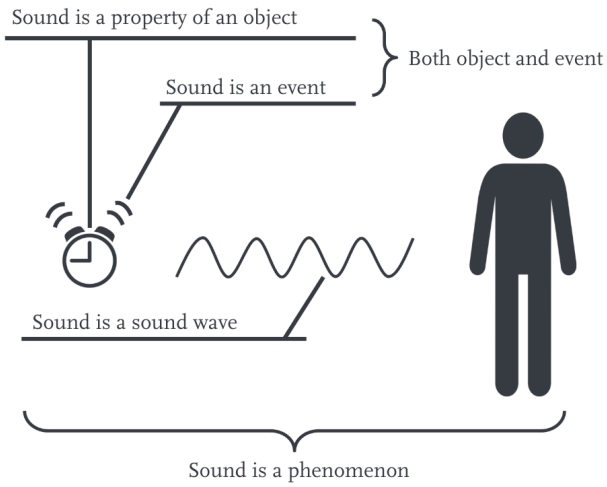

Figure 2. What is sound? (Grimshaw and Garner, 2015, p. 21)

The acoustic definition[19] , whose simplest statement is that sound is a sound wave, is perhaps the most objective. As the product of scientific rationality, it sprang from the drive to measure, categorise, regulate, and standardise all patterns of Western scientific thinking that followed the Industrial Revolution. Its relevance derives from it being a fundamental concept in industrialization, mass production, and mechanical, later digital, sound reproduction (Grimshaw & Garner, 2015, p. 20). Having made sound portable and reproducible, the technology that owed its origins and purpose to that interpretation has permanently altered both political and cultural aspects of society. This conception is, however, limited in its utility or practical worth due to its

[19] Grimshaw and Garner provide a fuller statement: *"(...) sound may be defined as a pressure wave moving through a medium and whose properties of position, frequency, and amplitude lie within the sensory ranges of the ear."* (Grimshaw & Garner, 2015, p. 22).

complete purging of the phenomenology of experience as it defines sound in relation to, but entirely distinct from the human self and eradicates all traces of subjective individuality and personal preference.

Citing the ANSI definition[20], Grimshaw-Aagaard underlines that even acousticians doubt the correctness of such formalization, only consider it operational for some purposes and find a need for domain-specific interpretations. Referring to a footnote of the ANSI formalisation alluding to the fact that not all sounds evoke an auditory sensation, he then arrives at what he considers the *"curiously pataphysical statements"* that *"not all sounds evoke a sound"* and *"not all sounds are evoked by a sound"* (Grimshaw-Aagaard, 2019, p.19) as well as pointing what he considers to be further numerous incoherences in the use of the terms in physics and acoustics literature.

What follows from the acoustic definition is that hearing is narrowed down to a process of technological recording, production, and reproduction of sound waves; hence, given identical technological and environmental circumstances, the same audio data should repeatedly produce identical sounds. The experiential dimension of sound is not considered unless under the realm of psychoacoustics, and even then, still focusing on objectivity and standardization, averaging experiential data, levelling out individual differences and statistically objectifying perception and experience to produce industry-friendly data sets (Grimshaw & Garner, 2015, p.22). It is concerned exclusively with the material, the physical, and the actual, and to avoid ambiguity in the definition, it is effectively blind regarding the sound source, the initial event that sets the sound wave in motion, or even the direction of that motion. In fact, it becomes empirically possible to produce multiple instances of the same sound as the only differentiation factor is a specific frequency and amplitude per point of propagation (ibidem). Any ambiguity-inducing individual cognitive and perceptual aspects are thereby excluded.

Since human experience tends to resist scientific objectification, one must define sound as something different than, and going beyond, its standard definitions to investigate sound as the object of our hearing and, therefore, its application and impact on technology, culture, and society (Grimshaw-Aagaard, 2019, p.20). Hence, this physicalist reductionism has been disputed by several authors. Numerous philosophical interpretations of sound exist that contrast with the

[20] The American National Standards Institute defines sound as either *"(a) Oscillation in pressure, stress, particle displacement, particle velocity etc., propagated in a medium with internal forces (for example elastic or viscous) or the superposition of such propagated oscillation"* or *"(b) Auditory sensation evoked by the oscillation described in (a)."*

previously discussed acoustic definition; however, they predominantly remain centred around the notion of a sound wave as an essential element in auditory processes or sound cognition. Let us briefly consider the ones considered more relevant.

Gaver (1993 a/b), inspired by Murray Schafer's writings on soundscapes and acoustic ecologies, developed a perceptual view of sound in two important articles, focusing on how meaning is extracted from information encoded in sound waves. Gaver's ecological approach to sound integrates the study of acoustics of the transmission of sound in the environment, considering the auditory system's properties that allow the decoding of said information. Particular importance and concern are attributed to developing a framework for describing sound in terms of audible source attributes (Gaver, 1993b, p. 1). Also important is the distinction between what he names everyday listening, or *"the experience of hearing events in the world",* and musical listening, *"the experience of the sounds themselves"* (Gaver, 1993a, p. 285). Gaver asserts that the recipient can decipher the information contained within a sound wave to gain insights into the dimensions or material composition of the source object, as well as the properties of the source event. Nevertheless, he does not explicitly address the content of reproduced audio and the methods by which meaning is inferred from audio reproduced as sound waves. While not attempting a definition of sound per se, Gaver's focus on the analysis of everyday listening is important as it presents sound as more than merely frequency and amplitude or a pressure wave moving through a medium, therefore disputing, if not objecting, the acoustic definition of sound.

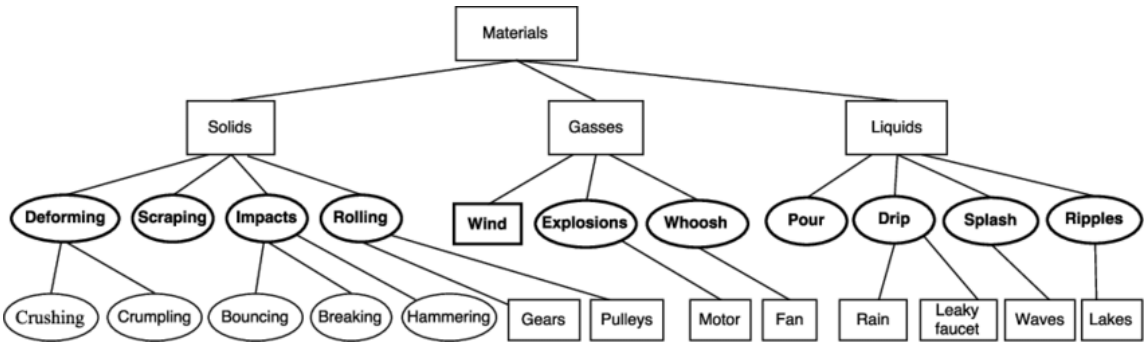

Figure 3 - Gaver's taxonomy of everyday sounds
(adapted from (Guastavino, 2018). Everyday Sound Categorization).

Pasnau (1999) posited the incoherency of the standard view that sound is a vibration in the medium. His argument is based on the fact that this perspective substantially contradicts how auditory perception is spatially contextualized. Specifically, we tend to perceive and articulate the origin of a sound as situated within the body that generated it, as opposed to within the airspace that is mutually accessed by said body and the listener's ears. Pasnau argues that

our auditory perception is spatial in nature, suggesting that sounds should be perceived as originating from the object itself. According to him, sounds are either the vibrations produced by these objects or emerge from said vibrations. Sound is, therefore, considered a characteristic inherent to the object[21], akin to attributes such as colour, size, and shape, and can be influenced by the surrounding environment. Pasnau's explanation of the nature and purpose of sound waves remains unclear; it is nonetheless evident that in Pasnau's interpretation, the existence of a sound wave is crucial for the perception of sound, emphasizing the importance of the source's location or the object itself.

Taking as a starting point Aristotle's statement (Aristotle & Shields, 2016, p. II.8, 420b10) that *"sound is a certain sort of movement of air"* and *"everything makes sound when something is struck and something strikes in something, which is the air",* O'Callaghan (2009, p.27) extends this reasoning and posits that a striking event generates a sound when it occurs in air. The sound is itself a movement but not necessarily the movement of the air itself. Rather, O'Callaghan postulates, *"it may be the event of that medium's being disturbed or moved"* (ibidem). Still quoting from Aristotle (420a20), *"For sound is the movement of that which can be moved in the way in which things rebound from smooth surfaces when someone strikes them"* O'Callaghan further states that sound results from the air being disrupted by an object's motion, consisting not merely in motion, but in the action of one entity influencing another. This perspective thus hints at an emerging Event View of sound where sounds represent specific events of a distinct nature, taking time and involving change (O'Callaghan, 2009, p.36), in which a moving object disrupts its surrounding medium, setting it in motion. The acts of striking and collision do not constitute the sounds per se but rather serve as their triggers. The waves within the medium do not embody the sounds themselves but, more precisely, manifest as consequences of the sounds.

So far, in the described approaches, sound has ultimately been defined and understood in terms of physical properties and processes. Philosophically, this physicalism has provided a framework for understanding sound phenomena in purely physical terms. That was the case for both Pasnau, who thought of sounds as properties of objects, and for O'Callaghan, who defended the view that sounds are events.

[21] Consequently, a property of the object.

The British philosopher Roger Scruton (2009), however, proposes a phenomenologist or experiential and perceptual view. Scruton's argument is quite compelling in articulating and substantiating his reasoning. His ground idea is that *"sounds exhibit the same ontological dependence on our perceptual experiences as secondary qualities"*[22] (Scruton, 2009, p.50), though not as qualities of the bodies producing them or the spaces in which they are perceived. Sounds exist as objects in and of themselves, carriers of properties, independent and distinguishable from their sources and spaces where they exist and propagate. They can, therefore, be considered as 'secondary objects', akin to how colours are deemed secondary qualities, and essentially stand as 'pure events'—events that unfold without being tied to any particular entity or body (ibidem). Contrary to what happens in normal physical events where physical change occurs, sound does not represent a change in another entity or body despite being triggered by such a change.

As Scruton underlines, while other authors have previously advocated for the concept of sounds as events, these proponents adopt a firmly 'physicalist' stance rejecting any insinuation that sounds may be inherently linked to the experience of hearing and instead associate them with physical events within or surrounding the objects that produce them. It is important to underline that they posit sounds as not synonymous with the waves transmitting them or the auditory perceptions facilitating their detection. Rather, equating sounds with the events that give rise to the sound waves—physical disturbances in tangible entities—like those arising when a violin string vibrates in the air. Essentially, sounds entail alterations in the fundamental attributes of physical entities. According to this perspective, a sound is an occurrence affecting the emitting entity, akin to how collisions impact cars, with this event manifesting as physical alterations quantifiable through means beyond auditory perception. These are the views of O'Callaghan, as previously described, among others. While substantiating his argument, Scruton goes into further detail, first by acknowledging the motives he recognizes as valid for the very physicalist approach he criticizes, and later by justifying the reasons to reject that view. By the richness of his thought, it is worth referring to the specificity of his reasoning.

At first, Scruton outlines three primary justifications supporting implementing a physicalist model in understanding auditory phenomena. Initially, grounded on scientific realism,

[22] In philosophy, particularly in the realm of metaphysics and philosophy of perception, the concept of secondary qualities is significant. Secondary qualities are attributes or characteristics of objects that are dependent on the perception of an observer rather than being inherent properties of the objects themselves. These qualities are typically contrasted with primary qualities, considered to be inherent properties of objects that exist independently of any observer. Examples of primary qualities include properties such as mass, extension, shape, and motion.

by arguing that auditory experiences can be explicable by physical events, rejecting secondary qualities in favour of primary-quality depictions. Secondly, from an evolutionary epistemological perspective, by suggesting that hearing evolved to offer relevant environmental information about survival-bearing events *"too distant to touch and too hidden to see"* (Scruton, 2009, p.52), thereby validating its physicalist construal. Lastly, by referencing acoustic principles, particularly as articulated by Helmholtz's theory[23], that accentuate the relationship between observable sound properties and physical disruptions, reinforcing the case for reducing auditory phenomena to physical representations. A fourth, more speculative reason is also named, positing that adopting a physicalist stance on auditory experiences is motivated by the inherent challenges associated with secondary qualities[24].

Regarding this fourth reason, Scruton immediately provides a counterargument: the named challenges are resolvable, and the reluctance towards what he calls 'ungrounded dispositions'[25] and the pursuit of a 'real essence' approach are seen as unwarranted[26]. The charge of circularity[27], rather than posing an insurmountable obstacle, is regarded as purveying a solution, as publicly observable secondary qualities afford insight into perceptual experiences. Therefore, the intelligibility of secondary qualities to observers is affirmed, grounded in the objective existence of said qualities notwithstanding their subjective manifestations. Collectively, these four perspectives advocate for a thorough comprehension of auditory perceptions within a physicalist framework, highlighting the significance of physical events in shaping sensory experiences.

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[23] Helmholtz's theory of pitch, loudness and timbre allows a mapping of these properties to, respectively, frequency, loudness and overtones of a soundwave, all primary qualities of a physical object - the sound wave itself – that describes similar qualities in the causing event – the vibration – reinforcing the idea that *"there is nothing more to a sound than the physical disturbance in which it originates"* (Scruton, 2009, p.52).

[24] Particularly exemplified by the perception of color. The notion that an object is deemed red if, and only if, it appears red to typical observers under standard conditions is commonly advanced. However, this proposition encounters several challenges as the proposition that objects are red if they appear so to typical observers faces objections related to circularity and the ambiguity of terms like 'normal' and 'standard'. Advocates of secondary qualities maintain that while the disposition to appear red may derive from a primary-quality property, it does not equate to redness itself.

[25] Scruton refers argumentations contending that these 'ungrounded dispositions' lack a scientific basis and cannot constitute an intrinsic reality. Accordingly, and for example, the disposition of an object to appear red cannot be a brute fact; instead, it must be explicable by its microphysical composition, revealing the true essence of redness. Consequently, secondary qualities disappear, constituting at best a facet of the concept of 'red' but not its substance (Scruton, 2009, p.53).

[26] With quantum mechanics offering precedent for their acceptance. There is nothing incoherent in quantum mechanics, and quantum mechanics attributes ungrounded dispositions to the particles that it describes.

[27] The argument that defining redness in terms of 'looking red' entails circular reasoning, while some propose that such circularity can be mitigated only through a phenomenological interpretation of the experience.

However, Scruton then proffers his reasons for asserting the perceptual view. Namely:

a) His willingness to support the view of sounds as 'objects of hearing' in the same way that colours are objects of sight, underlining the essence of sounds residing *"in the way they sound"* instead of based on a physicalist view. A special emphasis is placed on the fact that, as he suggests, both approaches *"relegate to the purely phenomenal level (...) SOUNDS' ability to speak to us, and much of their information-carrying potential."* (Scruton, 2009, p.57)
b) A belief that the secondary qualities of sounds are attributed *"not to the bodies that emit them nor to events that occur in those bodies"* but instead to the sounds themselves.
c) By noting that the information transmitted by sounds does not typically refer to specifics of vibratory states of objects nor are sounds typically grouped by referring to their sources. Instead, recalling the phenomena of auditory grouping[28]and the associated perceptual 'streaming' of perceived sounds according to acoustic features likely to have the same physical source, he goes a step further. He argues that this streaming occurs by attributing an identity to sounds which is *"distinct from any process in their source"* (ibid, p. 58) thus implying a coherency in the sounds-themselves rather than in spatiotemporal objects. This, he posits, is the exclusive grounding for sounds' ability to fulfil their evolutionary function of conveying an auditory representation of the adjacent physical world (ibidem).
d) The acousmatic experience of sound and its (sounds') ability to be completely separated from its physical source[29] without any loss in coherence or any of its essential aspects as an object of attention. This capacity of sounds, when separated from their causes, to be perceived as independent yet interconnected objects, forming coherent structures with *"boundaries and simultaneities, parts and wholes",* is a crucial aspect for Scruton. In it, he recognizes a mereology in the acousmatic domain that mirrors the

[28] Psychologists have delved into the concept of auditory grouping, pondering the evolutionary purpose it may serve (Gelfand 1998 as cited in Scruton 2009). For instance, we tend to group soft sounds interspersed with loud noises together, as if they were part of a continuous sequence, much like how we mentally extend interrupted lines on a page. Generally, sequences of sounds are perceived as 'streamed'—each assigned to a temporal Gestalt, shaped by temporal principles akin to those for Gestalt formation in vision. Similarities in pitch, duration, timbre, volume, etc., result in enduring streams despite silences, interruptions, competing streams, and unstreamed events. Albert Bregman, a prominent researcher in this field, suggests that 'the perceptual streamforming process involves grouping acoustic features likely emanating from the same physical source' (1990: 138).

[29] Such as through radio or gramophone.

mereology of the physical object world, albeit dealing with temporal rather than spatial wholes.

For these reasons, the physicalist standpoint is rejected, concluding that what is perceived, whether in everyday auditory surroundings or acousmatically, is not merely a subjective impression but a genuine aspect of the objective world. Sounds are, therefore, characterized as 'secondary objects.'

As mentioned earlier, Scruton also introduces the notion of sounds as 'pure events' referring to events that are also secondary objects. These occur, and can be identified, without the need to identify the emitting individual.

> *"(...) the 'pure event': the event that happens, even though it does not happen to anything (except perhaps to itself), the event that cannot be reduced to changes undergone by reidentifiable particulars. This, I believe, is how we should think of sounds." (Scruton, 2009, p.61)*

Aristotelian and Strawsonian[30] perspectives identify events primarily through changes experienced by specific objects. According to these views, events are described by identifying participating objects and their transformations. Scruton, however, challenges conventional understandings of events and suggests that these can also be seen as transformations experienced by particulars without the need for additional identification beyond the particulars involved.

The concept of the 'pure event' is introduced as exemplified by sounds, which can be identified without reference to a source, challenging the idea that sounds are inherently tied to their origins. This substantiates further criticism of a physicalist view that links sounds exclusively to their sources—such views neglect the intrinsic qualities of sound and limit its importance socially, morally, and aesthetically. Embracing the 'pure event' as an ontological category thus introduces unique possibilities of communication (ibid, p.62) and understanding sounds' relational and affective power.

II.1.2.2 Non-cochlear sound

Another definition of sound based on phenomenology is the one proposed by Riddoch (2011) (2019). It is essentially an argument critical of scientific empiricism, which is considered

[30] Aristotle and P.F. Strawson ss referred by Scruton (2009, p. 61).

as being unable to account neither for *"the subjectivity of hearing nor for the link between the auditory mechanism and the processes of sound perception"* (Grimshaw & Garner, 2015, p. 29); a recognition of the failure of empirical sciences in establishing a causal mechanism connecting neurological processes and the implied subjective perceived effects (Riddoch, 2011, p. 14). Distinguishing between cochlear and non-cochlear sounds, it is proposed that all sound is, in fact, non-cochlear and, consequently, a non-physical phenomenon revealed in the *"lived experience of hearkening to the meaningful sounds one hears in the world"* (Riddoch, 2011, p. 11).

What exactly is meant by non-cochlear sound?

The role of the cochlear structure in the perception of sound is relatively well understood in a psychophysiological sense and will not be detailed here. Briefly, acoustic vibrations travel through the cochlea, where they are detected by hair cells, which in turn trigger electrochemical signals that the auditory nerve carries through to the auditory cortex, cerebellum, and limbic system. This process is intimately related to the perception of sounds.

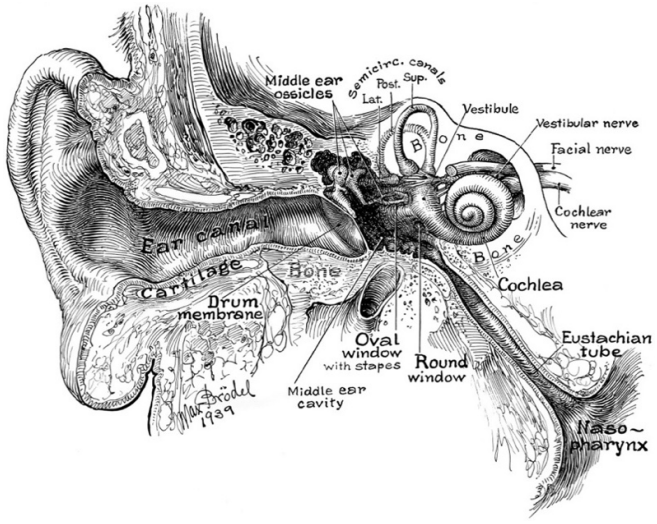

Figure 4. The human ear (Brodel, 1946)

A preliminary definition of 'cochlear sound' can thus be stated as *"the perceived sound associated with the kinetic energy vibrations within the cochlea that produce electrochemical signals in the brain"* (Riddoch, 2011, p. 11). However, the exact meaning of 'associated' in this context remains ambiguous. What is the link between the perception of sounds and the biological mechanisms of audition? Can one lightly conclude that the perception of sound is a mere psychological effect due to neuronal excitation? The exact nature of this causality is unclear.

Suppose we now return to our attempted definition, still following Riddoch's argument. In that case, it can be empirically posited that *"non-cochlear sounds are perceived sounds associated with the excitation of the auditory cortex in the human brain by means other than cochlear vibrations transmitted through the hair cells to the auditory nerve."* (ibid, p.12). Three cases in this empirical sense are demonstrated, namely, synaesthetic, infrasonic and auditory imagination. The first two are well-documented, so they will not be further addressed here. The third is especially relevant as its interpretation implies important questioning.

Auditory imagination occurs in diverse contexts ranging from remembering sounds in past events to musicians recalling performative work or composers contemplating possible new work aesthetics. All these cases involve the perception of sound and auditory cortex excitation without direct cochlear or somatic input but still involving electrochemical patterns in the brain. This directly implies that the sounds-themselves are not necessarily a product of cochlear or even acoustic stimulation. What is then the correlation between the perceived sounds-themselves and the concrete, worldly auditory brain functions? Non-cochlear or not, where does sound occur? In the brain? Elsewhere?

This notion of non-cochlearity is further expanded by Riddoch when introducing a fourth possible definition. Sounds-themselves, independently of being associated with cochlear vibrations or in any of the other non-cochlear variants, can have the ability to direct the attention of the perceiver to something other than the sound. Some sound artworks are especially effective in this capacity. Sounds can then be considered in terms of how they are conceptually situated and according to which worldly meaningfulness they may be pregnant with. Once more, a similar interrogation arises: What is the correspondence between this cognized meaningfulness of the sounds-themselves in their relation to the world and their biological basis? What precisely is being heard? Raw noises and tone complexes produced by cochlear vibrations? Or is our focus instead on the meaning of the sounds-themselves? Does the recognized melody precede the tonal sequence in the perceptual process? (Riddoch, 2011, p. 13).

In this context Riddoch quotes Heidegger:

> *"What we first hear is never noises or complexes of sounds, but the creaking waggon, the motorcycle. We hear the column on the march, the north wind, the woodpecker tapping, the fire crackling. It requires a very artificial and complicated frame of mind to hear a pure noise". (Heidegger, 2007, p. 207)*

to conclude that *"Sounds, whether associated with cochlear vibrations or not, are always in the first instance meaningful sounds."* and that *"all active hearing is a form of hearkening, that is, a form of directed auditory attention and understanding."* (ibidem).

Figure 5 - Christian Marclay - The Sound of Silence, 1988
b&w photography, 26,8 x 26,8 cm

If sound art succeeds in directing our attention towards the environment in which we perceive and listen, is this simply an artistic construction, or is this unveiling of a realm revealed by art leading us to a more fundamental phenomenon in non-cochlear sound? This potential in artistic conceptuality and latent meaningful substance hints at what is perhaps the central aspect of this argument; the observation that the auditory stimuli perceived possess inherent significance suggests that this power of non-cochlear conceptuality of sound is not simply a secondary consideration, an abstract creative representation, or a personal, subjective, mental construction. Sounds are intrinsically meaningful. This significance and meaningfulness of the auditory input we perceive constitute a fundamental characteristic of the sounds-themselves as we encounter them. The non-cochlear conceptual dimension of sound is thus simultaneously a theoretical conceptualization—an abstract construction—and yet also a very concrete phenomenon correlated with the perception of sounds within our environment.

Still, the question remains: How do the experienced worldly sounds relate to the psychophysiological processes tied to their perceptions?

Science has not been able to establish a causal mechanism connecting neurological functions with the perceived subjective experiences of the world around us. While concrete links exist between our biological makeup and the sounds-themselves, as demonstrated in medical research, there remains a lack of empirical evidence regarding how electrochemical patterns in

the brain translate into auditory sensations. Empirical sciences focus on objectively verifiable physical occurrences and the quantifiable data related to them. On the other hand, subjective phenomena like our daily experiences and the continuous stream of perceptions are inherently 'subjective' and resist empirical scrutiny. Science, therefore, operates within well-defined boundaries set by the physical domain. Non-physical occurrences, such as auditory perceptions – the sounds-themselves in this argument – lie outside the realm of empirical science. In essence, the relationship between neuronal processes and the resulting perceptions is not causally proven but merely associative, according to empirical evidence. This reasoning brings Riddoch to the suggestion that *"there is therefore no such thing as a cochlear sound in any demonstrable empirical sense"* (D. M. Riddoch, 2011, p. 13) and, consequently, all perceived sound is non-cochlear.

Sensing a possible criticism of the argument as being an exercise in semantics, the reasoning is extended beyond what could be understood as simply an interpretation of terms – 'non-cochlear' and 'sound'– and further supported by revisiting the fundamental principles of causality that underpin our conventional comprehension of sound and its discourse.

Figure 6 - Christine Sun Kim, All Day, 2012 [31]

[31] The deaf artist Christine Sun Kim illustrated the motion of her hand as it would sign the phrase "All Day" in American Sign Language. At the center of the depicted arc, she included a rest bar symbolizing silence and the inscription "126,144,000." This number represents her estimation of the total rest bars needed to symbolize the 32 years of silence she had experienced at the time.

For individuals with a scientific background, particularly those educated in a contemporary system and exposed to its paradigms, it may be tempting to adopt a form of what Riddoch calls ‘popular psychologism’ when addressing the relations of causality between scientific reality and the phenomenology of lived experience. In this context, it may seem undeniably evident that the perception of sound occurs 'within' the brain or mind and is triggered by electrochemical stimuli. This fundamental assumption can lead to significant confusion when discussing sound, as it leads to an interpretation of sound based on something other than the sound phenomenon itself. In this context, the sounds-themselves are viewed as an 'inner' sensibility that remains enigmatic, with an undisclosed origin, while the biological ‘cause’ takes precedence in comprehending those sounds. However, approaching a comprehension of sound-in-itself implies a reassessment of this psychophysiological perspective and the initial assumptions about sound and its connection to the physical and perceptual phenomena associated with hearing. Thus, from this analytical standpoint, the term 'sound' epitomises and incorporates an unresolved question that reveals itself in the lived experience of listening and ‘hearkening’[32], the term Riddoch prefers.

A new causality then needs to be invoked. One closely tied to one's focused attention (intentionality) within the world. Simply put, one listens and thereby perceives. This establishes a new ground, distinct from the psychologistic belief in the biological origin of sound, that potentially enables a discussion about sound-in-itself.

A further important consequence of this open viewpoint that Riddoch introduces is a complication of the causal link between sound and our biology. One possible argument is that, from an evolutionary perspective, we do not hear because we have developed the biological mechanisms for hearing. Instead, conversely, we have evolved the biological mechanisms for hearing because we already directed our attention to sound. Why else would the human species possess a sophisticated auditory cortex if not for the evolutionary benefit of hearing and listening to sounds themselves? One must first comprehend what sound is by listening and attending to sounds in our daily environment. On this direct perceptual foundation, we can then discuss those sounds in terms of the sounds themselves. According to this premise, the sounds themselves are not just outcomes of biological processes or subjective phenomena; rather, they are precisely the central matter of study (Riddoch, 2011, p.15).

[32] Listening with directed attention.

II.1.2.3 Sound as emergent perception

All the definitions presented so far inevitably face the perplexing conundrum that emerges when attempting to establish a relationship between the physicality of the sound waves as described by acoustics and the perceptual, experiential, and phenomenological aspects of everyday listening. Within this domain, ambiguity persists.

Grimshaw and Garner (2015) propose that the perception of sound arises not solely from the physical properties of sound waves but instead as an emergent phenomenon, in the sense that it emerges from the dynamic interaction between the physical properties of sound waves with contextual and environmental factors and the neural, cognitive, and perceptual processing mechanisms in the auditory system.

Sound waves are, in fact, not considered necessary for a sound to be perceived. Furthermore, it is posited that all forms of auditory illusions or hallucinations are in themselves sound (Grimshaw & Garner, 2015, p. 31). Supporting this assertion is the fact that, in those cases, activity is detected in the areas of the brain involved in processing auditory information, which are considered in neuroscience as part of the perceptual system. Similarly, in the case of aural imagery – imagining a sound – the same kind of activity is observed in the centres of auditory perception in the brain as in the presence of sound waves (ibid, p.32). This approach thus challenges the traditional view that sound perception is solely a bottom-up process, where auditory stimuli are passively received and processed by the ear and brain.

> *"Sound is therefore not the singular and independent entity of the sound wave but rather a perception of that waveform (if it exists) in conjunction with the infinitely complex and inseparable contextualizing variables of space, time, and self." (Grimshaw and Garner, 2015, p. 88)*

This conception acknowledges multisensory integration's role in forming a unified perceptual experience involving neural mechanisms that integrate sensory input with cognitive and emotional factors. A framework is thus provided for understanding the dynamic nature of auditory experience, which emphasizes the interaction between physical, cognitive, and contextual factors while offering insights into how we perceive and make sense of the soundscape around us.

This interpretation will be addressed further in section II.1.3.4.

II.1.3 Sound, meaning, and the Embodied Mind

After considering the physical and phenomenological dimensions of sound and the mechanics and challenges of aural perception, an examination of the contextual, subjective implications of these processes seems necessary. How do they interact with the surrounding environment? Beyond the ear and brain, what role does the body play, if any? Most importantly, what does sound mean, or perhaps more accurately, how does sound create meaning? In essence, how does the materiality and phenomenology of sound penetrate the mind, and how is meaning produced?

> *"Thinking about sound is inextricably relying on thinking about the senses. It relies on notions about the plasticity, the mingledness, and the idiosyncrasies shaping sensory and sonic experiences."* *(Schulze, 2019, p. 5)*

From its inception as a field of inquiry, sound studies have been positioned within the broader context of 'sensory studies' (Pinch & Bijsterveld, 2012, p. 9). This positioning reflects an effort to re-evaluate the importance and meaning of cultural sensory experiences (Bull, 2019, p.xviii) while marking a shift away from the long-standing emphasis on sight in academic thinking across social sciences, arts, and humanities. This shift is situated within a 'sensory turn' in academia, which originated from theoretical and empirical explorations of 'embodiment'—the bodily experience of the world—as a research focus (ibid). This approach aimed to challenge the traditional mind-body dualism prevalent in Western thought since ancient Greek philosophy (Csordas 1990, as cited in Bull, 2019, p.xviii).

How do these factors relate to this argumentation?

II.1.3.1 The Mind-Body Problem | Approaches to cognition in sound studies

Dualism is a metaphysical interpretation that states the essence of reality as divided into two fundamental components: the mental and the physical. The idea of mind-body dualism, predominantly attributed to René Descartes, further posits that each individual consists of two distinct and autonomous elements: a tangible, observable corporeal body defined by physical attributes, and an internal mind that integrates thoughts, emotions, and perceptions.

But are the mind and body distinct though interacting entities, or are they fundamentally the same thing? This apparently irreconcilable dichotomy is frequently referred to as the *mind-body problem*.

In the context of sound studies, this dualism raises important questions about the nature of aural perception and the process of meaning-making. How do the senses and the body relate to and impact aural perception? What is their role in the interdisciplinary nature of sound studies and the problem of meaning-making?

Assuming the significance of the process of meaning-making in the study of sound, two primary approaches can be considered:

1. Disembodied cognition: This approach treats cognition as a purely mental process that does not involve the body. Rooted in Cartesian dualism, disembodied models posit a strict separation between the mind and the body. These models have influenced research methodologies in auditory perception across several fields but have been criticized for their inability to adequately explain how abstract mental symbols acquire meaning.
2. Embodied cognition: This approach emphasizes the role of physical, perceptual, and sensorimotor experiences in cognitive processes. Embodied cognitive models have emerged more recently and offer an alternative perspective on how we understand and create meaning from sound.

The prevalence of disembodied cognitive models has been historically significant across various disciplines, while the emergence of embodied cognitive models has only surfaced in more contemporary contexts (Roddy & Bridges, 2021, p. 21). As we continue to explore the complexities of sound perception and meaning-making, the tension between these two approaches provides a fertile ground for further research and discussion in sound studies.

II.1.3.2 Breaking free from Cartesian Dualism

While not directly addressing meaning-making or the assignment of meaning to sonic symbols, psychophysics and psychoacoustics quantify relationships between physical stimuli and their perceptual correlates. Despite considerable efforts to address Cartesian dualism within their methodological frameworks, early psychoacoustics investigations faced significant critiques centred on both their theoretical foundations and methodological approaches. One key criticism focused on using overly simplistic and decontextualized stimuli in controlled laboratory settings, resulting in findings with limited applicability to real-world contexts (Neuhoff 2004, as cited in Roddy & Bridges, 2021, p.24). This led to adopting ecological frameworks, which examined auditory phenomena within authentic listening environments, and consequently to a

more effective refocusing on meaning-making processes (Walker and Kramer 2004, as cited in Roddy & Bridges, 2021, p.24).

Computer and cognitive sciences underwent a similar evolution. The transition from Cartesian dualism to embodied cognition arose as these fields moved beyond the constraints of computational models of the mind, such as the *Classical Computationalist Theory of Mind* (CCTM) proposed by philosopher and mathematician Hillary Putnam in 1961. Early cognitive science, influenced by advances in computer science, conceptualized the mind as an information processor analogous to a machine processing symbols through rule-based computations. However, this approach neglected the body's role in cognition and failed to account for aspects of human experience beyond rational, 'computational' thought. As the limitations of these models became apparent, researchers in the mid-1990s began adopting a user-centric approach informed by embodied cognition principles. This new perspective emphasized the inseparability of mind and body in meaning-making, recognizing that cognition is grounded in physical experience and environmental interaction. (Bannon 1995; Dourish 2004, as cited in Roddy & Bridges, 2021, p.26).

In parallel, early AI and robotics relied on a sense-model-plan-act (SMPA) framework[33], which proved inadequate for simulating human cognition. The contained systems prevalent in these fields perpetuated mind-body dualism by suggesting that the mind can exist independently of the environment. Although input and output might vary, neither system could fundamentally alter its nature in this rigid framework that treated the brain and environment as fixed and separate entities. This model's fundamental limitation was the inability to accommodate neuroplasticity—the brain's capacity to adapt to environmental, behavioural, and physical changes. (Chaney 2007, as cited in Grimshaw & Garner, 2015, p.66). This systemic rigidity, hence, failed to capture the complexity and adaptability of human perception, leading to a shift towards embodied approaches to cognition (Grimshaw & Garner, 2015, pp.65-66).

The history of Western music theory has also witnessed a significant shift in its conceptualization from Cartesian dualism towards embodied cognition. Early formalizations, such as Pythagorean tuning, reflect an initial attempt to establish a connection between music's physical and perceptual attributes. However, this also reinforced a separation between sound's

[33] A theoretical framework rooted in classical cognitive theory that, like the initial frameworks of artificial intelligence, tries to emulate human information processing through a series of sequential reasoning and conscious deductive reasoning (Grimshaw & Garner, 2015, p. 65).

abstract and embodied aspects as a particular mathematically derived formalization was regarded as the most pertinent.

This notion is reinforced by Descartes' mathematical approach[34], quantifying musical experience and prioritizing formal structures over perceptual experience, similarly dismissing the emotional and bodily dimensions of music, privileging rational, formal structures over lived experience, a dualistic perspective that, further entrenched by Kant's transcendental idealism[35] and Schopenhauer's philosophy [36], persisted in musical discourse, often disregarding the relationship between physical embodiment and musical experience.

Composers like Wagner and Schoenberg were also influenced by dualist thinking. In their work, they strived for universal, logically-structured aesthetics in musical constructions that prioritized formal logic and abstraction over the embodied reality of musical perception. Serialism, developed by Schoenberg and extended by the Darmstadt School, epitomized this approach by emphasising universalist structural elements over perceptual accessibility (Roddy & Bridges, 2021, p.30). However, these formalist tendencies faced increasing criticism for neglecting embodied experience. The cognitive challenges posed by serialism highlighted how disembodied systems of musical organization often rendered music inaccessible to listeners' perceptual and cognitive faculties (Lerdahl and McAdams, as cited in Roddy & Bridges, 2021, p.30).

In the 1950s, the two pioneering schools of electronic music, French *Musique Concrète* and German *Elektronische Musik*, also initially maintained Cartesian principles despite their different approaches. *Musique Concrète,* developed by Pierre Schaeffer, drew from Husserl's phenomenology (Kane, 2007, p. 16); Schaeffer's concepts of ‘reduced listening’ and ‘objet

[34] In his 1618 *Compendium on Music*, as cited in Roddy and Bridges, 2021, p.28.

[35] Kant’s transcendental idealism posits that we perceive only the appearances of objects, with concepts such as space, time, and causality being cognitive frameworks for organizing these perceptions. This theory has faced critique for neglecting the interplay between the physical body and the external world, reducing corporeal experience to an imaginary phenomenon (Todes, 2001, p.95, as cited in Roddy and Bridges, 2021, p.29). Consequently, it may exacerbate the Cartesian dichotomy of mind and body, by presenting a conception of humanity that is detached from the tangible, objective reality.

[36] Schopenhauer (1883) expanded on Kant’s ideas by highlighting the unique status of the human body as an object of both external perception (representation) and internal experience (will). He regarded instrumental music, unlike visual arts, as a direct expression of will, unmediated by representations of the external world. For Schopenhauer, music offered a way to transcend the suffering inherent in human existence. Although he emphasized bodily experience in his philosophy of music, he remained bound to a Cartesian framework, with bodily will confined within mental representation. Music thus became a temporary escape from this dualistic confinement (Roddy and Bridges, 2021, p.29).

sonore' aimed to isolate sounds from their sources, reinforcing a dualistic view of sound as an abstract entity. During this period, *Elektronische Musik*, led by Herbert Eimert, adopted a positivist stance rooted in materialist acoustics, emphasizing mathematical precision over bodily experience in music synthesis. Both schools contributed to a positivistic orientation in electronic music and sound production that decontextualized sound from its ecological and corporeal origins. This paradigm significantly influenced audio technology development, often at the expense of embodied musical practices. However, subsequent critiques emerged, challenging this disembodied approach. Authors like R. Murray Schafer advocated for a more phenomenologically driven and ecologically grounded understanding of sound; a critical re-evaluation that marked the beginning of a transition towards embodied cognition in electronic music discourse. This trajectory parallels a wider epistemological shift in cognitive science and philosophy, representing a change in music theory and a fundamental reconsideration of the nature of human interaction with sound and technology.

The questioning of musical universalism continued while the importance of individual perception and cultural context was recognized, and by the mid-to-late 20th century, these limitations sparked a shift towards embodied cognition. This development recognized that the human body and its relation and synergy with the environment are fundamental and inherent to the experience of music, challenging the long-standing dominance of abstract, rational frameworks in favour of approaches that embrace the physicality of sound and performance.

All the previously mentioned shifts in psychoacoustics, AI, robotics, and computer and cognitive sciences, represent significant departures from Cartesian dualism, acknowledging the complex interplay between physical embodiment, cultural context, and aural perception. They indicate, introduce, and translate a more holistic approach to understanding musical and sonic experience and understanding of meaning-making, with implications in various fields, including music theory, composition, education, or the sonic arts, a progression that continues to frame and delineate contemporary approaches to research in this field.

However, the transition has started much earlier.

II.1.3.3 A cognizant body

To better understand this path towards considering the interactions between mind, body, and environment, it is important to refer to perhaps two of its earlier conceptualizations.

Initially proposed by Jakob Von Uexküll in 1906, the concept of *umwelt* illustrates how biological and environmental factors intricately shape our perceptual and cognitive processes and underscores the significant role of biological and environmental constraints in shaping perception. In auditory perception, various physiological factors, such as the positioning of ears and the cochlea structure, determine how sound is processed and perceived. These biological limitations are not merely restrictive; they functionally filter out irrelevant information and reduce cognitive load. The notion of *umwelt* thus provides a framework for understanding how the auditory system operates within the constraints of its biological and environmental context. This perspective integrates with the argument that sound is not merely a mechanical phenomenon but is instead interwoven with the perceiver's body and cognitive processes (Grimshaw and Garner, 2015, p.67).

Also, Heidegger's notion of *thrownness*, or *Geworfenheit*, illustrates the inextricable link between human cognition, emotions, and the surrounding environment, suggesting that our thoughts and emotions are interlaced with our existence and cannot be disentangled from everyday life. As referred by Grimshaw and Garner (2015, p.68), dream states, particularly lucid dreams[37], offer compelling evidence of this connection and provide an illustrative case of how the mind creates vivid auditory experiences and, in doing so, demonstrate how perceptual experiences can occur without direct sensory input. These phenomena suggest that, while the brain and environment are discrete entities, they maintain an ongoing and essential connection, supporting an integrated model of embodied cognition.

Disembodied cognition frameworks have proven insufficient for explaining how listeners interpret and assign meaning to sound. As sound studies have matured, the notion of embodied cognition has been increasingly embraced, the body's central role in the meaning-making process has been recognized, and the profound influence of bodily experiences and interactions with the environment on cognitive processes has been posited. This shift mirrors trends across various fields, such as the second wave of human-computer interaction, cognitive science, and ecological psychoacoustics, all moving towards understanding cognition as deeply connected with physical experience.

It is thus proposed that cognition and perception are fundamentally distributed across the mind, body, and environment, and the notion of a centralized cognitive system is rejected.

[37] In which individuals are aware of their dreaming and can control their actions.

This integrated model is supported by empirical evidence[38] , demonstrating that physical states such as posture, movement, and facial expressions significantly influence emotional responses and cognitive tasks. Such a perspective resonates with theories of ecological perception and phenomenology, which advocate for a holistic understanding of how humans interact with and interpret their auditory environment (Grimshaw and Garner, 2015).

> *"By focussing upon sound as perception, Grimshaw-Aagaard is able to cast light upon a variety of sonic experiences that need not necessarily be vibrational in origin. Grimshaw-Aagaard argues that sound studies are at its strongest when it investigates the roles of memory, knowledge, reason, experience, emotion, mood, and so on in order to understand the ways in which sonic perceptions are formed." (Bull, 2019, p. 3)*

As previously referenced, any attempt at the comprehension of sound necessarily entails and implies a sensorial examination and recognition of the malleability, interconnection, and idiosyncratic nature of the complexities of the sense apparatus (Schulze, 2019, p. 5); our thinking, conception, appreciation, and engagement with the world is inevitably sense mediated. However, it is important to refer that this interfacial process implies and carries a translation mediated by ideology and culture even before it reaches the edges of the sensorium (Voegelin, 2010, p. xi). Although embodiment is an essential and inevitable factor in cognitive processes, it is crucial to recognize that the senses are also already acculturated from the start.

> *"The way we think about the world is in no small way influenced by the senses we engage to appreciate this world, and in turn these senses have always already an ideological as well as a cultural function prior to us employing them." (Voegelin, 2010, p. xi)*

II.1.3.4 A perceptual model of embodied acoustic ecology

> *"Considered in a rather crude but concise manner, embodied cognition theory can be understood as conscious thought processing within the here and now." (Grimshaw and Garner, 2015, p. 72)*

To fully understand the depth and width of Grimshaw and Garner's perspective on the processes of embodiment and their role in human cognition, it is essential to refer to their

[38] Namely Stepper and Strack (1993), Duckworth et al. (2002) and Havas and colleagues (2007) as cited in (Grimshaw and Garner, 2015).

proposed integration of construal-level theory of psychological distance (CLT)[39] with embodied cognition theory[40] and their combined influence on auditory perception.

CLT posits that increased psychological distance results in more abstract thought (high-level construals), while psychological proximity leads to more concrete cognition. Trope and Liberman (2010) outline four dimensions of psychological distance: spatial (physical distance), temporal (time), hypotheticality (likelihood), and social (relation to the self). In Grimshaw and Garner's reasoning, this notion is applied to auditory perception, suggesting that varying levels of psychological distance affect how sound is perceived and categorized.

For instance, considering the temporal dimension, a listener recalling a recent auditory experience is likely to provide a more detailed and specific description than when recalling a sound from the distant past. Different levels of psychological distance thus affect the abstraction level of sound perception, leading to more, or less, detailed representations and influencing how the brain integrates sound stimuli into meaningful auditory experiences - closer events leading to more detailed sensory processing.

Following Grimshaw and Garner's interpretation of Wilson's conceptualization of embodied cognition, this theoretical framework then ties into the concept of *situated cognition*, one of Wilson's first two attributes – namely, *situated* (the *here*) and *time-pressured* cognition (the *now*) – underlining that all cognitive processes occur within the context of an individual's local environment and time constraints. In this view, auditory perception is never an isolated process but is instead influenced by the listener's immediate surroundings and temporal demands. This situated perspective is central to understanding how sound perception operates within an embodied framework, where cognition is always intertwined with real-time sensory inputs and external conditions. During the process of cognitive embodiment, environmental inputs continually shape auditory perception.

> *"(...) all sound exists within the acoustic ecology of the mind, of which the environment is a component. Therefore all sound exists within the environment in the sense that it is always responsive to it." (Grimshaw and Garner, 2015, p. 74)*

[39] As defined by Trope and Liberman (2010).

[40] Based on Margaret Wilson's *Six Views of Embodied Cognition* (2002). Wilson delineates (drawing upon an analysis of a range of other embodied cognition literature) six characteristics of embodied cognition: (1) cognition is situated; (2) cognition is time-pressured; (3) we offload cognitive work onto the environment; (4) the environment is part of the cognitive system; (5) cognition is for action; (6) offline cognition is body-based.

The notion of *time-pressured cognition* is also introduced, essentially consisting of the idea that all human cognitive processes are inherently constrained by temporal factors and are shaped by the individual's perception of the progression of time while relating to objects or events. Time-pressured cognition thus refers to how the perceived urgency of a situation influences cognitive processes, hence stressing the impact of time constraints on how sound is processed, often implying a reduction of attention to detail. Accordingly, in a time-pressured scenario, auditory perception will likely be less detailed and more generalized. Similarly, if a listener is under pressure to complete a task, they may be less attentive to the sonic nuances around them and instead focus on the more immediately relevant auditory cues. This shift in cognitive focus demonstrates how temporal factors influence not only hearing but also processing and interpretation of sound. Understanding time-pressured cognition is crucial for developing a comprehensive model of auditory perception, as it highlights the dynamic and context-dependent nature of sound processing.

This links to the third of Wilson's attributes, the concept of *cognitive offloading*, which refers to the process of distributing cognitive work between the brain and the external environment to enhance processing efficiency. Due to the inherent limitations of human information-processing capacities, individuals often offload cognitive tasks onto the environment to reduce the cognitive load. In auditory perception, this occurs when individuals use external cues and aids to help process and interpret complex soundscapes. For instance, in everyday situations, a person may rely on environmental sounds to help them navigate a space, reducing the need for full cognitive engagement with every sound heard. This offloading of auditory cognition allows for more efficient processing, freeing up cognitive resources for other tasks. This phenomenon underscores the ecological nature of sound perception, where external environmental factors are deeply integrated into the cognitive processes that generate auditory experiences.

In parallel with a definition of sound as a perceptual and embodied entity, a path is now being drawn towards establishing an embodied model of acoustic ecology[41].

By reviewing several seminal acoustic ecology frameworks and describing relevant theoretical models and modes of listening, Grimshaw and Garner explore sound's direct connection with the natural environment where listening is an embodied experience influenced

[41] In this context, acoustic ecology refers to the study of the relationship between individuals and their sonic environment, foregrounding the interactive and immersive nature of auditory perception.

by listeners' memories, current state, and interactions with a dynamic environment (Grimshaw and Garner, 2015, p.83). Sound perception thus fuses with ecology, where "*life has the capacity to influence sound and sound has the capacity to influence life"* (Truax (1984) as cited in Grimshaw and Garner, 2015). This model effectively typifies and expresses the principles of embodied cognition and acoustic ecology by depicting an interconnected framework where the listener, soundscape, and environment function as mutually reliant elements of a unified structure and, in that, essentially interpret auditory processing in the real world (Grimshaw and Garner, 2015, p. 84). Sound, differentiated from sound waves, is with this defined as a perceptual entity, fully embodied and emergently perceived, not a mere carrier of information but also playing a significant role in shaping emotional responses, spatial awareness, and immersion, signalling changes in the environment, or prompting action from the subject. All these functions underscore its role as a purveyor of practical and emotional information within an ecological system.

As such, a perceptual model of acoustic ecology is introduced, integrating the various dimensions of embodied cognition, psychological distance, and sound perception into a unified framework. Sound is situated at the centre of an ecological system, wherein the listener's cognitive, physiological, and emotional states interact with environmental factors to shape auditory perception. The model accounts for both endosonic (internal, cognitive) and exosonic (external, environmental) components of sound perception, demonstrating how sound emerges from the interaction of these elements.

It is argued that sound perception is not merely the result of sound waves entering the ear but is a complex, emergent phenomenon shaped by the dynamic interplay of internal and external factors. The importance and relevance of these combined embodiment factors in the context of auditory perception are derived from their potential direct influence on the perceived sound. This phenomenon is typically thought to be attainable solely by directly altering the sound wave properties and the surrounding environment (Grimshaw and Garner, 2015, p. 87). This model provides a comprehensive framework for understanding how sound functions within an expanded ecological and cognitive system, foregrounding the interrelatedness of the mind, body, and environment in shaping auditory experiences.

In conclusion, a perceptual model of sound integrated with embodied cognition theory is now defined. The mind, body, and environment are conceptualized as a unified system, providing a comprehensive perspective for the understanding of auditory perception; one that draws attention to the importance of acknowledging the interdependence of cognitive processes with

physical and environmental factors. This holistic approach challenges traditional models and points out the singular ways individuals perceive and interact with their surrounding acoustic environments, reinforcing the profound connection between humans and their auditory world.

II.2. Sonic Materialism vs Auditory Culture

II.2.1 Perspectives, positions, and debates

The question remains: Given the diverse perspectives presented about the nature of sound, how can knowledge be produced in this field? What must be considered when investigating how sound and listening produce meaning and knowledge?

Theorizing these matters has been the focus of Sound Studies in its diverse strands and branches. However, despite the increasing institutional status and recognition of sound studies as a distinct disciplinary field, there is still a tendency for investigations in this domain to seek a redefinition of their research focus. Its most primary and fundamental inquiry persists – what is the nature of sound in sound studies? (Campbell, 2017, p. 362) The field has been entangled in a debate concerning its exact condition as an object of study and the potential for manifestation of this object in relation to the subject aiming to examine it (Lavender, 2015, p. 409).

In this context, Jonathan Sterne references the difficult relationship between the concepts, object, and methods involved, which have forced the introduction of what he considers *"abstract questions"*. Specifically, should sound be thought of in relation to a specific set of auditory capacities, referring to *"a phenomenon out in the world which ears then pick up",* as argued by Sterne himself in *The Audible Past*, or can sounds be conceived as possessing their own 'ontological' existence, independent of any particular auditory phenomenon (Sterne, 2012, p. 7)?

This raises the debate of whether sound should be contemplated *for us* or *in itself*. Should the study of sound be based on correlationism[42], or should it explore sonority beyond subjective boundaries? These contrasting possibilities intersect and question the notion of the object itself, mirroring the philosophical transition inspired by Immanuel Kant: the Kantian object emerges as what persists once the thing-in-itself is removed, stripping the phenomenon of the noumenon[43],

[42] Correlationism is a philosophical perspective that gained prominence through the work of French philosopher Quentin Meillassoux. It fundamentally concerns the relationship between human thought and the world. In correlationist thought, the idea is that we can only ever know the world through our mental faculties, which are necessarily limited to human perception and cognition. This implies that we can only understand reality in terms of how it appears to us, rather than how it might exist independently of our perception.

[43] A phenomenon denotes how an object or event appears to human perception—what can be observed, experienced, and described through sensory input. In contrast, the noumenon refers to the object as it exists in itself, independently of any sensory perception or conceptual framework. According to Kantian philosophy, while phenomena are accessible to human understanding, noumena represent a deeper, inaccessible reality beyond the limits of empirical knowledge, thus remaining fundamentally unknowable.

at least in terms of potential experience. This anticipates the precedence of the correlationist 'solution' (Lavender, 2015, p. 412).

Deleuze's philosophy has played an important role in addressing these questions in recent years. Scholars such as Christoph Cox, Steve Goodman, and Greg Hainge have predominantly utilized Deleuze's ideas to challenge perceived limitations in the existing methodologies of sound studies, particularly those stemming from cultural studies. It has been argued that these methodologies remain entrenched in the paradigm of the 'linguistic turn'[44] within the humanities and are thus considered unsuitable for studying sound. The analytical frameworks tailored for exploring visual and textual objects are deemed inadequate for capturing the uniqueness of sound. Critics contend that such an approach is inherently anthropocentric, restricted, and confined within too narrow boundaries. There has consequently been a resurgence of realist, materialist, and naturalist theories aiming to transcend the limitations of representation and meaning prevalent in cultural studies paradigms. These theories strive to achieve a more authentic grasp on the intrinsic nature of sound, independent of cultural or individual subjectivity.

Deleuze's philosophy has been particularly instrumental in this endeavour. Distinctly, his concept of affect, rooted in Spinoza and further developed in Brian Massumi's influential interpretation[45], is the basis for a form of sonic realism. This framework seeks to define sound as a vibrational matter or force, resistant to immediate reduction to subjective or cultural constructs (Campbell, 2017, p. 362). This argumentation has, however, already been subject to critique, and the discussion is at the core of the current debate on the main aspects that constitute possible future paths for the growth and development of sound studies. It is, therefore, important to specify the groundings of these discourses.

So, what precisely is being argued? What is this concept of affect? What defines these ‘new ontologies’? How is their evocation justified? Moreover, what kind of counterarguments have been posited?

[44] The ‘linguistic turn’ refers to a major shift in philosophy and social sciences, particularly in the 20th century, where language and its use became the central focus of inquiry. This shift was significant because it emphasized the idea that language doesn't merely describe reality but actively constructs it.

[45] In his 1995 essay *The Autonomy of Affect*, published in the journal *Cultural Critique* as well as in his book *Parables for the Virtual: Movement, Affect, Sensation* (2002).

II.2.2 Affect

The concept of affect plays a significant role in the development of ontologies of sound within sound studies. In this context, affect refers to how sound can evoke emotional, physiological, and psychological responses in individuals. Understanding affect is therefore crucial in analysing the impact of sound on human experience, cultural dynamics, and sense of self.

A crucial aspect of human hearing is that individual perceptions in a group are similar, interconnected, frequently synchronized, and possibly even a collective tuning into a single perceptual event. What is the prime matter upon which this sharing is built? On what medium? Is the entirety of the experience shared? Are there individual, private components? Referring to this context, John Tooby and Leda Cosmides posit:

> *"Although others cannot experience the great majority of our self-generated aesthetic experiences, from running and jumping to imagined scenarios, there are some avenues of expression that can be experienced by the creator and others. Sounds generated for aesthetic purposes—whether in the form of music, mimicry, or words—are a major example. Once others can experience an individual's aesthetic productions as members of the audience beyond the self, art becomes social, and motives for its production may become mixed."(Tooby & Cosmides, 2001, p. 25)*

Contrary to other aesthetic experiences, sound has the innate ability to be experienced simultaneously by both creator and audience. Unable to be fixated, ephemeral, and living in a symbiotic relationship with time, it creates ambience, inducts, modulates, and circulates moods, feelings, and intensities that, as felt by all listeners, belong to no one in particular (Thompson & Biddle, 2013, p. 5). It is so powerful in its capacity to mobilise bodies and produce intense, collective experiences that Deleuze and Guattari considered it to carry a *"fascist"* danger (Deleuze & Guattari, 1987, p. 324). Its life and experience are momentary, simultaneously enforcing a mandatory communality in its perception. This emotional, sensorial, and perceptual potential by which bodies become interconnected, of which sound is the carrier, has been called many things. Among them *energy*, *aura*, or *affect*.

These terms do not have simple definitions. *Affect*, for instance, has been used within a range of disciplinary contexts, especially since the emergence, around the end of the 20th century,

of a trend[46] in various fields of study[47] to focus more on emotions, feelings, and affective experiences rather than just considering reason and cognition. Thompson & Biddle (2013, p. 6) refer to it[48] as *"an interest in the relationship between bodies (in the broadest sense – including animal bodies, part-bodies and inorganic-bodies) and the fluctuations of feeling that shape the experiential in ways that may impact upon but nevertheless evade conscious knowing."* As a concept, affect tenaciously resists generalizations and attempts at its definition generate language modulations as rich as *"an entire, vital and modulating field of myriad becomings between human and nonhuman"* (Deleuze as cited in Gregg & Seigworth, 2010, p. 6).

Different authors refer to it in different ways but are generally in agreement, considering it as a dynamic force that has the power to modify and modulate in ways that go beyond what is consciously perceived as emotion. In that sense, two main trajectories of affect can be identified: The first, initiated by psychologist Silvan Tomkins, relates it to *"neuro-physiological processes and mechanisms"* qualitatively differentiated by neuronal firing gradient and intensity. Even though interacting with other human operating systems like the motor, drive, cognitive, and perception systems, in his interpretation, affect remains distinct from them. Only when these 'neuro-physiological processes' are combined with thought processes can they elaborate into the more complicated mixes of affect comprising emotion (Gibbs, 2001, as cited in Thompson & Biddle, p.8). Affects are therefore discrete and innate, with emotions being more complex and individualised (Thompson & Biddle, 2013, p. 8). The second trajectory starts in Baruch Spinoza's notion of affect, later reinterpreted by Deleuze and Guattari and, after them, Brain Massumi. Here, the term is defined as distinguishing between the notions of affect (*affectus*) and affection (*affectio*), which refer, respectively, to each body's capacity to affect and be affected, and to the state of the body[49] as it affects and is affected when it encounters other bodies. One notion flowing through the other (ibidem).

The fact that these capacities are relational, depending on and being modulated by encounters with other bodies, means their amplitudes are undefined. They are not intrinsic properties. For both Deleuze and Guattari, and Brian Massumi, they exist and go beyond what is

[46] Commonly referred to as the *Affective Turn*.

[47] Such as cultural studies, sociology, and psychology.

[48] The Affective Turn.

[49] Importantly, Spinoza's concept of *body* extends far beyond the human body, into an animal or plant body, a social group, a body of language, a group of sounds, or even a mind or idea, characterized only by their affective capabilities.

recognized and captured in a specific encounter with any other body, meaning part of this affect globality, while inseparable from any concrete, determined case, can never be fully measured, determined, or assimilated. Massumi calls it the *"connecting thread of experience",* holding the world together (Massumi, 2002, p. 217), existing independently of the bodies upon which emotion or affection are rendered. This idea of an exteriority, of an excess beyond emotion, is central when attempting to provide an ontology of sound or any other body carrying affective power. Massumi coined the term 'affect-itself' referring to this pre-personal, pre-cognitive, and non-representational quality of feelings, moods, and bodily sensations. It is the raw, subjective experience of emotion that is seen as operating prior to and outside of conscious thought and language. Will Schrimshaw tries to clarify this when he posits:

> *"(…) emotion is thought to reside on the side of subjective affirmation while affect 'itself' constitutes something akin to the carrier of this affirmation while remaining distinct from it." (Thompson & Biddle, 2013, p. 30)*

Thus, affect is established as an event independent of the self, upon which it is rendered as feeling or emotion. This separates it from its rendering, its effects, and affirms it as ontologically coherent as long as accessible to thought. A crucial consequence of this autonomy is that hearing this sound-affect is no longer necessary for it to be considered ontologically consistent. Sonic signalling can therefore become silent and retain its affective power, remaining functional and effective even if not perceived, and located, at least partially, beyond the ear.

II.2.3 Aural ontologies

Since around the turn of the century, several authors [50] have developed different conceptual approaches to the sonic with crucial importance to advancing and establishing the now denominated Sonic Turn, as previously referred. These voices are representative of a body of work that has evolved to interpret and make sense of substantial shifts in culture and technology from a specifically auditory point of view. They represent reactions to the dominance of Cartesian dualism, demonstrating methods to break free from the Western inclination to quantify, compute, and depict all aspects of existence. They present ideas, approaches and methodologies to safeguarding and reviving the *"nullified"* senses, such as the sense of hearing,

[50] Douglas Kahn, Michael Bull and Les Back, Trevor Pinch and Karin Bijsterveld, among others.

which should no longer submit to the oppression of visual-centric perspectives (Ikoniadou, 2017, p. 253).

In this process, researchers[51] have advocated the existence of an irreducible positivity in sounds, thus affirming their possession of an intrinsic ontological being. Various trends and authors have developed ontologies of sound, each with different emphases and theoretical frameworks, often intersecting with the concept of affect in distinct ways. Overall, the concept is woven throughout these various ontologies of sound, providing a framework for understanding how sound exerts its influence on human experience, perception, and behaviour. This examination of the affective dimensions of sound, allows for and seeks an uncovering of its transformative potential and role in forging and modelling individual and collective singularities.

> *"While sonic ontologists claim to investigate the nature of sound itself, proponents of auditory culture explore sound in specific cultural and social contexts." (Cox, 2018b, p. 234)*

II.2.3.1 Beyond cognition: vibration, affect, and the politics of frequency.

One of such authors is Steve Goodman. In *Sonic Warfare: Sound, Affect, and the Ecology of Fear*, an ontology of sonic vibration, focusing on vibration's bodily and affective force, is developed. In Goodman's theoretical framework, affects manifest and are imperceptibly transmitted through bodily interactions, distinct from conscious cognitive states or emotions and should be understood as forces operating before representation and signification (Kane, 2015, p. 4).

> *"(...) the term affect will be taken in this broadest possible sense to mean the potential of an entity or event to affect or be affected by another entity or event. From vibes to vibrations, this is a definition that traverses mind and body, subject and object, the living and the nonliving. One way or another, it is vibration, after all, that connects every separate entity in the cosmos, organic or nonorganic." (Goodman, 2010, p. xiv)*

Vibration is proposed as the mode of transmission where sound impacts the listener's body and is first registered by the rhythmic action of said vibration. This affective process, which

[51] Ikoniadou cites the examples of Frances Dyson and Veit Erlmann.

precedes and conditions cognitive reactions, is an impact phenomenon that carries a variety of potential affective powers exerted by way of different autonomic responses[52].

Goodman is specially focused on the moment of vibratory impact preceding cognitive involvement and the consequential possible phenomenological descriptions of listening. This sonic intermodal or synesthetic vibrational impact *"ontologically precede*(s*) the designation of a sensation to a specific exteroceptive sensory channel (the five senses)"* (Goodman, 2010, p. 47). Drawing from Julian Henriques' mention of psychologist Silvan Tompkins' idea of a *"plane of pure sensation"* (ibid, p.28), Goodman argues that affects exist ontologically before being divided into discrete sensory modes[53]. He emphasizes the importance of affective, intensive interaction with sound compared to the delayed moment of conscious listening, promoting an unconscious, affective comprehension of sound as a material impact while stressing the priority of interoception [54] over exteroception, with instinctive reactions occurring before conscious awareness. Citing Joseph Ledoux's studies, Goodman states that affective responses can bypass higher cognitive functions, highlighting the self-sufficiency of the affective system.

Moreover, Goodman suggests that modern power structures manipulate affective mechanisms to establish dominance, cultivating fear and terror regardless of actual dangers. He suggests that these affective control methods function below the level of beliefs and ideologies, making traditional resistance methods ineffective. An affective-based politics is further advocated, proposing the conversion of negative affective states into positive ones, which he labels a *"politics of frequency."* This approach involves experimental techniques like Afrofuturism and electronic dance music, which amplify vibrations to reach different mediums and individuals (Kane, 2015, p. 4).

II.2.3.2 Noise across media: Expression and Virtuality

Greg Hainge's (2013) study, *"Noise Matters",* outlines a cross-media ontology of noise that extends far beyond the sonic. Like other academics exploring noise theory, Hainge notes its

[52] The autonomic nervous system, in vertebrates, is the part of the nervous system that controls and regulates the internal organs without any conscious recognition or effort by the organism. In Britannica, The Editors of Encyclopaedia. "autonomic nervous system". Encyclopedia Britannica, 8 Apr. 2024, https://www.britannica.com/science/autonomic-nervous-system. Accessed 6 May 2024.

[53] Such as hearing, seeing, and touching.

[54] In affect theory, *interoception* refers to the body's internal sense of its own physiological states—like heartbeat, hunger, and visceral sensations. It underlies affect as a pre-conscious, bodily awareness of internal conditions, defining how we feel ourselves from within.

multifaceted nature, often presented while contrasting with ideas like signal, silence, or music. In an effort to organize this diverse and sometimes sinuous notion, Hainge embraces Deleuze's concept of *expression*[55], suggesting that matter itself is a creative element, producing its own forms that occur transitorily as they shift from *virtual* to *actual*[56] existence. By drawing a comparison between Deleuze's *virtual* and white noise, Hainge explains how various sound forms arise through processes analogous to filtering or subtraction from a disorderly sound spectrum. Beyond the aural aspects, in Hainge's model, white noise acts as a template for comprehending the interaction between the *virtual* and the *actual*, where all existing entities embody a manifestation of the *virtual* condensed into reality. Once more, it is important to highlight that Hainge separates ontological noise from ordinary noise or visually noisy occurrences like static or distortion, claiming that noise, as *"the sound of the virtual,"* surpasses mere sensory experience, existing in a realm where everything originates from and embodies the virtual. Hainge expands this examination to different forms of media[57] , suggesting that each medium both enables and resists the expression of its content, reflecting the interplay between the virtual and the actual. During the process of expression, the virtual both facilitates and complicates the emergence of the actual, with ontological noise indicating this inherent opposition. Again, recognizing ontological noise demands careful analysis, as it is easily mistaken for everyday noise. Nevertheless, artworks provide a distinct environment where ontological noise can be understood, illuminating the complex process of expression from the virtual to the actual (Kane, 2015, p. 10).

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[55] In simple words, for Deleuze, expression means that everything reveals its own nature from within, without relying on anything external. Rather than merely representing something else, each thing actively shows what it is through its connections and interactions, making existence a creative, dynamic process.

[56] Gilles Deleuze developed the concepts of *actual* and *virtual* as part of his broader philosophical framework;

1. The actual refers to what is currently existing or realized in the present moment. It encompasses the tangible, empirical, and observable aspects of reality. In Deleuze's thought, the actual is the realm of established forms, concrete events, and specific situations. It's the realm of empirical existence, where things are fixed, determinate, and manifest.

2. The virtual, on the other hand, is not about what is currently existing in empirical reality but rather what has the potential to exist or be realized. It's a realm of potentiality, becoming, and transformation. The virtual is a kind of reservoir or field of possibilities that underlies the actual. It's the domain of latent tendencies, virtual multiplicities, and unactualized potentials.

In Deleuzian terms, the virtual is not opposed to the actual; rather, it's immanent within it. The actual and the virtual are intertwined in a dynamic relationship of becoming. The actual emerges from the virtual through processes of actualization or realization, while the virtual continually generates new potentials and possibilities for actualization. Deleuze uses these concepts across various domains, including philosophy, art, science, and politics, to analyze processes of change, creativity, and transformation. He sees reality as a complex interplay between the actual and the virtual, where the virtual continually pushes the boundaries of the actual, driving it towards new forms and configurations.

[57] Like literature, film and photography.

II.2.3.3 From Representation to Sonic Flux

Given the impact and discussion it generated in the field, Christoph Cox's ontology deserves special attention. For approximately two decades, his efforts have been dedicated to crafting a unique and impactful sonic ontology and developing a framework that has been referred to as a realist, materialist, or naturalist perspective on the essence of sound. (Campbell, 2020, p. 1) Cox questions the adequacy of the models that have been predominant in cultural discourse since the 1970s to theorize sound art by pointing to their incapacity to generate convincing and pertinent critical literature on that field. This failure to capture the nature of the sonic is attributed to the fact that the development of said models was oriented to account for the textual and the visual. (Cox, 2011, p. 146). In this context, aiming at *"coming to terms"* with the Sonic Turn in Arts and Culture, Cox attempts a primarily philosophical conceptualization of sound art as a practice *"between and beyond"* music and the visual arts (Cox, 2018a, p. 1), while at the same time establishing an argument *"for sound art as a field deserving of serious philosophical inquiry"* (Campbell, 2020, p. 1). Having as his stated main objective an engagement in conceptual reflections on sound, noise, and silence within both the sonic and the visual arts, he aspires not only to realise a philosophical contemplation of sound but also to explore how sound can impact or shape philosophical discourse while *"avoiding the pitfalls encountered in theories of representation and signification"* (Cox, 2011, p. 146*)*. His central inquiries address the concepts and modes of thinking which are affirmed, instigated, or brought forth by sound, how sonic contemplation challenges the fundamental ontologies and epistemologies that govern both everyday and philosophical thought processes, as well as an exploration on how sound disrupts the established boundaries of art history and curatorial practices (Cox, 2018a, p. 2).

Cox alludes to the long-lasting influence on aesthetic theory by a variety of critical methodologies[58] that focus on signification, representation and mediation and epistemologically refute essentialism[59], which interprets the world as manifesting fixed conceptual or material essences to which images and signs correspond. This—considered —inflexible essentialism is seen by contemporary cultural theory (CCT) as opposing a necessary accountability for *"the contingency of meaning, the multiplicity of interpretation, and the possibility of change"* (Cox, 2011, p.146). In this context, culture is conceptualized as a system of signs that function within connections of reference to other signs, subjects and objects. Cultural criticism therefore

[58] Cox refers in particular semiotics, psychoanalysis, poststructuralism, and deconstruction.

[59] In practice, any of the (considered) simplistic notions of representation and signification that interpret images and signs as reflecting or denoting a pre-existing reality are rejected.

involves interpreting and tracking signs through associative meaning-attributing networks and tendentially views experience as always mediated by symbols. These networks are in constant flux, producing continuously unstable and ever-changing meaning. Cox goes on to underline the *"deep suspicion(s) of the extra-symbolic, extra-textual, or extra-discursive"* (ibidem) by these approaches, which consider the notion of realism and potential *"direct access to reality"* as either impossible or even deny the existence of such domain[60] (Kim-Cohen as cited by Cox, 2011, p.147). Even if the richness and analytical power of these theoretical approaches is acknowledged, their rejection of realism is said to carry with it a certain epistemological and ontological insularity. Textual and discursive theories implicitly separate cultural signification, representation and meaning from what is considered stagnant, vacuous matter, where nature is often disregarded as insignificant or interpreted as a cultural and social construct. Within CCT, there is a tendency to succumb to what Cox considers a narrow-minded, biased anthropocentric perspective, where human symbolic interaction is viewed as a superlative attribute that separates it from the rest of the natural world. This perspective parallels with the entrenched metaphysical and theological beliefs it (CCT) seeks to challenge, aligning with philosophies such as Platonism, Christianity, and Kantianism by asserting that humans, through some unique endowment[61], hold a superior ontological status above nature. Consequently, CCT demonstrates a problematic Kantian philosophy and understanding of existence, characterized by a dualistic framework that partitions reality into two realms: one of symbolic communication that defines the limits of what can be known, and another of nature and materiality that remains beyond the reach of knowledge and rational discourse (Cox, 2011, p. 147). This is the core of Cox's critical argument.

This explicitly Kantian ontological and epistemological understanding of sound-in-itself stresses the need to reflect on the status of the sonic object. The apparent incapacity of the *"prevailing theoretical models"* to think the objects of contemporary sonic practice points to a correlationist "solution" where an encounter with sound-in-itself is outside the realm of the possible. As Cox states, CCT,

> *"(...) divides the world into two domains, a phenomenal domain of symbolic discourse that marks the limits of the knowable, and a noumenal domain of nature*

[60] Cox refers Ferdinand de Saussure excluding physical sound from semiotics; Jacques Lacan stating that *'there is no such thing as a prediscursive reality'* and dismissing the material foundation of culture that *'resists all symbolization'*; Jacques Derrida contending that *'there is nothing outside of the text'* and Stuart Hall maintaining that *'nothing of significance exists outside of discourse.'*

[61] Such as, according to Cox, soul, spirit, mind, reason, language, etc.

and materiality that excludes knowledge and intelligible discourse." (Cox, 2011, p. 147)

As mentioned earlier, this segmentation effectively gives rise to the notion of the *object* differentiated from the *thing-in-itself*. While the former constitutes an aspect of possible experience, the latter denotes precisely what endures beyond such experience. Therefore, it can be inferred from Cox's assertion in this context that it is specifically this concept of the object originating from Kantian philosophy that inherently precludes sonority - namely, the idea of a *sonic object* thus becomes contradictory (Lavender, 2015, p. 412). This problematic impasse is central to this argument.

Given the apparent flaws of contemporary cultural theory, is there a better alternative?

Considering sonic arts' resistance to theoretical description and analysis, Cox posits the need for a new approach. One that would apply to all arts and eliminate the problematic dualisms[62] *"toward a thoroughgoing materialism that would construe human symbolic life as a specific instance of the transformative process to be found throughout the natural world"* (Cox, 2011, p. 148).

Cox fully distances from representational thinking by invoking Jonathan Sterne. Even if musical composition and sound installation are undoubtedly practices deeply rooted in history and society, carrying significant cultural significance, music lacks the representational aspects found in words and images, having always been acknowledged as a uniquely non-representational art form. It does not, generally, carry the referential structure of words and

[62] Cox mentions the dual planes of culture/nature, human/non-human, sign/world and text/matter.

images. Sterne stated in his Audiovisual Litany[63] that sound is immersive and proximal, while texts and images imply spatial separation between the observer and the object. In contrast, sound engulfs and penetrates the body, creating an immersive and immediate experience. While texts and images rely on spatial arrangements of elements, the sonic arts involve a temporal fluidity where elements blend and interact with each other.

This resistance of the aural arts to interpretations based on representation and symbolism has caused them to be often viewed as purely formal and abstract. Nonetheless, Cox argues that recent significant sound artworks[64] have explored the material aspects of sound, delving into its texture, temporal dynamics, and tangible impact on the materials it traverses. These works suggest that the sonic arts are not more abstract than visual arts but rather more concrete, calling for an analysis grounded in materialism rather than formalism (Cox, 2011, p. 149). A materialist ontology of sound is thus advocated, characterized by a central concept which he denominates *sonic flux,* translating a "*notion of sound as an immemorial material flow to which human expressions contribute but that precedes and exceeds those expressions" (Cox, 2018a, p. 2)*.

It is, however, important to refer that Cox establishes a clear differentiation between sound art and music, with the former illustrating the essential nature of sound as an ever-changing material flow, rich in gradients and potentials, a site for perpetual difference, going beyond mere auditory perception and human conceptual frameworks. He suggests that while music and sound art consist of sound ontologically, the latter specifically aims to reveal the fundamental underpinnings of sound itself. Through its scrutiny of sound's differential and inherently creative characteristics, sound art broadens auditory perception, exposing a genuine metaphysical aspect of sound. Therefore, even though music and sound art have a shared material foundation, only the latter seeks to comprehensively uncover and engage with sound's ontological status.

To summarise, music, typically concerned with formal structure, undergoes a shift when faced with naturalist philosophy, recorded sound, and avant-garde experimentation,

[63] Jonathan Sterne's "Audiovisual Litany" is a concept he discusses in his work on media theory, particularly in his book *"The Audible Past: Cultural Origins of Sound Reproduction."* The Audiovisual Litany is a critical tool Sterne uses to challenge the traditional distinctions often made between sound and vision. This dichotomy is frequently characterized by a set of opposing qualities usually ascribed to auditory and visual experiences.

[64] By artists such as Max Neuhaus, Alvin Lucier, Christina Kubisch, Christian Marclay, Carsten Nicolai, Francisco Lopez, and Toshiya Tsunoda.

transitioning from displaying formal relationships to investigating sound itself. This transformation leads to the emergence of sound art as a distinct domain, characterized by its focus on the materiality and creative potential of sound.

The sonic virtual - Deleuze via Nietzsche and Schopenhauer

Cox's reasoning is drawn upon the naturalist and materialist theories of Schopenhauer[65] and Nietzsche,[66] whose philosophical criticisms laid the foundation for comprehending music beyond mere representation, interpreting it as an expression of nature's fundamental forces in what can be understood as a first attempt to access the sonic virtual (Kane, 2015, p. 9). Both provided a critique of the concept that music functions as a means of representing something, instead viewing it as an embodiment of the ceaseless pursuit of the will – in Schopenhauer - or the inherent force of nature associated with Dionysus – in Nietzsche – thus providing a basis for constructing a materialistic framework for the study of music and sound.

At this point, it is important to clarify, as Cox does, some elements of this conceptual map and how they relate and situate within the Deleuzian metaphysical framework shared by Cox and the previous ontologies of Goodman and Hinge. In the philosophical naturalism concerning sound shared by these authors, the dichotomy between the 'virtual' and the 'actual' and the corresponding notions of 'difference' and 'diversity' are especially relevant.

Nietzsche describes the world as 'will to power' in a 'Dionysian world' distinguishing between the Apollonian and the Dionysian[67]. These so-called 'art impulses of nature' differ from Schopenhauer and Kant's distinctions[68] and anticipate Deleuze's distinction between 'the actual'

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[65] Namely, Schopenhauer's distinction between the notion of "representation" and the world of "will", *"an undifferentiated, propulsive energy or force"* where each individual has a personal experience of *will* as the driving force behind desire, action, and movement, which sets it apart from others. music offers an audible expression of nature in its power and is a direct expression of this will which precedes representation, therefore acknowledging the non-representational character of music. Schopenhauer's theory of music and sound is therefore considered important in the construction of a materialist philosophy of sound and music (Cox, 2011, p. 149).

[66] Nietzsche rejects the hylomorphic model (understanding every physical entity is a composite of two intrinsic principles: matter (hyle) and form (morphe)) and in that anticipates contemporary scientific and philosophical materialists, opting for a theory of self-organization. Cox states*: "For Nietzsche (2003[1885–8]), matter itself is creative and transformative without external agency, a ceaseless becoming and overcoming that temporarily congeals into forms and beings only to dissolve them back into the natural flux, an 'eternal self-creating' and 'eternal self-destroying … monster of force, without beginning, without end' (p. 38)."* Nietzsche's names this flux 'will to power', in an endeavor to develop a theory of natural causality inherent to matter that progresses without any external agency."

[67] In Nietzsche's philosophy, the Apollonian represents order, reason, and restraint, associated with structure, harmony, and individuality. The Dionysian, in contrast, symbolizes chaos, instinct, and passion, linked to emotion, unity, and the dissolution of boundaries. Nietzsche sees these forces as essential to art and human experience, with the highest forms of culture emerging from their dynamic tension.

[68] Respectively, between representation and the will and phenomena and noumena.

and 'the virtual', which naturalizes them. According to Cox, these terms "*mark the difference, within the flux of nature, between empirical individuals and the forces, powers, differences, and intensities that give rise to them.*" (Cox, 2011, p. 152) Cox then quotes Deleuze which describes that same dichotomy in terms of 'diversity' and 'difference' to clarify the distinction between 'what appears' and the material conditions for that appearance:

> *"Difference is not diversity. Diversity is given, but difference is that by which the given is given, that by which the given is given as diverse. Difference is not the phenomenon but the noumenon closest to the phenomenon ... Every phenomenon refers to an inequality by which it is conditioned."* (Deleuze, 1994, p. 222)

In Cox's ontology, forces of nature, characterized by their intensity and differential essence, are distinguishable from the objects that from them emerge. When viewed as a force, nature demonstrates a continual state of differentiation, while the emergent objects appear solid and permanent as *res extensa*[69]. The term 'actual' refers to these seemingly fixed, empirical things. On the other hand, the term 'virtual' describes the multitude of constantly varying forces that contribute to the existence of the actual. While the 'actual' refers to actualized potentialities, the 'virtual' represents pure possibility or absolute potential. (Kane 2015, p.4).

Cox further underlines an important distinction; Deleuze utilizes Kantian terminology to convey a thoroughly non-Kantian argument. Even if Deleuze maintains that a crucial differentiation must be made between what is visible and the prerequisites for this visibility, these conditions of possibility are not conceptual or cognitive, as they are for Kant; they are entirely material and inherent in nature itself. The diversity of empirical individuals[70] results from material intensive *'differences'* at the micro-level of physical, chemical, and biological matter but remains virtual, imperceptible at the level of actual, extensive entities. Deleuze's distinctions are not of linguistic, conceptual, or cultural origin. Operating below the realm of representation and signification, these distinctions subsist in nature itself.

[69] The concept of 'res extensa' is a term used by the philosopher René Descartes. It refers to the idea of 'extended substance,' which means anything that has physical properties like length, width, depth, and mass. In simple words, 'res extensa' is everything that takes up space and can be measured. This includes all physical objects in the world, like rocks, trees, and even our own bodies. Descartes contrasted 'res extensa' with 'res cogitans,' which means 'thinking substance' or 'mind.' While 'res extensa' is about physical things that can be touched and seen, 'res cogitans' is about thoughts, feelings, and consciousness. Descartes' philosophy separates the mind and the body into these two different types of substances.

[70] The actual. - 'That which appears' (the variety of the actual, empirical individuals that inhabit the world of our encounters) (Cox, 2011, p.153).

An exterior immanence

A major step toward the disclosure of sound's virtuality was, according to Cox, the invention of the phonograph by Edison and Cros that further emancipated sound from human-centred limitations, exposing its true essence beyond human understanding. Quoting Kittler, Cox underlines the phonograph's capacity to *"register acoustic events as such"* (Kittler, 1999). According to Friedrich Kittler, and contrary to what happens in human hearing, the phonograph does not filter sounds as trained human ears do; instead, it registers acoustic events in their entirety, which he equates with 'the real' in a materialist interpretation of Lacan[71] (Cox, 2011, p.154). The disclosure of auditory events as such reveals the pervasive conceptual and anthropocentric framework that human listeners impose on sound, consequently enabling access to Kittler's 'real'. Cox links Kittler's concept of 'the real' with the Deleuzian notion of 'the virtual', representing a fundamental rejection of symbolic and imaginary constructs and portraying them using comparable language (ibidem).

As mentioned earlier, music captures sound and transforms it into form as part of symbolic and imaginary order. Similarly, composition shifts focus from sound to organizational features. Contrastingly, the encounter with naturalist philosophy, recorded sound, and avant-garde experiments[72] alters music's purpose, turning it into an investigation into sound-itself where artists explore sound's ontology, leading to the emergence of sound art (Kane, 2015, p.9). That is the case of sound poetry, *musique concrète*, and works like John Cage's *4'33"* where sound is explored beyond traditional music. That is also the case of Edgard Varèse's discarding of the term 'music' and embracing the concept of 'organized sound' leading to the advent of electronic music. This further illustrates the shift towards understanding music as dynamic flows of sound, emphasizing the physicality and fundamental nature of auditory experiences, a progression that underscores an ongoing exploration of sound transcending representation, central to modern sound art. That is what is implied in John Cage's assertion that *"music is continuous; only listening is intermittent",* which encapsulates his view of sound as a constant,

[71] For Jacques Lacan, 'the Real' refers to a fundamental order of experience that is beyond language, symbolization, and understanding. It represents what is impossible to fully grasp or integrate into the symbolic structures (like language or culture) that shape human subjectivity.

[72] Kane cites Russolo, Varèse, Cage, etc, while Cox's original text refers a wide range of creators from sound poets Aleksei Kruchenyk and Hugo Ball through Henri Chopin and François Dufrêne which Cox considers *"withdrew language from representation and signification, shifting it, in poet Steve McCaffery's (1996) words, 'from phonic to sonic'"*, through Pierre Schaeffer's *musique concrète* discarding *"the traditional apparatus of musical culture" (...) in favor of worldly sound recorded onto disk and tape"* to John Cage's *"collapsing the distinction between 'silence' and 'noise' – the dense virtual field that subtends all signal and meaning;"* leading to the disclosure of noise as a resource to the sonic arts (Cox 2011, p. 154).

anonymous flux that exists independently of individual listeners and composers, viewed by Cage as curators rather than creators of this sonic continuum (Cox, 2011, p.155).

Sensing a potential objection to this notion in the argument that sound is a product of human perception and the implied division between the phenomenon of sound and its noumenal source, Cox cites Casey O'Callaghan's arguments in *"Sounds"* (O'Callaghan, 2007). As referred previously in section II.1.2.1, O'Callaghan challenges this orthodoxy, proposing a sonic realism and arguing for an event view of sound. This conception implies that sounds persist through changes in their qualities, hence opposing the phenomenological perspective and assuming the conception of sound as an independently existing object. Although from a phenomenological perspective, Pierre Schaeffer's concept of the *objet sonore*—the sonorous object—supports this same idea of sounds as distinct objects, separate from both their sources and the listener's perception, and considered ontological particulars and individuals instead of qualities of objects or subjects. Cox, however, is critical of Schaeffer's approach, which he considers missing the temporal qualities of sound. These inherently temporal and durational aspects, linked to the varying qualities over time, make sounds temporal events rather than static objects.

This idea of an ontology of events is at the centre of Cox's argument. To escape the exile of perception-dependent secondary qualities to which the hegemony of the visual condemns sounds, it becomes necessary to begin with sound and adopt a different ontological conception—one of *'becomings'* or *'haecceities'*[73] in the words of Nietzsche and Deleuze, respectively. A new ontological commitment is thus made to the primacy of becoming, time, and change (Cox, 2011, p. 157).

Considering this materialist approach, Cox posits the need to re-evaluate the arts, where sound and the sonic arts are not seen as an exceptional domain of non-signification and non-representation but integrated within the material world and its inherent powers, forces, intensities and becomings. This sonic point of origin challenges traditional theories and promotes a materialist model of force and flow where it is less likely to engage in thinking in terms of representation and signification or to perpetuate the preponderant dualisms[74] associated with

[73] In Nietzsche and Deleuze's philosophy, *'becomings'* refer to dynamic processes of transformation and perpetual change, emphasizing life as a flux of forces and creativity rather than fixed identities. *'Haecceities'*, drawn from medieval philosophy and expanded by Deleuze, describe singularities or unique moments of existence defined by their qualities and relations rather than substance—focusing on the 'thisness' of an event or experience. Both concepts reject static being in favor of fluid, relational, and evolving realities.

[74] Between culture and nature, human and nonhuman, mind and matter, the symbolic and the real, the textual and the physical, the meaningful and the meaningless (Cox 2011, p,157).

those reasonings. This shift calls for a reassessment of aesthetic production through a materialist lens, emphasizing the dynamic nature of sound, where artworks are thus the product of material complexes of forces.

Cox parallels the Deleuzian analysis of art forms such as painting, film, music, or literature in this context. Deleuze focuses on the actions and operations of art forms rather than their meanings, emphasizing movement and transformation. The locus is on what art does and how it operates rather than what it means. For Deleuze, images and language are defined by their capacity to move, flow, and transform, rather than by their representational content.

In summary, adopting a realist conception of sound questions traditional theories of signification and representation, inducing a transition towards a materialist model of force and flow. This approach allows for an advanced theory of the sonic arts, comparable to literary and visual art theories, and calls for a rejection of the idealist and humanist frameworks that have dominated theoretical discourse over the past fifty years. Instead, aesthetic production and appreciation should be reconceived through a materialist lens, affirming sound's dynamic and immanent nature.

II.2.3.4 Sound as lived experience

This reasoning would not be complete without mentioning Salomé Voegelin's theory of sonic materialism. Hers is an interpretation grounded in a phenomenological approach, emphasising sound's subjective and immediate experience. Voegelin focuses on the perceptual and affective dimensions of sonic experience, advocating for an engagement with sound that prioritizes the listener's embodied and situated experience, presenting a *"generative poetics that aims at activating the reader's listening"* (Schrimshaw, 2019, p. 119).

> *"Sonic materialism proposes to pursue a phenomenological materialism that engages in the reciprocity of being in the world and the world being the commingling of all the slices of its possibilities, complex, plural, and possibly at times unintelligible and unreliable but felt and lived." (Voegelin, 2021, p. 86)*

While focusing on the phenomenological, the approach articulates the lived experience of sound, exploring how sound is perceived and experienced from a first-person perspective and highlighting its temporal and spatial dimensions. Like Cox, Voegelin's sonic materialism foregrounds the affective, non-representational aspects of sound. It is argued that sound engages listeners on an emotional and sensory level, fostering an immersive and immediate connection with the auditory environment. Furthermore, in Voegelin's view, sound is inherently

immanent, existing within the listener's experience rather than being an external object to be analysed or represented. This immanence is tied to the ephemeral and contingent nature of sound, which unfolds in real time and is inseparable from the act of listening.

> *"Where the matter of sonic materialism does not coincide with an external materiality but is equated with sensation and auto-affection, the material reality of sonic materialism is grounded within subjective experience. It is this latter perspective that we find in the work of Salomé Voegelin." (Schrimshaw, 2019, p. 116)*

However, several key differences can be established relative to Cox's interpretation. Voegelin's phenomenological method contrasts with Cox's naturalistic physicalism. While Voegelin centres on subjective experience and affect, Cox emphasizes the objective, material, and physical properties of sound, extending beyond human perception *"wherein matter is that which resides beyond the human in a mind-independent reality."* (Schrimshaw, 2019, p. 113) Moreover, as mentioned, for Voegelin, sound is immanent within the act of listening and inseparable from perception. In contrast, Cox views sound as an autonomous material entity existing independently of human experience.

> *"The matter populating the reality of such a lifeworld entails appearances, affects, sensations rather than the objects of theoretical or empirical science, or theoretically contaminated modes of perception. The reality with which Voegelin is concerned is that which is immanently generated in the affective encounter, the experiential reality of a subjective lifeworld rather than objective exteriority." (Schrimshaw, 2019, p. 120)*

> *"What we can take from Voegelin's clear alignment of phenomenological and sonic materialism is the sense that matter pertains to the sensorial events of a contingent encounter that ultimately boil down to an auto-affective sensation of the self. This is what we will call phenomenological matter." (Schrimshaw, 2019, p. 120)*

It is therefore important to underline this important distinction between Voegelin and Cox's arguments; while both authors agree about sound's privileged position in relation to the real, its composition and location remain ambiguous, encompassing, in Voegelin's case, the autoaffective experience of the listener or, in Cox's, an external immanent essence that reaches and remains beyond human perception.

These stances cannot simply be categorized respectively as internal and external since the immanence associated with Voegelin's stance views external existence as a phenomenon emerging from the self-affecting inner world of the listener. In Cox's perspective, the relationship

between interior and exterior is nearly the opposite: it is the excessive exteriority[75] implied in the naturalistic interpretation of the real that encompasses and generates the inner world of auditory experience. (Schrimshaw, 2019, p. 119). Both viewpoints offer layered interpretations of internal and external aspects, but it is the overarching concept defining the domain of immanent existence to which each author adheres that should be considered the defining location of reality.

> *"The sonic material is not a mirror but a depth into which I entrust myself in listening and from where it moves that which is above, on the surface of the visible world, including my own visibility and my relationship to yours. The sound work gives us not the certainty of the visual object, neither actually nor metaphorically, but invites us into an invisible place that we co-inhabit for the duration of our listening and through which we generate each other in a different light." (Voegelin, 2021, p. 88)*

II.2.3.5 On the primacy of affect

In the present described ontologies of sonic materialism, sound has been theorized as fundamentally impervious to conceptualization and representation, while intuition and sensorial encounters have been advocated as the most relevant processes to engage with the reality of the sonic. Such an interpretation is a reaction to the visual hegemony that has historically favoured visual culture over auditory culture (Cox 2011, p. 157 as cited in Schrimshaw, 2019, p. 114). It proposes a theoretical framework where sound is imbued with ontological primacy due to its closer ties to fundamental materiality. Sound is elevated by this priority above vision in the hierarchy of senses, thereby establishing auditory culture as more closely linked to a primal materiality than the abstractions inherent in visual culture. At the core of this notion of sonic materialism lies therefore a commitment to the importance of pre-symbolic materiality. Immediate sensory experiences are considered foundational to all knowledge, whereby concepts and representations are deemed secondary to direct sensory engagements with the material world. This standpoint grants sound a privileged status, as it is perceived to have a more immediate connection to pre-symbolic experiences than visual representations.

An affective methodology is thus employed. To directly access a primordial materiality, the focus is on the prioritization of sensations or emotions elicited by an interaction with artworks, rather than its representational or symbolic content. This process steers the artwork into an indeterminacy, which is only resolved through the contingency of an encounter with the listener. This internalist logic implies that an artwork's determinate form or content is relegated

[75] Affect, in its autonomy.

to a subordinate position in favour of an auto-affective generation of sensation and meaning (ibidem). This is an important aspect to retain as it will be central to the critique presented in section II.2.4.

As referred to previously, in sonic materialism, affects are viewed as autonomous forces that exist in excess of individual emotions and subjective experiences. Building on Deleuze and Guattari's ideas, affects are understood as inherently valid, independent of subjective feelings. This autonomy allows affects to transcend the boundaries of individual bodies and emotions, placing them within a physical domain rather than a transcendent one. This affinity of autonomous affects with the extra-somatic asserts an unequivocal materialist interrelation, affirming the agential participation of materials as constituent elements of the work of art, thus upholding that sensation is inherently rooted in the material realm. An immanence of materials and sensations is thus proposed in sonic materialism, emphasizing their intertwined and inseparable nature (Deleuze and Guattari 1994, p. 166, as cited in Schrimshaw, 2019, p. 115).

The location of this affective materiality relative to perception is subject to different interpretations. For Deleuze and Guattari, the affective maintains an ambiguous relation to subjective experience where it is assumed to exist within a material, physical domain, exceeding or existing beyond perception to some extent. The existence of this excess places this material aspect somewhat outside the realm of perception. As a result, a potential pathway is revealed towards a physical, naturalistic realism. It is precisely this coupling with a material plane that characterizes Christoph Cox's sonic materialism, marked by a naturalistic realism that recognizes material reality beyond human perception. This perspective maintains that materiality and sensation are fundamentally connected within a physical, naturalistic framework, allowing an understanding of the real that transcends subjective experience (Schrimshaw, 2019, p. 115).

Within Gilles Deleuze's philosophical framework, the concepts of ‘affect,’ ‘virtual,’ and ‘actual’ are intertwined in a complex and nuanced relationship. These terms are central to his metaphysical and ontological framework, where affects represent a key interface between the virtual and the actual. As mentioned in the previous section, Cox, Hainge, and Goodman collectively engage in a critical examination of ‘representation and signification’ in their consideration of the metaphysical aspects of the virtual and the actual. Notwithstanding the particularities of their ontological approaches, their transition to ontology represents an attempt to evade the alleged linguistic turn, or the emphasis on cognition, consciousness, anthropocentrism, phenomenology, or culture. Specifically, as detailed by Kane, Goodman's conclusions align with Cox's perspectives, with a central focus on affect. According to Goodman,

affect is not merely an addition or a substitution to the concerns of cultural theories of representation but rather a framework that establishes itself as fundamental before such frameworks. For instance, by delving into *"theories of affect and the imperceptible,"* Goodman's work circumvents the limitations imposed by critical musicological approaches in cultural studies, which often confine discussions to issues of representation, identity, and cultural significance (Kane 2015, p.4).

In opposition to Cox's external material realism, Salomé Voegelin situates her perspective and material reality of sonic materialism within subjective experience, diverging from external materiality and instead aligning with sensation and auto-affection. This differentiation underscores the different levels of focus on the material—and the perceptual—in discussing sonic materialism.

Ultimately, sonic materialism questions the dominance of sight and vision by highlighting the primacy of sound and its close connection to essential materiality. Through an affective methodology, it seeks to prioritize immediate sensory experiences over conceptual representations, justifying a naturalistic and materialist understanding of sensation and affect.

II.2.4 Critique | Re-situated knowledges

We have now characterized different approaches and theorizations of ontologies of sound. Our search for the object of sound studies has led us to explore various conceptions of sound, both in-itself, as a physical, material phenomenon, and relative to our perception of it. To ground the interpretations presented, correctly translate the difficulties of this discussion, and illustrate its continued vitality within sound studies, it is crucial to present the diverse counterarguments already posited by several authors.

As previously stated, within the emerging academic domain known as 'Sound Studies,' there is a predominant focus on discourse amid the humanities and social sciences fields, where what has been referred to as the 'Acoustic Turn' is primarily addressed via methodologies from cultural sciences and semiotics. These areas of study are established on principles that starkly contrast with those of sound (or noise—referred to as the 'sonic field') (Herzogenrath, 2017, p. 3). On this basis, there is a prevalent belief that Deleuze provides a pathway to move away from the metaphysical concepts of being, representation, and identity commonly found in cultural theory, deemed inadequate for analysing music, sound, and noise. This is what led Christoph Cox's attempt to go 'beyond representation and signification,' as well as the investigations of several other authors mentioned in this text.

II.2.4.1 The problem with onto-aesthetics

It was precisely this context that caused Brian Kane, in 2015, to criticize Cox and other scholars in the field of what he names 'Deleuzian sound studies' for basing their interpretations of sound on what he considered a flawed ontological approach. Kane argued that by focusing on the Deleuzian concept of the 'virtual' as a realm of difference and endless potential, these thinkers overlook the historical, cultural, and institutional contexts that shape sound as a subject of analysis. As a result, they tend to create a divide between 'auditory culture,' which explores these contexts, and 'sound studies,'[76] which concentrates on the intrinsic essence of sound (Campbell, 2020, p. 2).

Brian Kane has thus been striking in his critique of the 'ontological turn' inherent in Deleuzian approaches, which prioritize research into *"universals concerning the nature of sound,*

[76] Campbell uses the term to differentiate from 'auditory culture' even if it has been referred as very closely related to Sound Studies earlier in this text.

the body, and media" (Kane, 2015, p. 3) over investigations into auditory culture, defined as the cultural, social, technological, and political constitution of sound and listening. This prioritization, Kane argues, creates a problematic distinction that hinders the ability of Deleuzian scholars to recognize the influence of culturally-situated practices and techniques on the constitution of sound and other ontological entities as enquiry objects (Campbell, 2017, p. 362).

> *"For Kane this ontological turn is undertaken at the expense of adequately accounting for the cultural conditions of perception and artistic practice." (Schrimshaw, 2019, p.109)*

Focusing on the theories of Cox and Hainge, Kane observes that both view the sonic arts as crucial in revealing the essential nature of sound: Cox sees it as material flux, while Hainge views it as boundlessly creative noise, both aligned with Deleuze's concept of the *virtual*—inferred as fundamental difference underlying empirical actuality. For these authors, artwork discloses its ontological condition[77] (ibid, p. 363).

To emphasize this idea that artwork can reveal or disclose its ontology, Kane introduced the term 'onto-aesthetics', referring to the merging of aesthetics and ontology (Kane, 2015, p. 11), (Schrimshaw, 2019, p.110).

However, according to Goodman and Quine[78], as referred by Kane, this notion of disclosure does not align with the critical inquiry required by ontology. Quine posits that ontology addresses the question 'What is there?', a question incompatible with the Deleuzian assertion that the virtual is in some respects more 'real' than the actual. Drawing on Goodman, Kane further argues that Cox and Hainge confuse embodiment with exemplification (Campbell, 2017, p. 363).

> *"The problem with onto-aesthetics is that it relies on a category mistake. It confuses embodiment with exemplification." (Kane, 2015, p. 11)*

Embodiment refers to whether an object is of a certain kind or belongs to a particular category; one can assert that a given sound *is* a sound but not that one sound is more of a sound than another. Conversely, exemplification is a form of reference, allowing one to state that a work of art is a better example of sonicity or draws attention to its sonicity more effectively than another (Campbell, 2017, p. 363). However, contrary to exemplification, *"ontology does not come in degrees"* (Kane, 2015, p. 12). Most importantly, exemplification does not transcend

[77] That is, in this case, the condition of sound or noise.

[78] Nelson Goodman and W.V.O. Quine.

representation and signification; it operates within an existing representational structure. Therefore, Kane contends that the concepts of sound in Cox's and noise in Hainge's theories are not ontologically essential but are culturally mediated, historically situated, and embedded within systems of signification. (Campbell, 2017, p. 363)

> *"However we construe the predicates, exemplification, like all symbolic or referential acts, only occurs when the predicates that are being exemplified are already organized into systems of signification." (Kane, 2015, p. 13)*

> *"My argument with Cox and Hainge's onto-aesthetics is not that the virtual can never be presented as such but that their use of analogies betrays the fact that their supposedly culture-free ontology presupposes a cultural ground." (Kane, 2015, p. 15)*

Thus, Kane argues that exemplifying an ontology of sound is unnecessary since sound embodies this ontology, which can consequently be recognized in any sound, irrespective of its involvement in representational systems. The ontology of sound is also not necessarily obscured by its engagement in representation, as addressing this ontology is a matter of attention, of listening, rather than aesthetics or artistic intent. Listeners can perceive sound as it is, as sound itself, or concentrate on its indicative or semantic meanings. The possibility of a portrayal of sound as an indistinct non-signifying flow of sonic materiality, as seen in the diverse drone compositions of Éliane Radigue, La Monte Young, Phill Niblock, or Kevin Drumm, does not imply an assumption that these sounds embody a sound ontology any more than any other kind of sound. Realism can thus be maintained without disregarding sound's involvement in representation, conceptualization, or cultural practices. Meaningful sounds embody a sound ontology just as much as a non-signifying sonic flux. Consequently, onto-aesthetics places an excessive demand on aesthetic and creative approaches that explore ideas of reality by insisting that material ontology be mirrored or demonstrated at the aesthetic level (Schrimshaw, 2019, p. 110).

Brian Kane presents another critique, accusing Cox of essentialism. Kane suggests that Cox's emphasis on sound's 'virtual' dimensions—understood as the abstract, non-actual potentialities of sound—neglects the concrete historical and cultural contexts within which sound is produced and experienced. According to Kane, this essentialist stance fails to account for the full complexity of sound as a material and cultural phenomenon. Cox responds to these critiques by reaffirming the necessity of realism and materialism for a comprehensive understanding of sound, arguing that these philosophical positions provide essential insights into the nature of sonic phenomena (Campbell, 2020).

II.2.4.2 Empowering the pursuit of sonic realism

As Kane, Will Schrimshaw posits that the reflection of material ontology in aesthetics, termed *onto-aesthetics*, restricts our understanding of sonic experience and reality by amalgamating sound-itself with a limited understanding of sonic experience outside of representation. This can therefore be understood as hindering sonic realism. For a more accurate pursuit of this realism, it is thus essential to distinguish between ontology and aesthetics. An undoing of onto-aesthetics may enable a better comprehension of how artistic practices can align with a realist, post-correlational perspective without assuming onto-aesthetic conflation.

Even if Schrimshaw still values the realist perspective, he then takes an important step in this direction that fully differentiates his thinking from Cox's: the assumption that by severing this conflation, we can more effectively employ methods of representation and conceptualization to address a naturalistic conception of reality that extends beyond human perception. At the centre of Schrimshaw's argument, this approach opposes the already mentioned Christoph Cox's notion of 'sonic thought,' which emphasizes thinking through or as sound. Rejecting the obligation to perform this 'sonic thought' allows for more diverse ontologies, fostering more varied and potentially richer images of the real.

> *"Beyond the constraints of onto-aesthetics we are more able to understand how methods entailing representation, conceptualization and picturing might equally well or better address a conception of real that is naturalistically construed and identified in excess of the human." (Schrimshaw 2019, p.111)*

However, Schrimshaw goes further and extrapolates on Kane's reasoning. Besides rejecting onto-aesthetic conflation, Schrimshaw also deems essential *"an unbinding of immanence from immersion"*, as the latter is considered to impose an unnecessary epistemological restriction[79] (Schrimshaw 2019, p.111). Positing that immersion has evolved into an orthodoxy in sound art practices, Schrimshaw attempts to differentiate what he perceives as a merging of the concepts of 'immanence' and 'immersion' as employed by sound artists and scholars in sound studies. But what exactly is meant here?

Immersion, frequently considered a fundamental experiential attribute within sound art, as in the broader domains of sound studies and auditory culture, has an inherent significance, reinforced when contrasted with a visual, ocular-centric culture, often perceived as more distant

[79] This restriction arises from assuming a phenomenological and correlational rationale that equates reality with a fundamental phenomenological substance that precedes the distal abstractions of representation (Schrimshaw 2019, p.111).

and anti-immersive. Conceptually, it illustrates enveloping qualities attributed to a particular auditory experience or sensibility and suggests an embodied presence, an affective encounter frequently seen as contrary to rationality and critical thinking. Its importance is typically advocated by prioritizing the affective impact of sound over the epistemic aspects, potentially abstract and critically distant, consequentially considered contrary to the aesthetic interiority of immersive experiences. Also important is the temporal immediacy of the immersive experience generated in the encounter between the artwork and its audience. This relationship between the audience and the artwork has a pivotal role in shaping the encounter. The immersive artwork is fundamentally reliant on a subject to immerse. Immersion is therefore a phenomenon that experientially combines space and time through the immediate encounter with a fundamental sonic flux or vibration. Its enveloping and enfolding attributes contribute to an internalist logic that emphasizes the importance of perceptual engagement.

The immediacy of immersion and its underlying phenomenological and correlational rationale assert that true reality is limited to what is immediately experienced, while anything conceptualized, modelled, or predicted remains abstract and diminished in ontological significance. Within the internal logic of immersion, reality is defined by what is immediately present; abstract thoughts that are predictions or accessible only through contemplation are considered less real (Schrimshaw 2019, p.111).

Scrimshaw, however, challenges this logic of interiority.

> *"This logic is challenged on the grounds that it diminishes capacity for thinking beyond the immediacy of human experience, collapsing differentiation through the assertion of an affective homogeneity positing mystical unification through a figure of cosmic vibration[80]." (Schrimshaw, 2019, p. 2)*

Invoking Marshall McLuhan's theories of auditory space and Jonathan Sterne's subsequent concept of the *audiovisual litany*, acoustic space is defined as allowing an immersive, enveloping experience characterized by immediacy, simultaneity, and affectivity, which stands in stark contrast to the linear, objective nature of visual space. Acoustic space is thus described as circular and subjective, providing a holistic sensory experience that engages the subject on multiple levels. Accordingly, immersion in sound is presented as a potent means of achieving a profound, visceral engagement with art (Schrimshaw 2019, p.7).

[80] This '*figure of cosmic vibration'* originates in Dyson (Dyson 2009, 88) as referred by Schrimshaw.

Oral	Visual
spherical	directional
immersion	perspective
affect	intellect
temporal	spatial
subjectivity	objectivity
interior	surface/exterior
contact	distance
life	death

Table 1- The Audiovisual Litany – Adapted from Schrimshaw 2019, p.6.

In this context, and central to the discourse, is the notion of immersive aesthetics and the emphasis on affective and experiential engagement. Sensation is prioritized over conceptualization, fostering an embodied experience that transcends mere representation. Schrimshaw thereby underlines that the immersive experience in contemporary art is aligned with phenomenological principles, focusing on immediate, lived experience and embodied presence. However, this alignment is criticized for potentially limiting critical thought and ampler conceptual engagement. By emphasizing direct sensory experience, phenomenology may restrain deeper intellectual exploration and critical reflection. Schrimshaw thus contends that immersion shares the same shortcomings identified by Quentin Meillassoux in correlationism, drawing a parallel between phenomenological theories of immersion, which confine understanding of the world to immediate experience, and correlationism's assertion that the world perspective of phenomenologists (and others) fails to acknowledge an external *"mind-independent reality"* beyond personal experience (Lacey, 2024).

> *"The opposition of the visual and auditory in the audiovisual litany, which still informs the logic of sound studies, is underpinned by an opposition of reason and affect traversing the senses, and ultimately that of correlationism." (Schrimshaw, 2019, p. 14)*

A critical analysis of the acoustic condition [81] reveals an internalist logic that risks mystification and reductionism. While valuable, the focus on phenomenological experience is seen as potentially restrictive, preventing a fuller engagement with conceptual and critical

[81] Schrimshaw defines the acoustic condition as *"a condition where a co-constitution of subject and object takes place within the sufficient aesthetics of an immersive encounter with an indeterminate artwork" (Schrimshaw, 2019, p.4)*.

dimensions. The critique calls for a balance that includes but goes beyond the immersive, phenomenological focus.

> *"The acoustic condition describes a regime of thought informed by the internalist logic of the audiovisual litany yet extends its oppositions along the lines of a broader underlying logic which affirms the affective and an immersive aesthetic sufficiency against the operations of reason." (Schrimshaw, 2019, p. 15)*

What, then, is the endpoint? Where are we headed beyond phenomenology?

Immanence in philosophy refers to the concept that the divine or the ultimate reality permeates the material world and exists within it rather than being separate and transcendent. This contrasting idea of transcendence represents the same divine or ultimate reality, seen as existing outside and independent of the physical universe. Schrimshaw invokes Spinoza and Deleuze to characterize and clarify his notion of immanence.

Baruch Spinoza, a central figure associated with immanence, proposed that God and Nature are the same. For Spinoza, everything that exists is part of a single substance, identified with God, implying that the divine is immanent in the world. It is this notion of substance, rather than God as the inherent cause, that is pertinent to Schrimshaw's discourse, particularly in elucidating immanence through the concept of all entities existing on a singular ontological plane and rejecting externality as a means of achieving transcendence, thus defining immanence. (Schrimshaw, 2019, p.16) Gilles Deleuze and Félix Guattari further developed the idea of immanence, particularly in their concept of the 'plane of immanence', referring to a field of reality that is self-sufficient and does not rely on a higher realm or transcendence. Immanence is, in that sense, contrasted with hierarchical structures that imply transcendent authority or origins. Schrimshaw's interpretation of immanence is rooted in this Deleuzian concept of the plane of immanence, representing a realm of forces and intensities existing beyond human perception.

Positing that sensory experiences are incapable of grasping the essence of the immanent domain, he argues for the necessity of scientific abstractions and models to reveal the 'imperceptible'[82] aspects of reality. In this process, "*Gilles Deleuze's philosophy of absolute immanence is to be drawn upon as a philosophical framework presenting the basic materials with which to stage an exit from the sufficient aesthetics of immersion"* (Schrimshaw, 2019, p. 19). He cites various artists, such as Rolf Julius, Stephen Vitiello, and Nina Canell, whose works

[82] Cf. Schrimshaw 2019, p.65.

incorporate imperceptible sounds, like infrasound, hinting at underlying acoustic forces and intensities that surpass immediate sensory encounters (Lacey, 2024).

As referred to in the previous sections, theories of sonic materialism propose a non-anthropocentric understanding of reality while relying on affective methodologies; Schrimshaw's approach, however, articulates a notion of immanence that diverges from the aesthetics of affective immediacy. Such a notion often leads to an oversimplified perception of immanence as mere affect and flux, resulting in an onto-aesthetic conflation[83] *"where method and matter are confused in a becoming-sound of thought that withdraws from representation and conceptualization"* (Schrimshaw, 2019, p.18). To counteract this trend, Schrimshaw advocates for focusing on the 'scientific image' in sound practices to effectively convey the 'naturalistic real' in the context of immersive artistic creations. By advocating for this 'scientific image'[84]—distinct from a 'manifest image'—in artwork, particularly in sound art, an engagement with this notion of immanence is encouraged.

Accordingly, he proposes a synthesis of aesthetic experience and conceptual depth and argues for moving beyond the purely immersive logic to incorporate critical and conceptual elements, thereby enriching the overall engagement with sound art. This more balanced methodology aims to mobilize immersive aesthetics and critical analysis strengths.

> *"Shifting attention from the experience of subjective interiority towards its external yet immanent conditions supports a conceptualization of reality beyond appearances and a more functionalist conception of sound in the arts, considered not according to its immersive qualities but as intensive quantity that affects change beyond the limits of perception and experience." (Schrimshaw, 2019, p. 20)*

To illustrate this perspective, he references artist Ryoichi Kurokawa's piece, *unfold*, which translates scientific (astrophysical) data into an immersive experience involving visual and auditory stimuli. Through this approach, Schrimshaw asserts, artists can thoroughly investigate

[83] As initially referred, Brian Kane's critique of the ontological turn is central to Schrimshaw's argument. Kane's introduction of the term 'onto-aesthetics' highlights the conflation of aesthetics and ontology in current sound studies and criticizes immersive aesthetics for overlooking the cultural conditions that shape perception and artistic practice. Consequentially, Kane asserts that sound inherently embodies its own ontology, making the immersive aesthetic approach redundant. Within this reasoning, Schrimshaw argues that immersive aesthetics can obscure a broader understanding of realism. By separating aesthetics from ontology, one can appreciate the representational and conceptual dimensions of sound without compromising its material reality. This critique extends to Christoph Cox's concept of 'sonic thought', which posits that thinking through sound is primary. Schrimshaw thus advocates for a diversification of ontologies that may have a broader potential to recognize different scales and aspects of reality.

[84] Schrimshaw refers to Wilfrid Sellars' *Science, Perception and Reality* (1963) as the source of the concepts of 'scientific' and 'manifest' images referring to *"the disparity between reality as it appears and as it is described through scientific enquiry"* (Schrimshaw, 2019, p.136).

immanence by recognizing it as a *"mind-independent reality outside subjective experience."* (Schrimshaw, 2019, p.19).

To summarize, Schrimshaw critiques the acoustic condition in contemporary art, supporting a more integrated approach that balances sensory immersion with critical and conceptual engagement. This approach seeks to expand the potential of sound art, encouraging deeper intellectual and sensory involvement. The critique underscores the importance of not only experiencing art but also reflecting on and conceptualizing its broader implications.

Several other authors have expressed their critical positions on Deleuzian-inspired realist and naturalist approaches and their relationship with cultural theory. Annie Goh's and Marie Thompson's (Goh 2017; Thompson 2017) argumentations focus on how the material aspects of sound neglect its cultural and political dimensions. Goh and Thompson posit a deep intertwining of sound with issues of race, gender, and power and a consequential need for any comprehensive theory of sound to address these dimensions. By ignoring these aspects, naturalist approaches[85] risk presenting an incomplete and potentially problematic view of sound.

II.2.4.3 Gender and post-colonial perspective

Centred on the theoretical intersection between sound studies and feminist epistemologies, Goh frames the central question: what is at stake when we consider how sound and listening contribute to knowledge production? (Goh, 2017, p. 283)

While emphasizing the need for a more critical approach to understanding how sound and listening produce knowledge, Goh argues that much of the existing literature in sound studies remains rooted in traditional paradigms that are not successful in thoroughly questioning the complexities involved in sonic knowledge production. In this context, she posits a need to reconsider the relation between the subject (the listener) and the object (sound) through the lens of feminist theories, particularly the contributions of Donna Haraway (Goh, 2017, p.283). This perspective orients itself closely with movements[86] in science studies that propose a more

[85] Specifically, their focus is on Christoph Cox's views.

[86] Goh is referring to specific movements within feminist science studies and feminist epistemologies that critique traditional, objective views of science and knowledge production. These movements include Feminist Standpoint Theory, Donna Haraway's *Situated Knowledges* or *Postcolonial Critiques of Science*.

situated approach to knowledge production that accounts for the specific contexts and power dynamics that shape the production and validation of knowledge.

Contextualizing, she underlines that, as already evident in the works of R. Murray Schafer concerning the concept of 'soundscape', a naturalistic approach to sound has persisted within the field, evolving in contemporary discourse within the framework of recent *new materialism*[87] discussions. The concept of sonic naturalism, whether discussing sounds in nature, naturalized perceptions of sound, or the essence of sound itself, is advanced through a conventional relationship between subjects and objects[88] in the production of sonic knowledge, which is rooted in the established dualisms of Western scientific and philosophical traditions (such as culture-nature, subject-object, mind-matter) (Goh, 2017, p. 285). Within the prevailing tendencies in sound studies, Goh critiques this notion of 'sonic naturalism', a concept that allegedly perpetuates the referred traditional dualisms. This approach, she argues, often overlooks how these binaries constrain our understanding of sound and listening, limiting the scope of investigation to predefined categories that do not fully capture the dynamic and relational nature of sonic experiences. By uncritically maintaining these dualities, sonic naturalism fails to account for the diverse ways sound is experienced and interpreted across different contexts and communities.

> *"Although it purports to overcome dualistic thought of the Kantian divide between phenomenon and noumenon as part of the speculative realism school of thought, Cox perpetuates more troubling dualisms which demand greater attention" (Goh, 2017, p. 286)*

Goh advocates for re-examining discussions in sound studies regarding the 'nature of sound' through the lens of Haraway's concept of 'natureculture'[89]. For Goh, although Cox claims to transcend the Kantian bifurcation of noumenon and phenomenon, his efforts inadvertently sustain another cluster of classical dualisms, including reason and desire, matter and language, as well as nature and culture, while overlooking both 'the problem of the body' and 'the processes

[87] New Materialism is a philosophical approach that emphasizes the active, dynamic role of matter in shaping reality, moving beyond anthropocentric perspectives and the dominance of language or culture in understanding the world. It challenges traditional materialism and postmodernist views by integrating insights from science, technology, and feminist theory to explore how matter, bodies, and environments are interconnected and mutually constitutive (Coole et al., 2010), (Dolphijn & Tuin, 2012).

[88] Goh is attempting to foreground the relation in processes of knowledge production but is essentially simply referring to the act of 'listening' as clarified in footnote nr2 of the original reference.

[89] Donna Haraway's concept of 'natureculture' is a theoretical framework that challenges the traditional Western dualism between nature and culture, suggesting instead that the two are inseparably intertwined and co-constitutive.

of knowledge production' that, in various respects, span these divisions (Goh, 2017, p. 286), (Campbell, 2020, p. 5). The focus here is on how some theories of sound and knowledge production, particularly in the context of speculative realism[90] and new materialism, fail to adequately account for embodied experiences in the processes of knowledge formation.

The 'problem of the body' refers to how certain philosophical approaches, such as those advocated by Christoph Cox and other theorists in the speculative realism tradition, tend to focus on disembodied, abstract forms of knowledge. These theories often emphasize the material, non-representational aspects of sound but neglect the role of human embodiment, subjectivity, and situated experiences in engaging with sound. Specifically, Goh posits that Cox's sonic philosophy, which focuses on sound as a material, asignifying flux, overlooks the role of the body and subjectivity in knowledge production. By contrasting the 'mind-independent reality' of 'sound-in-itself' with an 'orthodox cultural theory' that portrays nature merely as a projection or construction of culture, Cox, Goh claims, perpetuates a schism between the ontology of the object and the epistemology of the subject. This division reinstates the authority of a masculine-coded subject over a feminine-coded nature (Goh, 2017, p. 286), (Campbell, 2020, p. 5). Goh criticizes this approach for perpetuating the legacy of Kantian and Cartesian rationalism, which traditionally separates reason and intellect from emotions and bodily experiences. By ignoring the body's role, these frameworks reinforce a disembodied rationality that fails to acknowledge how embodied encounters shape knowledge.

Both Karen Barad and Donna Haraway, whose ideas Goh draws on, emphasize that knowledge is always produced through embodied and situated experiences, where the body actively participates in understanding and engaging with the world. Accordingly, Goh proposes the adoption of Karen Barad's concept of 'onto-epistemology', emphasizing *"the co-constitution of knowledge through material phenomena, apparatuses, and discursive practices between human and non-human actors"* (Goh, 2017, p. 287). Consequently, onto-epistemology entails the *"inseparability of ontology and epistemology, nature and culture, language and matter"* (ibid. p. 292).

Goh then introduces 'sounding situated knowledges' as a feminist methodological framework for rethinking knowledge production in sound studies. Drawing on Donna Haraway's

[90] Speculative realism is a philosophical movement that challenges the anthropocentric and anti-realist tendencies of much contemporary philosophy. It is unified by its critique of "correlationism," a term coined by Quentin Meillassoux to describe the view that reality can only be understood as correlated with human thought (Meillassoux, 2008), (Harman, 2018b).

idea of 'situated knowledges', which emphasizes the importance of partial, situated perspectives over isolated, objective ones, Goh argues that sound studies can benefit from a similar reorientation. This approach involves critically examining how knowledge is produced through sound, considering the specific contexts and power relations that configure listening practices and interpretations. Goh accentuates the need to avoid universalizing narratives that overlook the diverse and situated ways sound is experienced. Instead, 'sounding situated knowledges' stimulates researchers to delve further into the embodied, relational, and contextual aspects of listening, recognizing that all knowledge is produced from a specific position and is influenced by various social, cultural, and political factors. This shift expands the scope of research in sound studies and aligns the field towards more inclusive and reflective research practices.

In summary, Goh advocates for a feminist critique that brings to centre stage the embodied and situated aspects of listening, referencing feminist epistemologies that question the presumed objectivity and neutrality of scientific knowledge production. This critique not only exposes the limitations of existing approaches but also offers a pathway for rethinking the role of sound in producing knowledge, one that considers the complexities and power relations inherent in any act of listening. By re-evaluating the subject-object relationship through feminist lenses, Goh argues that sound studies can move beyond simplistic dichotomies and develop more inclusive and reflective methodologies.

II.2.4.4 Racial politics of ontology and white aurality

Marie Thompson (2017) explores the intersection of race, ontology, and sound studies. Her argument critiques how recent trends in sound theory and philosophy, particularly the ontological turn, often disregard the racial dimensions of sound and being. Thompson discusses the described shift in sound studies toward ontology—involving questions of being, materiality, and reality—as opposed to previous focuses on culture, identity, and representation. This shift, influenced by speculative realism, object-oriented ontology[91], and new materialism, emphasizes a 'real' world beyond human perception and social constructs.

[91] Object-Oriented Ontology (OOO) is a philosophical framework that prioritizes the existence of objects independently of human perception or interaction. Proposed by thinkers like Graham Harman, OOO argues that all objects—whether human, non-human, natural, or artificial—exist equally and cannot be fully comprehended or reduced to their interactions or uses by humans or other entities. This approach rejects anthropocentric views, emphasizing the autonomy and hidden dimensions of objects beyond their observable relationships. (Harman, 2018a), (Bogost, 2009).

The critique is centred on how the turn towards ontology often evades issues of race and racialization. By focusing on materiality and non-human entities, ontological thought tends to ignore the socio-political dimensions of race, particularly how racialized bodies experience and interact with the world. Scholars like Sylvia Wynter, Frantz Fanon, and Fred Moten, whom Thompson references, have examined how race is implicated in ontological and metaphysical discourse.

Noting that Cox advocates for a shift in sound studies from traditional concerns with cultural representation and signification toward a more materialist and realist approach, Thompson criticizes this perspective by arguing that Cox's emphasis on sound's materiality risks uncritically naturalizing a specific onto-epistemology of sound. This approach, she suggests, overlooks how sound is deeply entangled with historical and social contexts, particularly those related to whiteness and coloniality. By focusing on sound as an abstract and autonomous entity, Cox's framework disregards the racialized dimensions of listening and sound production and inadvertently perpetuates what Thompson considers a Eurocentric perspective. Thompson highlights this as a significant limitation of Cox's materialist approach, as it fails to account for the broader socio-political structures that shape auditory experiences.

From a critical perspective, Thompson then introduces the concept of 'white aurality', a racialized mode of listening and perceiving sound that privileges certain sonic experiences while marginalizing others. This concept is tied to a critique of how white-centric perspectives shape the 'nature of the sonic' in sound studies. It is argued that this white aurality amplifies certain sounds (e.g., abstract noise, drones, and hums associated with Eurocentric sound art) while muffling others, particularly those related to racialized experiences.

Two sound works are examined to illustrate these concepts: Lawrence English's "*Airport Symphony*" (2007) and Chino Amobi's *"Airport Music for Black Folk"* (2016). The former is described as moving toward sonic generality, representing the aesthetic of the ontological turn by focusing on generic and depersonalized sounds that evoke a sense of abstract sonic flux. In contrast, the latter piece is used to demonstrate how sound can be a medium to express and confront racialized experiences, particularly the violence and surveillance faced by Black bodies in airport spaces. Amobi's work is hence seen as a disruption that challenges what Thompson sees as the normative frameworks of sound art and its racial politics.

Thompson thus argues for a re-situating of ontological approaches in sound studies to be more inclusive of racial and social dimensions, suggesting that rather than entirely dismissing

ontology, scholars should explore how ontological and social concerns co-produce each other, opening space for more diverse and critical engagements with sound.

II.2.4.5 Rebuttal

Cox's (2018b) response to these critiques reaffirms the relevance of realism and materialism for understanding sound, arguing that these philosophical positions are essential for capturing the true nature of sonic phenomena. Therefore, sonic ontology and auditory cultural studies should be viewed as complementary rather than oppositional. He maintains that understanding the nature of sound as a material phenomenon does not exclude an examination of its cultural meanings and functions. Furthermore, the pursuit of ontology in sound studies is defended by arguing that ontology is an essential part of any philosophical or scientific inquiry.

The idea that ontology is inherently Eurocentric or colonialist is rejected, pointing out that ontological investigations have also been central to many non-Western philosophical traditions. Thompson's reliance on onto-epistemology, a framework that insists on the inseparability of being and knowing, is also criticized. Cox claims that while cultural perspectives may shape human knowledge of sound, sound itself exists independently of human perception and cultural frameworks, maintaining his argument for a materialist realism that acknowledges the existence of sound as a material phenomenon, even as it is shaped by cultural and social forces (Cox, 2018b, p.236).

A central point of contention between Cox and his critics is the relationship between cultural relativism and universalism. While Thompson and Goh argue that sonic realism imposes a universalist framework that erases cultural particularities, Cox counters this by asserting that scientific and philosophical claims, while made by individuals situated in specific cultural contexts, often aspire to universal validity (Cox, 2018b, p.238). He argues that scientific knowledge about sound—such as water being H_2O—exists independently of any particular cultural perspective. This position, Cox contends, is essential for a robust understanding of sound's material reality (Cox, 2018b, p.236).

To Thompson's claim that the turn toward ontology and realism in sound studies depoliticizes the field by ignoring issues of race, gender, and class, Cox highlights how realist philosophy has contributed to leftist political thought, particularly in addressing issues of economic inequality and social justice. He cites examples of feminist and post-capitalist

movements[92] that draw on realist philosophy to develop universalist frameworks for addressing global challenges (Cox, 2018b, p.237).

Cox concludes by proposing a synthesis between sonic ontology and auditory cultural studies. He argues that sound should be studied as a material phenomenon both shaped by and shaping cultural contexts. This interdisciplinary and interdependent approach, Cox suggests, would allow sound studies to incorporate insights from the humanities, social sciences, and natural sciences, offering a more comprehensive understanding of how sound operates across different domains.

In summary, Cox advocates for a materialist realist approach to sound studies that acknowledges both the material nature of sound and its cultural dimensions. He rejects the notion that ontology is inherently exclusionary or colonialist, arguing instead for a synthesis of ontological and cultural approaches in the study of sound and, by doing so, calling for a more interdisciplinary and holistic understanding of sound's role in human experience.

II.2.4.6 A middle ground | Deleuzian onto-ethology in sound studies

Iain Campbell (2020) refers to the work of Gilles Deleuze, particularly his collaborations with Félix Guattari in *A Thousand Plateaus*, as a critical counterpoint to Cox's materialism. Deleuze and Guattari's concept of 'onto-ethology'[93] offers a relational and dynamic approach to understanding sound that moves away from essentialist and reductive views. As articulated by Deleuze and Guattari, onto-ethology emphasizes the relational and processual nature of being, where entities are understood in terms of their capacities for affecting and being affected. In sound studies, this approach foregrounds sound's interactive and emergent properties, highlighting how it simultaneously is shaped by and shapes its environments.

Campbell illustrates this Deleuzian perspective through the works of experimental musicians John Cage and Pauline Oliveros. Cage's use of 'silence' and focus on environmental soundscapes, as well as Oliveros's concept of 'deep listening,' exemplify the relational dynamics

[92] Cox specifically mentions the 'xenofeminist' collective Laboria Cuboniks "*who reconstruct intersectional feminism on rationalist, universalist grounds and argue that to view science, reason, and universality as inherently patriarchal or European is to concede defeat"* (Cox, 2018b, p.237).

[93] Deleuze and Guattari's notion of *onto-ethology* is a concept that blends ontology (the study of being) with ethology (the study of behavior, particularly of animals). This concept appears primarily in their later works, especially in *A Thousand Plateaus*, where they explore how individuals, animals, and even objects interact within complex environments.

and non-essentialist approach advocated by Deleuze and Guattari. These practices demonstrate how sound can be understood as an interactive, emergent phenomenon, constantly in flux and relationally constituted.

While Cox's sonic materialism provides valuable insights into the material aspects of sound, it requires a broader, more inclusive approach that integrates cultural and political contexts. Deleuze's practical materialism offers a more comprehensive framework for sound studies that effectively incorporates these dimensions. His approach, emphasising relationality and process, allows for a richer understanding of sound that acknowledges its material, cultural, and political dimensions. This alternative framework, Campbell argues, is better suited to address the complexities of sound as a multifaceted phenomenon. Maintaining this engagement with both Cox's and Deleuze's philosophies foregrounds the need for an interdisciplinary approach to sound studies that might bridge the gap between materialist and cultural analyses while at the same time drawing attention to the importance of considering sound not only as a physical phenomenon but also as a socio-cultural construct that shapes and is shaped by the contexts within which it is experienced. Campbell ultimately calls for a more holistic and inclusive approach to the study of sound that recognizes its inherent complexity and integrative nature.

II.3. Sonic Thinking | On Sound as an Object of Study

II.3.1 Conspectus

At this point, it is important to summarise the main arguments raised throughout this text and then situate our perspective regarding our main question: Is there (still) a place for sonic matter in auditory culture?

As referred to, the development of sound studies as a discipline has been marked by ongoing uncertainties, particularly about the objecthood of sound, which complicate its study and call for a philosophical interrogation of sound itself. This process has been accompanied by debates over sound's ontological and philosophical status and even doubts about whether sound can truly be positioned as an object of study and theoretical inquiry (Lavender, 2015). Although sound studies aims to make sound thinkable, this goal has led to new uncertainties reflecting a deeper problematic in philosophical thinking, particularly when considering sound through the traditional frameworks of Western thought[94]. However, even if this creates what is described as a "zone of indetermination" that threatens the coherence of sound as an object of study, this is considered a source of vitality for sound studies, as it promotes new discussions that push the discipline forward by focusing on the immanent difficulties in the process of thinking about sound (Lavender, 2017).

This ongoing analysis has been approached from subjective and objective perspectives, with different possibilities and implications. Central to the discussion is the debate regarding whether sound should be thought of relative to a specific set of auditory capacities (subjectivity) or if it can have its own 'ontological' existence beyond any phenomenon of audition (objectivity). While it has been argued that sound studies should advance from a correlationist standpoint, considering the subjective positions of perception and experience, other perspectives have suggested that sound studies should seek sonority beyond subjectivity, exploring the intrinsic qualities of sound-itself (Lavender 2015).

At the core of this discussion and argumentation is this antithesis between sensorial-perceptual and conceptual paradigms or, using Kane's (2013) wording, between sonic phenomenology and sonic idealism (Wanke, 2021, p. 116).

[94] The typical dualisms already referred.

Within the sensorial-perceptual paradigm, several theories have developed surrounding the concept of 'sound-in-itself', underscoring different philosophical approaches. The argumentations distinguish between a phenomenological view, which emphasizes subjective perception, and a materialist, non-anthropocentric view, which considers sound independent of human perception. The former, "*grounded in the idea that listening is an act of perceptual engagement with the world, not an act of deciphering codes"* (ibid, p. 117), attempts to integrate the theories of sound-in-itself within a subjective and phenomenological domain, affirming the materiality of perception, grounding sound in focused listening and bodily experience, as in the works of Salomé Voegelin. (Wanke, 2021, p. 118). In parallel, other approaches conceive the notion of sound-in-itself within a materialist framework. These, corresponding to Christoph Cox's view, advocate for a form of sonic materialism rooted in vibrational or material reality independent of perception, drawing on Deleuzian materialism and Speculative Realism[95].

Alternatively, the conceptual paradigms highlight a sonic idealism, predominantly in sound art, which revives the value of conceptual praxis, positioning the idea of a 'non-cochlear' sound as integral and fundamental to sonic discourse and analysis[96] (ibidem), to which Kane (2013, p.6) refers as *"a form of sonic idealism, in the sense that works of sound art are not to be made intelligible on the basis of their perceptual properties"*.

These approaches integrate further within diverse areas in sound studies and tie in with theoretical arguments and critiques such as those referred to throughout this text and widely in musicology, sound art, and related fields. Sonic materialism thus serves as both a critique of representation and signification and a means of direct contact with the *sonic flux* of the world, as well as translating and interpreting the material experiential and phenomenological complexity of aural perception.

However, materialist non-anthropocentric perspectives have been widely criticised mainly due to what is, arguably, a lack of consideration for the influence and significance of the surrounding culture. This criticism resonates with post-Deleuzian approaches to sound ontology, as articulated by Kane (2015), which question the traditional divide between culture and nature.

[95] Deleuzian materialism and Speculative Realism challenge traditional metaphysics in distinct ways. While Deleuzian materialism focuses on matter as dynamic and always in a state of becoming, rejecting fixed structures, Speculative Realism attempts to move beyond human-centered thought, exploring reality as independent of human perception. While both rethink materiality, Deleuzian materialism is more processual, and Speculative Realism emphasizes the autonomy of the real world from human thought.

[96] Cf. Kim-Cohen's "*In the Blink of An Ear"* (Kim-Cohen, 2009).

Kane critiques Cox's view of sonic ontology, particularly his emphasis on the metaphysics of the actual and virtual, which situates sound within a framework that minimizes the importance of cultural expression in favour of material differences operating at a micro level in physics, chemistry, and biology (Kane, 2015). Campbell (2020) later joins the debate between Cox and Kane, emphasizing what he sees as the latent complementarity between sonic ontology and auditory culture and suggesting that the key question is whether Cox's argument can accommodate the cultural dimension without lessening its relevance, an aspect that remains central to current discussions within sound studies. These tensions highlight the dynamic and evolving nature of the field as the difficult relationship between sound, culture, and philosophy continues to be acknowledged.

> *"(...) contrary to Kane's position that sonic ontology constitutes a sound studies 'without' auditory culture, there is, in fact, a complementarity between sonic ontology and auditory culture, as evidenced through Cox's claim that human expressions 'contribute' to the sonic flux." (Campbell, 2020, p. 3)*

> *"The weight of the debates around Cox's position lies in this third aspect: the claim of a complementarity between approaches to sound. The key question is of what this complementarity looks like, and if Cox's account can accommodate cultural inquiry as he suggests it can, or if it necessarily diminishes the auditory culture side of sound studies." (Campbell, 2020, p. 3)*

In parallel, others, such as Schulze (2019, p. 12), argue for a more integrative approach that situates sound within sensory and cultural contexts while focusing on the subject as a site of sonic research. From this perspective, sound should not be reduced to its physical properties, as its cultural meanings and affects are equally important.

> *"(...) research on sound needs to be conceptualized, performed, and presented foremost in the realm of the sonic, the audible, the sensible itself – and not in translations into neighbouring realms of alphanumeric codes, logocentric hermeneutics or refined abstractions crafted from philosophical concepts." (Schulze, 2019, p. 12)*

This view aligns with the critique within sound studies of overly materialist approaches, such as Seth Kim-Cohen's and Douglas Kahn's, who argue for a more relational understanding of sound that considers its social, political, and ecological dimensions (Cobussen et al., 2017).

> **What I think is important in Kim-Cohen's work (as well as in Douglas Kahn's) is how it seems to caution sound scholars not to focus too much on "sounds-in-themselves," a rigid and perhaps even old-fashioned materialism. One of sounding art's most important values is its playing with conventions, its relational aspects, making audiences aware of, for instance, time and spaces, its call for engaging with our sonic milieus, etc. In that sense, sounding art is always social, political,*

> *differential, ecological, etc., besides being aesthetical (or anti-aesthetical)." (Cobussen et al., 2017, p. 2)*

In sum, as widely referred to until now, Sound Studies is a field characterized by its ongoing engagement with sound's philosophical and ontological challenges. As Lavender, Cox, Kane, Campbell and others demonstrate, these challenges are not merely obstacles to overcome but are central to the vitality and significance of sound studies as a discipline. The direction and conditions under which sound studies can move are plural and diverse, and these attempts to progress are multifaceted in their contemporary significance. In that process, they intersect with debates on theory[97] and propose critical revisions and re-orientations. This implies a sinuous exploration and argumentation that may lead us into unexplored paths.

II.3.2 Way Forward

Given the current positions, what may be the path moving forward? What form of critical perspective on the traditional approaches to sound studies may be needed? Can alternative frameworks for understanding sound, knowledge, and artistic research be proposed? How can materiality, affect, embodiment, environment, rationality, meaning, and culture be (processually) merged? Is it at all possible?

II.3.2.1 At the intersection of space, body, and imagination

> *"How could it thus be possible to do research on sounds that leaves more traditional logocentric approaches of academia behind—and indeed proceeds by thinking and researching sonically and not verbally, visually, diagrammatically?" (Schulze, 2017, p. 219)*

In *How to Think Sonically? On the Generativity of the Flesh* (2017), Holger Schulze challenges conventional academic methods of studying sound, suggesting that knowledge in this field cannot be gained solely through traditional practices. A framework for researching sound as a multidimensional experience is thus presented. Moving beyond traditional, language-based approaches, methods attuned to the unique properties of sound as a sensory and material phenomenon are advocated, and the notion of '*sonic thinking'* is introduced to tackle sound as a generative force that shapes both spatial and bodily experiences. The predominant focus on

[97] In this context 'theory' refers to a systematic and abstract framework for understanding and interpreting phenomena within a particular field, providing a set of principles, concepts, or ideas used to analyze and interpret cultural, social, literary, or artistic phenomena.

written or visual analysis in academia is questioned. Instead, a *"post-logocentric theory of the auditory"* that may allow "*thinking with, through and beyond sounds"* (Schulze, 2017, p. 219) to explore their influence on life, art, and academia, is proposed. This alternative framing of sonic thinking suggests that sound is not merely a passive object of study but an active process requiring bodily presence and participation.

Schultze's sonic thinking is part of the philosophical and epistemological trend that has been ongoing in the humanities and social sciences since around the turn of the century, as previously discussed. From then on, academic research has been increasingly aware of the limits of traditional, language-based analysis, especially when it comes to comprehending sensory experiences like sound, which, it has been questioned, may require a different set of analytical tools rooted in the materiality and contingency of the auditory experience. As a result, a more embodied and spatially situated understanding of sound becomes imperative to translate an experience that involves both the physical environment and the human body.

One of the key ideas explored by Schulze is the *spatiality of sound*. His argument proposes that sound events should be considered fundamentally spatial phenomena modelled by their material and situational contexts. For sound to be accurately understood, researchers must consider it an experience that interacts with "*specific spatial constellations of materials"* (Schulze, 2017, p. 221), focusing on its inseparability from the settings in which it occurs.

Referencing theorists such as Martina Löw and Barry Blesser, Schulze illustrates different frameworks for proper analysis and consideration of sound's spatiality. Löw's *Raumsoziologie* introduces the notions of 'spacing' (the mental awareness of the spatial distribution of objects, beings, and processes) and 'achievement of synthesis' (the formation of coherent spatial impressions) as ways humans construct and inhabit space. Blesser's concept of *aural architecture* goes further, focusing specifically on how sounds are experienced within architectural spaces without reliance on visual or structural analysis. Blesser's idea of an 'acoustic horizon' is also mentioned as an important element in framing the spatiality of sonic experiences—a building does not produce sound on its own; rather, it is activated by the sound events within, which are themselves intrinsically linked to the surrounding architectural and environmental elements. Moreover, Schulze introduces *the auditory dispositive*, a term coined by Rolf Großmann, which refers to how specific spaces, such as libraries or offices, are layered with historical, ethical, and cultural expectations that affect auditory experiences. Schultze exemplifies by mentioning that the silence in a library has a "moralistic" effect caused by the sense of respect or deference associated with the physical presence of the texts and archives.

This silence, deeply connected with the space, determines the reader's conduct, demanding a certain bodily restraint and concentration to preserve and safeguard the library's quiet atmosphere. Understanding this aspect of the spatiality of sound hence requires recognition of these *auditory dispositives* and *aural architectures,* which are culturally and materially determined and frame each listening experience. For that reason, sound's situational and physical environment allows and determines a more comprehensive understanding of sonic experiences, always bound to the specific material spaces in which they exist.

The somatic dimension is also central to this argument since, in addition to its spatial dimensions, sound is also deeply corporeal. As "*the actual means of access to a spatial thinking"* (Schulze 2017, p.224), the human body plays a central role in sonic thinking, acting as both a receiver and interpreter of sound. This bodily and dynamic complicity with sound questions traditional approaches prioritising conceptual, abstract understandings and perspectives over incarnated experiences.

In this context, Jean-Luc Nancy's reflections on the human body in contemporary culture[98] inspire Schultze to express a notion of corporeal thinking that underlines the intrinsic connection between actions, thoughts and culturally determined resonances "*of the situation and its meaning"* (Schulze 2017, p.226). This concept of *sound-as-resonance*, context-dependent and intertwined with its historical and situational specificities, is experienced through the individual's bodily actions and sensory responses. By conceptualizing this notion of resonance as inherently situated and somatic, Schulze suggests that the experience of sound extends beyond isolated sonic events, becoming instead part of a network of interactions between organisms, objects, and physical forces, all producing vibrational, resonant effects.

In support of this approach, along with Nancy, authors like Steve Goodman and Bruno Latour are invoked to advocate for a *symmetrical anthropology,* challenging anthropocentric perspectives and instead positioning the body as embedded within a complex web of material, historical, and cultural relations. Within this framework, listening is therefore an embodied and visceral act, constituting a *"Sonic Corpus"* that defies verbal articulation (Schultze 2017, p. 227). Eugene T. Gendlin's concept of a *bodily felt sense* is acknowledged, affirming that this corporeal experience of sound carries a form of profound and ineffable knowledge, illustrating the idea that each sensory encounter holds meaning beyond what can be linguistically expressed.

[98] in *Corpus* (Nancy, 1992).

This brings us to Schulze's critique of *logocentrism* or the dominance of language-based reasoning in academic research. In the context of sound studies, traditional academic approaches, which prioritize written and verbal language, fail to account for the dynamic, embodied, and often inexpressible nature of auditory experiences. Sound, Schulze contends, requires a post-logocentric approach—one that moves beyond the limits of language and embraces sensory and experiential envelopment, circumventing conventional, logical, and rational models which often reduce complex, sensory experiences to simplified, abstract representations resulting in a loss of the experiential richness inherent in sonic—and overall sensory—experience.

Academia's propensity for eloquent but detached arguments is referenced[99]. While rapid, fluent discourse can appear compelling, it risks producing theoretical artefacts that sound persuasive yet fail to capture the true, situated nature of sensory experiences. Drawing on Serres, William James[100], and Eugene T. Gendlin, Schulze advocates for an approach that values *"situated empiricism and sensualism"* (Schultze, 2017, p.230) and experiential *"continuity between sensing and thinking"* (ibidem) where sensory interaction is appreciated for its role in generating meaning beyond verbal frameworks. Beyond an impossible experience of the world "*as a well-tempered, objective, and neatly organized model of arguments and examples"* (Schulze 2017, p.232), Schulze endorses what anthropologist Clifford Geertz terms *"thick description,"* a method where contextualized and historicized sensory experiences provide an empirical foundation; a starting point for a sonic analysis, potentially allowing insights that traditional language-based analysis cannot fully encapsulate. By allowing experience to 'sink in' and unfold in its natural complexity, a more authentic understanding of sensory phenomena can be achieved—one that emerges by thinking imaginatively towards an "*intense and personal narration of an auditory experience and one's highly idiosyncratic, explorative, essayistic reflections on it"* (ibid, p. 233). Hence, meaning in sound studies is not solely derived from formal analysis but through patient, embodied probing and involvement with the sensory world. An experiential and generative process itself recognized as a legitimate source of knowledge.

Accordingly, imagination plays a crucial role in the present conceptualization of sonic thinking, constituting one of its vital aspects. Imaginative thinking encourages a subjective,

[99] Via Michel Serres' concept of "the golden mouth". "La bouche d'or" (Serres 1985: 166, as cited in Schultze (2017)).

[100] William James' (1912) proposed interpretation of radical empiricism.

immersive connection with sound, enhancing the depth and richness of sonic perception and enabling listeners to construct personal interpretations of sonic environments. The creative relationship with sound inherent in that process allows for a reading of auditory experiences unrestrained by conventional academic approaches, hence latently enabling researchers and listeners to transcend the limitations of factual representation while merging empirical understanding with potentially limitless creative perspectives. This imaginative approach to sound facilitates what Schultze calls 'narrative immersion', where listeners create a multi-sensory experience by weaving personal significations, emotions, and sensory responses into their understanding of sonic events. Therefore, this mode of interaction is not only personal but generative of new perspectives on sound that challenge standardized, objective descriptions.

> *"Because of this generative character of experience it becomes both problematic and challenging to manifest, to transmit, and to analyze individual sonic sensations. At this point the aforementioned cultural technique of narrating, of poetry, and of art becomes crucial as method." (Schultze 2017, p. 235)*

A significant concept within Schulze's imaginative framework is this *generativity*, defined as the capacity to produce new, evocative apprehensions of sound that invite others into a deeper, more active relation with auditory phenomena.

Schulze draws on Kodwo Eshun's notion of *sonic fiction* to show how imagination transforms listening into an active, meaning-generating process. Interestingly, Eshun calls his own writing "*a machine for travelling at the speed of thought"* (Eshun, 1998). This generativity and imaginative interpretation are particularly potent in sonic thinking, as they enable listeners to capture the fluctuating, often intangible qualities of sound and its influence on emotional and sensory perception. By way of this approach, Schulze proposes that sound studies can integrate subjective, sensory experiences with analytical inquiry, yielding a balance of experiential knowledge with theoretical insights. Sound studies are enriched by expanding beyond conventional analytical methods to include deeply personal, context-sensitive, and affective responses to sound. This imaginative approach respects the complexity of auditory experiences and allows for exploring sound's cultural, historical, and even cosmic dimensions, capturing aspects that purely objective methodologies might fail to address. Ultimately, Schulze asserts that incorporating imaginative and generative thinking into sound studies can transform how researchers and listeners engage with sound, allowing the capture of its subtleties, ambiguities, and impacts on human perception. By implementing a creative and immersive approach, this sonic thinking can open new paths for understanding auditory phenomena, advancing the field by blending sensory depth with intellectual rigour.

In essence, Schulze calls for a more holistic approach to sound studies, that integrates spatial, corporeal, and imaginative aspects, challenging researchers to move beyond abstract theorizing and engage more directly with the sensory, material realities of sound. Fundamentally, it deals with body, space, and mind to create a framework for sonic interpretation.

> *"Sonic thinking starts right here: where knowledge is not mainly gained by academic reading, by discussing, falsifying or confirming, by rejecting or redefining propositions on some object called sound." (Schulze, 2020, p. 19)*

II.3.2.2 Reframing sound as a vital epistemological approach

We have been approximating a novel form of sonic thinking that is intrinsically connected to the world, as opposed to being abstracted from it; a perspective that advocates for understanding sound not merely as an aesthetic phenomenon but as a vital form of knowledge and interaction with the real, embodied and experienced through sound itself while disputing the traditional dichotomy that separates rational knowledge from sensory experience.

In this context, can we strive for an interdisciplinary methodology that integrates art, philosophy, and science and converges towards a paradigm of artistic research that treats art not as a subordinate to science but as an equally valid form of investigation and knowledge production?

Bernd Herzogenrath (2017) reconfigures sound as a vital form of thought and knowledge, positioning sound studies and sonic art as critical fields that challenge the traditional, visually centred Western epistemology. His particular mode of sonic thinking is introduced as an intellectual and philosophical approach to a dynamic, embodied mode of knowledge that points to a *"re[a]sonance"*[101] where sound is *"a thinking 'of' and 'in' the world,"* (Herzogenrath, 2017, p.1) generative of an immediate, temporal encounter with reality, contrasting with the retrospective and static nature of vision-based knowledge.

As already stated, Western philosophy has traditionally privileged visual perception, leading to an emphasis on permanence, identity, and representation. Herzogenrath critiques this 'visual regime', instead positioning sound as a temporal, ephemeral phenomenon that—approximating Deleuze— *"recognizes entities as events and contingent actualizations of virtual potentiality"* (Herzogenrath, 2017, p.4). Unlike vision, which emphasizes static forms, sound

[101] Herzogenrath coined the term as a hybrid of "reason" and "resonance".

captures the process, flow, and temporality intrinsic to reality, thus inspiring a shift to sonic thinking that encourages a reorientation away from *"being"* and toward a more fluid, process-oriented *"ontology of becoming"* (ibidem).

> *"So what could be the nature of a "sound thinking"? Initially one would have to oppose (or accompany) the predominant discourses in sound studies to a philosophy that is process-orientated: an ontology of becoming, not of being, which recognizes entities as events and contingent actualizations of virtual potentiality." (Herzogenrath, 2017, p. 4)*

Invoking Spinoza, Schopenhauer, Nietzsche, Bergson, Whitehead and Deleuze, Herzogenrath frames sonic thinking within a broad philosophical lineage that embraces fluidity and rejects rigid categorizations. In this context, sound is not a passive subject of study but an active agent of thought that engages with the world's continuous becoming. Such a view dissolves rigid divides between art, science, and philosophy, instead proposing an interdisciplinary *"ecology of echoes and resonances"* (ibid, p.5).

> *"From this vantage point, the rigorous division between aesthetics and research (and the likewise rigorous division between the various related [academic] disciplines, e.g.,"art" and "science") can no longer be seriously upheld." (Herzogenrath, 2017, p. 4)*

Herzogenrath, referring to Deleuze, posits that science *"involves the creation of functions, of a propositional mapping of the world"*. In contrast, art *"involves the creation of blocs of sensation (or affects and percepts)"* and philosophy *"involves the invention of concepts",* i.e., as stated by Deleuze and Guattari, they are *"defined by their relation to chaos"* (ibidem). Deleuze highlights the 'strange correspondences' that emerge across these fields, where affective resonances merge thought and sensation, enabling a form of 'doing thinking' (Deleuze as cited by Herzogenrath, 2017, p.5) that transcends representation and categorization.

Artistic practice becomes a significant form of investigation in this context; not merely a vehicle for representation but a method of exploring ideas and generating knowledge, a reimagining that situates art as a mode of interrogation and analysis where artists are positioned as researchers who think through their medium—here specifically sound. Traditionally seen as separate from academic research, art praxis is validated as a form of inquiry by integrating cognitive, sensory, and material processes. Unlike a linear progression from concept to creation, art involves complex interactions where implicit and explicit knowledge emerge at every stage. This underlines the embodiment of 'tacit' knowledge at all stages, rendering it inseparable from the mental and physical processes involved. Herzogenrath cites Martin Tröndle to underscore

this point, observing that cognitive and affective activities work in tandem during artistic practice, making it a unique form of probing.

> *"The work materializes knowledge—beyond the aesthetic experience it facilitates comprehension of the world." (Herzogenrath, 2017, p. 6)*

> *"(...) artistic experience is a form of reflection. And affect-driven artistic production can arrive at more singular thought-positions than purely rationally organized philosophical systems of thought." (Herzogenrath, 2017, p. 7)*

The increasing recognition of artistic research as a legitimate form of academic investigation is reinforced through its alignment with Embodied Mind Philosophy (EMP), which affirms the integration of body, environment, and mind in knowledge production. EMP, particularly in its interpretation by thinkers like Alva Noë, further supports this perspective by positing that consciousness is not merely an internal process confined to the mind but arises from active bodily engagement with the world. For Noë, the mind is shaped through its interaction with material and sensory environments, suggesting that knowledge does not merely exist within us but is enacted through our lived experiences. In this light, artistic practice instantiates embodied cognition as artists engage directly with materials, spaces, and sensory elements, gaining insights that are inherently tied to these physical interactions.

> *"The mind is tightly embedded into the interplay between body, environment, and matter. This is the quintessence of Embodied Mind Philosophy. Alva Noë, one of its originators, even takes it a significant step further: for him the mind evolves from the movements of the body in its environment—the mind is not a substance that could be simply located within the confines of our skull. Consciousness is not "something that happens in us, like digestion"—it is rather "something we do... a kind of living activity... the ways in which each of us... carries on the process of living with and in response to the world around us" (2009: 7). Embodied Mind Philosophy, I argue, can stimulate a fertile resonance with the concept of artistic research: the artistic practice is here not (only) understood in terms of the finalized work of art (work-aesthetic), but rather in regard to the practices and strategies of artistic production (production-aesthetic)." (Herzogenrath, 2017, p. 6)*

In this model, art is not merely a finished product but a medium for exploring and understanding the world, with its process at the core of research, a shift that reframes the work of art as an active participant in knowledge-making rather than a static representation.

> *"(...) it is not that art morphs into science. Art and science are rather poised in a force field of "mutual becoming."" (Herzogenrath 2017, p. 7)*

These perspectives reframe artistic experience and production as forms of reflection and knowledge creation, establishing a framework where art can materialize knowledge beyond

aesthetic experience and simultaneously encouraging a deeper understanding of the real; affect-driven artistic production can potentially generate more unique and insightful thought positions than purely rational philosophical systems. Such an approach to sound studies and artistic research reaffirms the importance of embodied, process-oriented, and interdisciplinary approaches to understanding sound and creating knowledge (Herzogenrath, 2017).

In summary, this mode of sonic thinking presents an interdisciplinary configuration that merges sound, knowledge, and philosophy and redefines sound as an epistemic tool, expanding the scope of its study beyond traditional visual-based paradigms. Sound and music thus become integral to the processes of knowing and connecting with reality while allowing the capture of its fluidity, temporality, and intersubjectivity. By advocating for a shift from being to becoming and from static forms to dynamic processes, this reasoning calls for a reorientation of how we understand and experience sound and its philosophical implications. Sonic thinking situates sound studies and artistic research as essential fields that illuminate the dynamic, resonant interplay of thought and sensation uniquely offered by sound. This approach not only broadens the scope of sound studies but also enriches our understanding of knowledge and existence itself.

III. CONCLUSION

Throughout this text, an argument was construed for the continued co-significance of sound and its material presence within auditory culture. In a world where the shapes and bounds of human perception and search for knowledge are primarily defined by visual culture, the ambivalences between notions of sonic materialism and the possibilities for its recognition within auditory culture were explored, and in that process, underlined the capacity of the sonic to evoke, inform, and transform cultural meaning.

The consideration of sound as a material, perceptual, and cultural phenomenon highlighted its potential as an artistic medium and its fundamental agency in shaping and contextualizing human embodied experience. The influence of the sonic, extending beyond the auditory phenomenon, permeates cognitive and affective domains, thereby challenging the primacy of visual-centric paradigms; the analysis of its materiality, phenomenology, and role in embodied cognition and artistic expression demonstrates how auditory experiences can produce and convey meaning as rich and potent as visual experiences. These perspectives resonate strongly with sonic materialism's conceptualization of sound as holding intrinsic value through its physical and affective properties rather than as a subsidiary to other sensory modalities.

Between and beyond arguments about the character of possible conceptualizations of sonic matter, the specificities of affective processes and their locations relative to listening subjects, or the intrinsic powers of its phenomenological generativity, one can readily acknowledge the special relevance of sound in addressing and accessing a certain notion of the ‘real’. This reality, in its continuous flux and becoming, parallels our experience of the sonic, which, contrary to the visual in its apparent static and representational nature, emerges as especially effective in that probing.

However, although several materialist perspectives and their underlying groundings and processes have been described, their ontological positions are not conclusive or absolute; the multiple counterarguments presented reaffirm the need to maintain awareness of social and cultural dimensions beyond the material. If any consensus emerges, it points toward complementarity between these approaches. This holistic perspective values the interplay of body, mind, and environment while attributing similar weight to empirical, philosophical, and artistic inquiries. Hence, and as anticipated, this discussion remains open-ended. Rather than reaching or suggesting definitive conclusions, this argument's primary purpose has been to map

this problematic's conceptual terrain and identify perspectives that may guide future research directions in sound studies.

As extensively referred to, sound studies is a vast and dense field of investigation that potentially involves diverse disciplines and approaches whose intersections constitute an important complexity factor. Jonathan Sterne provides further convolution:

> *"(…) there is no a priori privileged group of methodologies for sound studies." (Sterne, 2012, p. 6)*

> *"(…) sonic imaginations are guided by an orienting curiosity, a figural practice that reaches into fields of sonic knowledge and practice, and blends them with other questions, problems, fields, spaces and histories. Method matters, but it should arise from the questions asked and the knowledge fields engaged, not the other way around." (Sterne, 2012, p. 6)*

This complex nature of sound studies and the latitude of possible methodological approaches place it in a unique category within academic research; avoiding transdisciplinary overlapping and interconnectivity of the objects and concepts studied is difficult and perhaps even undesirable; their boundaries are inherently permeable, with significant overlay between different research domains; a certain level of ideational crossbreeding is not just inevitable, but valuable. Therefore, acknowledging these particularities and developing an approach tailored to comprehend the specificities of the involved processes, concepts, affects, and perceptions becomes vital.

In light of the diversity of perspectives presented in this text, we can affirm Nelson's (2022, p. 60) notion that knowledge production and thought organization rely on the cross-pollination of ideas, reflecting a conception of network-related perspectives—multi-directional, chaotic, interconnected, and fluid. As indicated by the shifts in scientific thinking observed since the second half of the 20th century, understanding is not simply a matter of gathering objective information but an ongoing and diverse process of discovery (ibid, p. 70). Rather than striving for absolute certainty, modern science acknowledges that comprehension is incomplete, provisional, and unavoidably influenced by individual and circumstantial factors (Nelson, 2013, p. 39), evidencing that the pursuit of knowledge is a continuously developing occurrence that demands a multidisciplinary approach (Bohm, 1998, p. 50). These processes stress the need to move beyond the linear paradigm of the Enlightenment era toward more dynamic and adaptable models capable of capturing the complexity of the factors that shape and contribute to our comprehension of the world.

The concept of the rhizome[102] as an alternative model for understanding knowledge production and the organization of thought seems particularly adequate in this context. The idea of the rhizomatic structure, contrasted with traditional vertical models of thought, is proposed as a non-hierarchical, interconnected, and multiplicitous structure that allows for a myriad of entry points and connections, embracing the idea that knowledge can emerge from multiple directions and be continuously created. The resulting non-linear structure, challenging rigid and binary thinking, instantiates a network that can be traversed in many directions without a predetermined path or fixed order. This allows for creative and unexpected connections, fostering the emergence of new ideas, knowledge, and potentials; a productive and generative space for thought and action. The application of these notions and methodological approach in the context of analysis and interpretation of the processes involved in the production of knowledge in sound studies and sonic arts fields is thus considered crucial.

Figure 7. Richard Giblett. Mycelium Rhizome, 2009. Pencil on paper 120 x 240 cm. Collection of the artist.

Ultimately, this should drive a progression towards a complete integration of sound into contemporary discussions on culture and media. Beyond hearing, the path leads to listening and understanding; to pulling sound out of the shadows into a bright centre of cultural and academic conversation. Through its continuing evolution, sound studies should be considered not as a vehicle for secondary sensory experiences but as a prominent cultural and perceptual phenomenon with its own ontology.

[102] As introduced in the first chapter of *"A Thousand Plateaus"* by Deleuze and Guattari.

As a privileged channel of perception and interaction with the real, sound has narrative capabilities that reach far beyond the visual, touching and resonating deeper and further than the horizons of cognition. Sometimes even paradoxically silent, like an eloquent mute ventriloquist, aurality is a dimension waiting to be (re)discovered. In its rightful place, sound will unlock narratives of life, open creative resonances and elevate itself as an interpreter of human experience.

Academia is in a privileged position to facilitate this process, to function as a nexus of exploration, encounter, and disclosure of the sonic as a cultural, social, and relational superpower we have only just begun to decode. Sonic materialities and auditory culture can thus be resituated to synergetically establish the foundations for future investigations. Collaborative, cross-disciplinary, scientific, philosophical, and artistic adventures of multi-cultural expression and cognitive engagement at the cutting edge of a nascent frontier.

This is not the end of a journey, but instead, an invitation; to a different hearing, to a deeper listening and to a recognition of a path leading to a profound aural experience of the world.

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