MUSIC & PRACTICE
PEER-REVIEWED JOURNAL – PERFORMANCE AND PRACTICE STUDIES | ARTISTIC RESEARCH

ISSN: 1893-9562
DOI: 10.32063/1101

How Do Cellists and Sounds 'Become' With Each Other?

Exploring the Entanglements of Artistic Research and Agential Realism

Evelyn Buyken & Katrin Losleben

With her cello, Evelyn Buyken is an artist-researcher and currently holds a Musicology / Sound Studies professorship at the University of Siegen. She is working on multisensory sound research and embodied knowledge practices, as well as institutional and pedagogical knowledges of artistic research.

Katrin Losleben is a musicology, literature, and media scholar and joined UiT The Arctic University of Norway's Centre for Women´s and Gender Research, working with sound and space in relation to feminist and critical theories.

Abstract

Music and bodies 'become' through co-creational processes of sound and different human and non-human bodies within social contexts. We conducted in-depth micro-phenomenological interviews with six cellists to understand better the relationship between musicians – traditionally understood as those who produce sounds – and the sounds themselves. This novel method allowed us to zoom in on the moment of the creation of sound. Drawing on Karen Barad's accounts of intra-action, we theorize within the field of artistic research how sounds, materials, and bodies become with each other and iteratively co-constitute the musician-persona, the sound, and the instruments.

Keywords

Sound creation, intra-action, agential realism, artistic research, feminist theory, micro-phenomenological interviews

Katrin Losleben's research for this article was financially supported by the Research Council Norway (Arctic Auditories – Hydrospheres in the High North, RCN 325506). Evelyn Buykens training in micro-phenomenological interview technique has been financed by the North Rhine-Westphalian Academy of Sciences, Humanities, and the Arts. We would like to thank our interview partners for sharing their experiences with us, Mari Ystanes Fjeldstad for repeatedly reading the draft and commenting in a wonderfully helpful and constructive way, and UiTs research group FemArc for their critical yet always supportive feedback on earlier stages of the text.

Introduction and Research Question

How do we know through listening? Whether we know where we are located in the moment of reading this text or that the tone we played with our instrument expressed our musical intentions perfectly, through the sonic, we experience knowing as a bodily experience. Though the two of us are working on different topics, we ask how those entangled in sonic situations experience these moments of knowing in order to make them intelligible and fruitful in our respective fields of learning and teaching.

Evelyn is a baroque cellist who plays in several ensembles. Despite years of experience, she still often finds sound creation to be challenging. For many years, she was convinced that to play the 'perfect sound',[1] specific parameters – frequently superordinate and referred to as 'good technique' – needed to be in place: the positioning and movement of arms, hands and fingers learnt from her teachers, using 'good materials' like historical instruments and bows, and suitable gut strings, and finally, anticipating or quickly adapting to certain acoustic or weather conditions that influence the tuning and the response of the strings. In the meantime, Evelyn began wondering: What conditions made her play sounds that felt good? How did she experience coherent sounds in the ensemble? Finally, what questions and answers does the still-emerging field of artistic research hold? In sum, like many other players, Evelyn perceives sound production, despite being the very fundamental action in music-making, as precarious: it puts the music, the ensemble and herself at constant risk.[2]

As a feminist researcher with a background in musicology, Katrin currently works with 'knowledge production in and through sound'.[3] Feminist activists, scholars, and researchers have long challenged traditional knowledge production by asking: What counts as knowledge? Who can be a knower? How can we know? What ethics guide research practices for the better? And more recently: How does the feminist notion of 'sounding situated knowledges' trouble still intact dualisms like nature–culture or subject–object relations?[4] With their project Arctic Auditories, Katrin and her colleagues are most interested in an often-excluded form of knowledge: how humans and non-humans experience the world through their bodies, specifically through sound. Here, Indigenous epistemologies and feminist theories offer a helpful vocabulary to think with.

We posit that artistic research and feminist research share some common ground. First, both fields question research practices and the question of who can be a knower. In artistic research, the distinction between the 'researching subject' and the 'researched object' is no longer valid: artists experience and reflect on their own doing. Also, feminist researchers position themselves in their research process, understanding how their positionalities influence and change the process and

1 The inverted commas, here, flag that these descriptive adjectives are common, yet very subjective. However, musicians tend to know which sound they aspire to create in different (musical) situations.

2 Our research on sound as a vulnerable practice is inspired by Jennifer Torrence, 'Soft to the Touch: Performance, Vulnerability and Entanglement in the Time of COVID', *VIS – Nordic Journal for Artistic Research*, 6 (2021), doi:10.22501/vis.1040522.

3 Marcel Cobussen, *Engaging with Everyday Sounds* (Cambridge: Open Book, 2022), 33.

4 Annie Goh, 'Sounding Situated Knowledges: Echo in Archaeoacoustics', *Parallax*, 23/3 (2017), 283–304, doi:10.1080/13534645.2017.1339968.

outcome.[5] In both approaches, the hierarchy between researcher and researched and the sharp distinction between them are or should be dissolved.

The second commonality of artistic research and feminist research concerns what counts as valid knowledge. In music education practices, sound production is a complex issue with a tendency to be, on the one hand, particularly technical, but on the other hand, highly ideological (e.g. the imperative to find an 'individual sound' and a 'particular expression'). Teaching and learning cello is guided by a variety of rules that students learn by imitating their teacher and putting into practice the latter's explanations. This reinforces (often competing) 'schools', a technical understanding of corporeality in playing, and ultimately sound production as disembodied from one's own particular body. The 'god trick' of which Donna Haraway accuses scientists[6] – seemingly observing 'everything' from disembodied positions 'from nowhere' – can be witnessed in music education when the production of sound is taught in instrument lessons. Yet, in artistic performances and daily practising, musicians often experience sound production as a holistic and complex venture. To our knowledge, however, those practice-based experiences have remained mostly vague; they have neither been systematically analysed nor rendered intelligible and, consequently, have not been implemented in educational practices to date. Yet poststructural feminist thinkers posit that there is no knowledge without a body. Elizabeth Grosz's material feminist interrogation of the Enlightenment's mind–body split is a radical claim that '[b]odies have all the explanatory power of minds'.[7] Feminist new materialist and posthuman approaches, which we will explain in more detail below, theorize the relationship of various matters (which include bodies and non-human matter), and their 'becoming with'[8] each other in situations but are mostly silent about any constellations with sound.

Feminist research and artistic research are both constantly emerging, but the two rarely meet. We are still at the very beginning of understanding what a body knows as it is infused by sound (which it is constantly). However, the connections between artistic research and feminist theorizing have great potential to strengthen both fields by being creative and wild sources of practical and

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[5] Sandra Harding, *The Science Question in Feminism* (Ithaca: Cornell University Press, 1986).

[6] Donna J. Haraway, 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective', *Feminist Studies*, 14/3 (1988), 575–99.

[7] Elizabeth Grosz, *Volatile Bodies: Towards a Corporeal Feminism* (Bloomington: Indiana University Press, 1994), vii. For a criticism of new material feminist theory as reductive and exclusionary of a rich body of feminist work on the body and biology, see Sara Ahmed, 'Open Forum Imaginary Prohibitions: Some Preliminary Remarks on the Founding Gestures of the "New Materialism"', *The European Journal of Women's Studies*, 15/1 (2008), 23–39, doi:10.1177/1350506807084854, and, in response to Ahmed, Iris van der Tuin, 'Deflationary Logic: Response to Sara Ahmed's 'Imaginary Prohibitions: Some Preliminary Remarks on the Founding Gestures of the "New Materialism"', *The European Journal of Women's Studies*, 15/4 (2008), 411–416, doi:10.1177/1350506808095297.

[8] The expression 'becoming with' can be found in the writings of Donna Haraway, among others. It expresses the non-representational, new materialist, posthumanist ethical position that humans are neither the centre of creation or an inherent entity; rather, like all beings and matter, they emerge to an unsecure outcome in the contact zone with others; see Donna J. Haraway, *When Species Meet* (Minneapolis: University of Minnesota Press, 2007), 244. Critical scholars like Red River Métis and Amiskwaciwâskahikan anthropologist and feminist Zoe Todd (2016) or Xwélmexw artist, curator and sound scholar Dylan Robinson call attention to the epistemic injustice of claiming the idea of entangled becoming of human and non-human beings, material and matter without referring to millenia old Indigenous epistemologies; see Dylan Robinson, *Hungry Listening: Resonant Theory for Indigenous Sound Studies* (Minneapolis: University of Minnesota Press, 2020), 79, and earlier Zoe Todd, 'An Indigenous Feminist's Take on the Ontological Turn: 'Ontology' is Just Another Word for Colonialism', *Journal of Historical Sociology*, 29/1 (2016), 4–22.

theoretical knowledge.[9] We therefore explore here situations of this becoming with together with those who experience them – the instrumentalists – and we read them through the feminist new materialist and posthuman theories of agential realism that emerged from quantum physics and seek to explain how materials constantly intra-act in playing.[10] With this study, we aim to disentangle the complexity of sound creation. Our research explores the intra-actions in sound creation and asks how bodies, non-human materials, and sounds become with each other. We argue that any sound is becoming in the intra-actions of bodies, instruments, bows, and space.[11] How does sound become 'good', whatever that might be? The insights we have gained by reading our micro-phenomenological interview data on artistic practices through a feminist new materialist and posthumanist framework can potentially transform playing and learning cello. We know the potential risks of bringing together the seemingly incompatible traditions of feminist new materialist and posthuman theories with the micro-phenomenological interview method: inquiring about the open-ended "dynamism of unfolding of mattering"[12] with a rather rigid method that aims at scrutinizing human experience might oversimplify both.[13] Nevertheless, with our approach, we can make moments of becoming with sound tangible. We assume that becoming a musician is an iterative becoming through intra-actions of human and nonhuman bodies, materials, spaces, and times, and we asked our human conversation partners to engage in a research project with us, and, in doing so, to enter a research apparatus, asking:[14] What entanglements created the moment when the sound became 'perfect'? Based on this research, we propose a feminist new materialist micro-phenomenology as a way of exploring these entanglements.

The article proceeds as follows: in the first section, on theoretical foundation, we explore the interconnections of artistic and feminist research and introduce how we set up our research apparatus. In the following section, we outline the micro-phenomenology interview method, with which we guided our conversations with our interview partners, the cellists. The interview material is then presented in four configurations of 'entanglements'. Finally we conclude the article by pinning down how players understand the creation of satisfactory sounds and sounds as a becoming with.

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[9] See the creative methodologies for teaching and learning situations at Higher Music Education Institutions developed by the research project 'RAPP Lab – Reflection-based Artistic Professional Practice': Evelyn Buyken et al., 'RAPP Lab Outcomes', in *Research Catalogue. An International Database for Artistic Research* (2023), doi:10.22501/rc.1673421.

[10] Karen M. Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (Durham, NC: Duke University Press, 2007).

[11] These relations between sound, space, listeners, players and materials might not be novel for readers from an Indigenous background; Robinson, *Hungry Listening*, 103.

[12] Barad, *Meeting the Universe Halfway*, 180, 182.

[13] Katrin Heimann, Hanne Bess Boelsbjerg, Chris Allen, Martijn van Beek, Christian Suhr, Annika Lübbert, and Claire Petitmengin, 'The Lived Experience of Remembering a "Good" Interview: Micro-Phenomenology Applied to Itself', *Phenomenology and the Cognitive Sciences*, 22/1 (2023), 217–45.

[14] Barad, *Meeting the Universe Halfway*, 148, writes: 'the apparatus specifies an agential cut that enacts a resolution (within the phenomenon) of the semantic, as well as ontic, indeterminacy. Hence apparatuses are boundary-making processes' (emphasis in original). They define apparatuses as 'the material conditions of possibility and impossibility of mattering; they enact what matters and what is excluded from mattering'. (ibid.)

Theoretical Foundation: Artistic Research Meets Agential Realism

Artistic research gives rise to a reflexive and critical perspective, and through artistic *practice* that *becomes research* under certain conditions.[15] In this way, both artistic research and feminist theory share the question of how, among other things, subject/object, nature/culture, or matter/meaning relate to each other, and how these interrelationships influence the practices of knowing.

Agreeing with feminist science theorists such as Donna Haraway or Sandra Harding that knowledge is always partial, situated, and incomplete, and that it expresses the experiences and identities of the knower,[16] we recognize players as situated knowers in their own right. This discernment is also foundational in artistic research, yet the researcher and knower are the same person. The distinction between the researching subject and the researched object, which is deliberately created in other scientific contexts (and rejected in others such as feminist new materialism or sound studies, by the feminist figure of the Echo),[17] is abolished in artistic research: the self-experiencing, researching, and playing artists and their researched objects fall into one. An artist–researcher[18] union is created: Artistic researchers question their own doing while being immersed in the doing. These critical negotiations with oneself are an objective in themselves. Beyond that, possibly unfamiliar novel playing practices on the one hand, or the un-learning of routines on the other, might be the outcome.

The goal of exploratory engagement in playing is to develop new insights for one's own practice and generate intelligible artistic knowledge for use in e.g. teaching situations.[19] The re-evaluation of knowledge in artistic research is not new, but it continues to uncover power dynamics in knowledge discourse.[20] Who produces music-related knowledge? Who is the expert on what? Whose voice is heard? Why are the voices of performers in music-related sciences still so quiet or unheard?

In our interviews, we investigated how the players imagined and described the act of sound production. The interviewees' statements about sound production were voiced from their positions as musicians trained in Western classical music in Western institutions, which is a background we share with the interviewees. In our cases, we also speak from a position as trained

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[15] On the more general discourse in artistic research, see e.g. the 'Enquête' on the State of the Arts in Artistic Research, recently published in *Music & Practice* 10 (2023), and within the same special issue, Barbara Lüneburg, 'Knowledge Production in Artistic Research – Opportunities and Challenges', *Music & Practice*, 10 (2023), 1–30. Also relevant are Robin Nelson, *Practice as Research in the Arts (and Beyond). Principles, Processes, Contexts, Achievements* (Cham: Palgrave Macmillan, 2022) and Henk Borgdorff, *The Conflict of the Faculties* (Leiden: Leiden University Press, 2012).

[16] Harding, *The Science Question in Feminism*; Donna Haraway, 'Situated Knowledges: The Science Question in Feminism as a Site of Discourse on the Privilege of Partial Perspective', *Feminist Studies*, 14/3 (1988), 575–99.

[17] Goh, 'Sounding Situated Knowledges'.

[18] Darla Crispin, 'Artistic Research and Music Scholarship: Musings and Models from a Continental European Perspective', *Artistic Practice as Research in Music: Theory, Criticism, Practice* ed. by Mine Doğantan-Dack (Farnham: Ashgate, 2015), 53–72, 56.

[19] For further theoretical foundations see Henk Borgdorff, *The Conflict of the Faculties* (Leiden: Leiden University Press, 2012).

[20] Miranda Fricker, *Epistemic Injustice. Power and the Ethics of Knowing* (New York: Oxford University Press, 2007).

music scholars from similar institutions. We are thus aware of the limited validity of our statement: both the understanding of the materiality of sound and the displacement of the body from the music discourse over a long period are culturally specific. These relations are conceptualized very differently across geographies and cultures.[21]

In sound studies, artistic research and feminist theory meet. In her research on singing, singers, and singing lessons, Nina Sun Eidsheim builds on (among others) feminist new materialists such as Jane Bennett to re-think the relationality of bodies, listening and hearing. Here, sound is no longer a matter that is perceived solitarily in an auditory mode but is a literally vibrating, sensuous event. For Eidsheim, 'also the tactile, spatial, physical, material, and vibrational sensations are at the core of all music'.[22] Her umbrella term 'the thick event of music' encompasses 'intermaterial vibrational practices and events'.[23] By expanding DeNora's notion of music as 'a silent practice',[24] Eidsheim emphasizes the presymbolic and prelinguistic reactions to the 'thick event of music'.[25] Besides all cultural concepts with which we approach events in music and sound, 'we still react perceptually and instinctually to them'.[26] Yet her intention is not to redefine sound or noise and their materiality, but those who 'are moved and defined through these practices':[27] The singer, the singing teacher (in her case), the listener, and their relation. The act of listening moves into the spotlight, and the physical phenomenon of inter-material vibration defines the interconnection. These interconnections may also occur on an organological level. Karen Barad's feminist, posthumanist performative, materialist theory of agential realism has only recently been applied to the realm of sound, e.g. by Tyler Shoemaker or Salomé Voegelin.[28] Marcel Cobussen has developed a 'sonic materialism', meaning that '[h]uman as well as nonhuman agents always partly constitute and are partly constituted by their sonic environment', or, in Barad's terminology, constitute each other *intra*-actively.[29] They constitute each other mutually (or not) and do not pre-exist their entanglements. Kevin Toksöz Fairbairn proposes from his positionality as a sound artist working with wind instruments an engagement with the 'disjointed temporal and

[21] A.M. Kanngieser and Zoe Todd, '3. From Environmental Case Study to Environmental Kin Study', *History and Theory: Studies in the Philosophy of History*, 59/3 (2020), 385–93; Robinson, *Hungry Listening*; Martin Winter, 'Musik als Technologie der Körper: Eine Skizze der Ko-Produktionen von Klang, Körper und Subjekt', in *Music in the Body – The Body in Music. Körper an der Schnittstelle von musikalischer Praxis und Diskurs*, ed. by Christine Hoppe and Sarah Avischag Müller (Hildesheim: Georg Olms, 2021), 115–32; Cobusson, *Engaging with Everyday Sounds*.

[22] Nina Sun Eidsheim, *Sensing Sound: Singing and Listening as Vibrational Practice* (Durham: Duke University Press, 2015), 8.

[23] Eidsheim, *Sensing Sound*, 160.

[24] Eidsheim, *Sensing Sound*, 160.

[25] Eidsheim, *Sensing Sound*, 2.

[26] Eidsheim, *Sensing Sound*, 160.

[27] Eidsheim, *Sensing Sound*, 3.

[28] Tyler Shoemaker, 'Sonic Materialism and/as Method', in *The Bloomsbury Handbook of Sonic Methodologies*, ed. by Michael Bull and Marcel Cobussen (London: Bloomsbury, 2020), 169–85; Salomé Voegelin, 'Sonic Methodologies of Sound', in *The Bloomsbury Handbook of Sonic Methodologies*, ed. by Michael Bull and Marcel Cobussen (London: Bloomsbury, 2020), 269–80.

[29] Cobussen, *Engaging with Everyday Sounds*, 21–26.

spacial (dis)continuities that sonic materialism helps to build'.[30] To understand better the relations of beings and matter within sound and music, Xwélmexw scholar Dylan Robinson proposes a non-exclusive approach to sound, music and space through Indigenous epistemologies apace with non-representational theory that explores 'relationships that occur between human and nonhuman musical and spatial subjects' and, consequently, moves away from the anthropocentrism of listening.[31] Also Mari Ystanes Fjeldstad has read violin lessons as phenomena through feminist new material, posthumanist theories and writings of Sámi scholars from Johan Turi to Hanna Ellen Guttorm, Liisa-Rávná Finnbog, Britt Kramvig and Ánde Somby and gives with this a thorough account of how to understand 'the knowing, playing, learning, teaching, and being of violin lessons as knots of knowing-in-being' and how to refrain from traditional distinctions of research and practice.[32] All these approaches have inspired us to do research on playing with a string instrument in a classical music setting – which, to our knowledge has not been done before – and to how to read the interview materials.

We suggest – to start with – an understanding of playing situations as phenomena, which are 'the primary ontological units … dynamic topological reconfigurings/entanglements/relationalities/(re)articulations of the world'.[33] Barad writes, 'phenomena are the ontological inseparability of intra-acting "agencies"'.[34] Agencies are 'an enactment, not something that someone or something has', but a '"doing" or "being"',[35] of both human and nonhuman components, and those mutually constitute each other (they *intra*-act). Those '[i]ntra-actions always entail particular exclusions, and exclusions foreclose the possibility of determinism, providing the condition of an open future. … Indeed, intra-actions iteratively reconfigure what is possible and what is impossible – possibilities do not sit still. One way to mark this is to say that intra-actions are constraining but not determining.'[36] Without Barad addressing them as such, we read this passage as illumination of the notion of so-called 'agential cuts' that differ from the Cartesian cut in that they cut agencies to create insides (e.g. body or being) and outsides of the apparatus (other), or 'exteriority-within-phenomena'.[37] Agential realism approaches the relationship between continuity, discontinuity, possibilities, and impossibilities differently; it does not see it as a contradiction. Instead, Barad adjusts these concepts, presenting them as dis/continuities and im/possibilities.[38] This is not to say that

[30] Kevin Toksöz Fairbairn, *dis/cord: Thinking Sound through Agential Realism* (Brooklyn: punctum, 2022).

[31] Robinson, *Hungry Listening*, 98.

[32] Mari Ystanes Fjeldstad, *Knots of Knowing-in-Playing: Stories from violin Lessons Read Diffractively Through Agential Realism* (Oslo: NMH Publications 2023).

[33] Barad, *Meeting the Universe Halfway*, 141.

[34] Barad, *Meeting the Universe Halfway*, 333.

[35] Barad, *Meeting the Universe Halfway*, 178.

[36] Barad, *Meeting the Universe Halfway*, 177.

[37] *Knots of Knowing-in-Playing*, 66.

[38] Barad, *Meeting the Universe Halfway*, 177.

everything was possible at any time, but that it is an iterative reconfiguration of what is possible or not.[39] Mari Ystanes Fjeldstad explains how the research process then can unfold:

> The nature of the entities is emerging through the intra-actions of entities and the measuring apparatus. Thus, if we are to investigate the nature of entities, or the quality of research, we must take phenomena – the entanglements of intra-acting agencies – as our objects of investigation and we must attune to the specificities of these entanglements.[40]

The apparatuses that Fjeldstad mentions are yet another term that Barad develops beyond its initial formation in quantum physics. She elaborates them as 'specific material-discursive practices', 'boundary-making practices that are formative of matter and meaning, productive of, and part of, the phenomena produced', and 'themselves phenomena (constituted and dynamically reconstituted as part of the ongoing intra-activity with the world)', that 'do not exist as static structures, nor do they merely unfold or evolve in space and time)'.[41] Apparatuses are phenomena themselves, they are tools to analyse the entanglements, they are not neutral, and they entail the discursive and material aspects of measuring.

Agential realism invites us to unlearn among others a taken-for-granted 'distinction of "human" and "nonhuman"'.[42] Matter is

> not immutable or passive; it does not require the mark of an external force like culture or history to complete it. Matter is always already an ongoing historicity … matter does not refer to a fixed substance; rather, matter is substance in its intra-active becoming – not a thing, but a doing, a congealing of agency. Matter is a stabilizing and destabilizing process of iterative intra-activity.[43]

With this, we deviate from the anthropocentric music tradition of the Euro-American classical music tradition in which the centre is 'Human' (with a capital H) which is usually is white, male, and able-bodied.[44] By attuning to the intra-active mattering of agencies, we can become aware of how in music-making matter matters, how we *like all agencies*, participate in these becomings – or non-becomings – and 'foster some forms of life and not others and [are] response-able to our productions'.[45] As we will discuss further below, a bow becomes different when it meets the strings and over time, sound becomes different when it meets a wall or an ear, and the performers

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[39] Barad, *Meeting the Universe Halfway*, 177.

[40] Mari Ystanes Fjeldstad, 'Evaluating the Quality of Posthuman Music Education Research: Diffracting Quality Criteria through Response-Ability' in *Music Education Research* 3 (2024), 1–13, here 4, citing Barad, *Meeting the Universe Halfway*.

[41] Barad, *Meeting the Universe Halfway*, 146.

[42] Barad, *Meeting the Universe Halfway*, 32.

[43] Karen Barad, 'Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter', *Signs: Journal of Women in Culture and Society*, 28/3 (2003), 801–31, here 821–22 (emphasis in the original).

[44] Fjeldstad, *Knots of Knowing-in-Playing*, 41 seconds here Rosi Braidotti, *The Posthuman* (Cambridge: Polity, 2013).

[45] Fjeldstad, *Knots of Knowing-in-Playing*, 46, encourages us to become aware of the response-ability in research and music education that is an 'interactive intra-active responding and enabling responsiveness' (Fjeldstad, *Knots of Knowing-in-Playing*, 69, citing Karen Barad and Daniela Gandorfer, 'Political Desirings: Yearnings for Mattering (,) Differently', *Theory & Event*, 24/1 (2021), 30) and to become aware of an ethic that 'entails an ongoing responsiveness to the entanglements of self and other, here and there, now and then', Barad, *Meeting the Universe Halfway*, 394, here as responsibility, later Barad uses the term response-ability.

become different when they intra-act with the audience. They are agencies that intra-act with each other in phenomena like concerts or rehearsals.

Our thinking began by building mostly on a feminist new materialist framework, through which we could understand the production of sound knowledge as a process in which player, instrument, space, composition, audience become with each other. Thinking with feminist theories also allowed us to validate the players' bodies and their experiences as important places in the generation of sound knowledge. Thinking with agential realism over time, we became different researchers: more attuned to the entanglements of knowing, playing, and being of humans, nonhumans, and discourses. With this, we also became more attuned to 'how practices of knowing are specific material engagements',[46] and to how theorizing and playing are 'complexly entangled'.[47] to how 'theorizing and experimenting' (in our case: theorizing and playing), are 'complexly entangled'.[48] Theorists and experimentalists 'engage in the intertwined practices of theorizing and experimenting',[49] and so do players and researchers.

Our Interview Material: Entanglements of the Perfect Sound

Micro-Phenomenological Interviews

We are aware of the venture of our attempt to dissect continuing moments of becoming with in music-playing situations with a micro-phenomenological interview method developed in the context of neuro-phenomenological research.[50] This method enables the exploration of subjective experiences. It has been used in art, design[51] and music to explore emotional experiences,[52] or musical experiences more generally,[53] in educational[54] and medical contexts such as epileptic seizures[55] or fibromyalgia.[56] Inspired by Astrida Neimanis's posthuman feminist phenomenology, we understand our practice as a 'deep description and knowledge-creation' through a scrupulous

[46] Barad, *Meeting the Universe Halfway*, 91.

[47] Barad, *Meeting the Universe Halfway*, 91.

[48] Barad, *Meeting the Universe Halfway*, 55.

[49] Barad, *Meeting the Universe Halfway*, 55.

[50] Heimann et al., 'The Lived Experience of Remembering a "Good" Interview".

[51] Bruna Beatriz Petreca, *An Understanding of Embodied Textile Selection Processes & a Toolkit to Support Them*, (PhD diss., Royal College of Art, London, 2016).

[52] Alejandra Vásquez-Rosati, 'Body Awareness to Recognise Feelings: The Exploration of a Musical Emotional Experience', *Constructivist Foundations*, 12/2 (2017), 219–26.

[53] Jean Vion-Dury and Gaëlle Mougin, 'L'analyse des entretiens phénoménologiques expérientiels par la méthode des saillances résonances: Vers une pensée multi-paradigmatique', *Chroniques phénoménologiques* 17 (2020), 34–37.

[54] Claire Petitmengin, *L'expérience intuitive* (Paris: L'Harmattan 2001).

[55] Claire Petitmengin et al., 'Seizure Anticipation: Are Neurophenomenological Approaches Able to Detect Preictal Symptoms?', *Epilepsy & Behavior*, 9/2 (2006), 298–306.

[56] Camila Valenzuela-Moguillansky, 'Pain and Body Awareness. An Exploration of the Bodily Experience of Persons Suffering from Fibromyalgia', *Constructivist Foundations*, 8/3 (2013), 339–50.

exploration of 'multimodal',[57] more-than-human constellations. We are aware that when asking a research partner to re-evoke a playing situation,[58] much is left out and will not matter in the description. Yet the agential cut we make with the interviewed cellists – leaving out matter, leaving out moments in time – helps us to understand how matter comes to matter in playing situations. Having undertaken training in the micro-phenomenological interview method with Claire Petitmengin, we invited six cellists individually to explore one playing situation with us, five of them on Zoom and one in person. The sample strategy was criterion-based and designed to find players who had undergone instrumental training over several years and had devoted their lives to music making. The four women and two men were homogeneous in their racial (white), geographical, and professional background and training (all are situated in Europe and were trained at least partially in Germany), were aged between 25 and 60, and were accustomed to playing with other musicians.[59] One of the interviewees had a PhD and peripheral experience with feminist theory. Each interview lasted between 45 and 75 minutes and was approved by the Norwegian data protection and management organization Sikt. All the interviewees were recruited from our personal networks, but none of them were in a directly dependent relationship with us. After a rehearsal interview, each of us interviewed three players. While being interviewed, the cellists did not have their cellos with them. These was not needed, since the micro-phenomenology interview technique builds on the unfolding of layers of micro-experiences, in which the 'real' experience is remembered. This means that, although the material – the cello or the bow – is not touched, the experience of touching is enacted. Of course, the cellists moved their arms and bodies while recalling their memories. These movements gave us important information which we deepened through further questions.

We invited the cellists to recall a situation in which they experienced coherence in sound, or what we called a 'perfect sound' while playing the cello. The micro-phenomenological interview method envisages inviting the co-researcher to evoke a moment their past.[60] We are aware of the subjective experience of what a 'perfect' sound might be and leave it to the cellists to explore the feeling of the sound(s). To do so, they then return to a specific situation, which one cellist described as follows: 'I was rehearsing the first movement of Edward Elgar's Cello Concerto with my new piano partner, and during the *crescendo* in the part with the syncopations, I had this feeling that this is the perfect sound. It wasn't like that when I re-entered after the piano part'. This is what we want to elicit: the experience unfolds in time, it has a beginning (the beginning of the piece), a core (the experience, which is playing the perfect sound), and an end.

The interview technique requires a detailed examination of those specific moments.[61] In further exploration, the musicians refined the description of their experience – 'browsing its moments'[62]

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[57] Astrida Neimanis, *Bodies of Water: Posthuman Feminist Phenomenology* (London: Bloomsbury Academic, 2017).

[58] Barad, *Meeting the Universe Halfway*.

[59] We are aware that this cohort reflects the problem of a white classical music life.

[60] Heimann et al., 'The Lived Experience of Remembering a "Good" Interview', 223.

[61] Heimann et al., 'The Lived Experience of Remembering a "Good" Interview', 224.

[62] Heimann et al., 'The Lived Experience of Remembering a "Good" Interview', 226.

– and specifically investigated *how* something was done or experienced (not *why*). In other words, we encouraged the cellists to deepen their description by asking: 'When you play this, what happens?' or: 'When you hear this, what do you hear?' What seems at first like a counterintuitive question is an attempt to avoid predefined categories,[63] and to separate the cognitive, bodily, emotional or discursive dimensions. From a feminist new materialist perspective, we might consider this a way to learn about the moment before a phenomenon becomes (such as sound). We know that in such conversations some experiences and things matter while others are cut apart. We also understand that we, Katrin and Evelyn, as researchers, are not outside the inquiry process but part of its becoming. With the answers the cellists gave, we, our research question, and the way we collected the data all became different. When we reorganized the material, it was no longer important to separate the individual memories of our interview partners and mark them as responses from cellists 1 to 6. Together, the materialized memories of the perfect sound formed distinctive configurations. In the following, we explore the four configurations of the entanglements as they developed through our organization of the collected interview material: spatial entanglements, bodily entanglements, material entanglements, and sensory entanglements.

Mess and Matter of the Perfect Sound

In the interviews, the cellists recalled situations of the perfect sound in playing. They made the perfect sound, although they did it in memory. Guided by the practices of the micro-phenomenological interview technique, we collected and organized conversation material into four categories. We understand the data as materialized entanglements of the perfect sound, however, they are an effort to translate the cellists' experience (and express in a traditional language), and read them through the theory of agential realism.[64]

Spatial Entanglements[65]

All of the perfect, coherent sounds had become with the space, such as concert halls, churches, chamber music halls, or rehearsal rooms. One cellist described the space as a setting where a conversation between two partners developed: 'The sound came back from the hall, I responded. It was a nice feeling, a feeling of strength. The sound I wanted, I could make it in this hall.' In another case, the room was large and over-acoustic, and thus not an ideal material figuration in the playing situation. However, the feeling while playing was one of being very 'clear': 'the acoustics were a bit strange because it was … a huge church, but it's suitable for symphony concerts, and it's kind of very reverberant. But I … suddenly felt very clear: [there was that] very, very strong, mighty sound'. A third cellist said: 'It was one of those community halls – ugly. We were a bit shocked at how ugly it was. There wasn't any nice light. There were blinds behind us.

[63] Claire Petitmengin et al., 'Discovering the Structures of Lived Experience: Towards a Micro-Phenomenological Analysis Method', *Phenomenology and the Cognitive Sciences*, 18/4 (2018), 702.

[64] In the way we describe the collected data and the inquiry process of guiding interviews from a posthumanist feminist approach, we are inspired by Fjeldstad, *Knots of Knowing-in-Playing*, 124–34.

[65] The terminology is to be found in Fjeldstad, *Knots of Knowing-in-Playing*, 123.

It was all an indefinable orange. And then, somehow, from the beginning to the end, it was strangely simple, even though the room was so ugly'.

There is no doubt that the musicians experienced a moment of perfection, whether stated specifically ('the sound I wanted') or indirectly ('felt very clear', playing with a 'strong … mighty sound', playing as 'simple'). The first example might suggest that the space merely creates the preferable acoustic conditions and that the sound 'coming back' from the hall to the player is a result of the ideal construction of space. The sound became through intra-acting with the hall's matter (things, materials, humans, the atmosphere, the meanings). Yet there is more to it: we read the cellist's statement as her validation of several elements that matter in the moment of perfection – sound, hall, and the player herself. Whereas the way the cellist expresses herself suggests that she understands the sound and the player as the agencies in the situation (the sound that 'came back', the 'I' that 'responded'), the hall was the element that turned the sound back to the player: the sounds were sent by the player and her instrument, they met the hall and bounced back to the cellist where they re-entered her body. She heard them and felt their vibration. In that way, a phenomenon with sounds, instruments, bodies, and space became, leading to another, and another (yet unknown) one.

Similarly, the second statement reflects on the acoustic condition of the space and the space itself, a 'huge church'. As often with churches, the cellist did not experience the situation as acoustically ideal ('a bit strange') because the reverberations diffused the sounds excessively. Despite that, the described sound experience is imbued with clearness that contradicts the woolliness of the overall acoustic situation ('felt very clear', with a 'strong … powerful sound'). With regard to the role of the space in that description, we understand the cellist's emphasis on the size of the church as meaningful for the moment of perfection. The cellist underlined this quality with another item suggesting enormousness, i.e. a symphony orchestra as an ensemble suited for a space of this size. Whereas the statement of the first cellist provides little information about the characteristics of the space, the third example shows that our colleagues were not suggesting perfect spatial settings to play perfect sounds. In the latter examples, the spaces caused a moment of irritation, one merely acoustically, the final one on the grounds of the ugliness and uncomfortable illumination of the space. Recalling this surprisingly sub-ideal situation, the cellist said that she had anticipated stress about how the instruments would sound. Yet she was surprised by the perfect sound experience with/in this space.

We suggest reading the descriptions not as a call to search for a 'perfect' arrangement of spaces and constellations of matter, beings, and music (whatever that may be) when aiming for coherent playing. To ask, 'What is a perfect space in which the perfect sound could be made?' would not contribute to an understanding of spatial entanglements in a way agential realism offers it. We understand the quality of the space as less meaningful than the fact *that* it was in all cases understood as an important element in the moment of playing. Therefore, the question is: 'How does space take part in creating sound?' The statements of the cellists suggest that in moments when they play perfect sounds, they are aware of the space they are immersed in and that they witness it as a vital element in sound creation. Many performers remember performances in which space is connected with a fixed concept of how the performing body and the space should ideally

or based on aesthetic and acoustical norms relate to each other. It is often induced by an affordance to change oneself (one's own playing technique like bow speed and pressure) in order to play in a certain space and under certain acoustical conditions. This, however, creates a mono-directional relationship. Instead, our interview material enables a reading of space as a non-static but intra-actively co-constitutive agency. Within the framework of artistic research, which encompasses questioning one's own playing while being immersed in it, we suggest that becoming with also embraces a gesture of (re-)searching. While making the 'perfect sound', space as one (of more) intra-acting agencies, becomes an equivalent research partner, with which the coherence of sound is enacted.

Bodily Entanglements

In instrumental schools – represented in treatises, etudes or oral traditions – the use and movement of body parts are explained, but we would contend that the body is often reduced to technique and function by focusing on things like bow pressure or speed,[66] left-hand techniques, vibrato and cello-bow-coordination.[67] The body is salient as a knowing apparatus in the cellists' memories of how their perfect sound became. Which events were the cellists aware of in the moments when coherent sounds occurred?

One cellist indicated a process of relaxation which emerged as follows: 'The bass notes … hum beautifully; only when it's right, it's relaxed in the stomach, [there is] this buzzing in the belly because the chord and the sound are … right'. The focus is here on specific body parts ('stomach' and 'belly') in which resonance and vibration are felt as the moment when chord and sound integrate with the body. In another conversation, we were able to catch a precise description of how this bodily unity developed: 'And I don't feel all of that separately though … it's like flowing … complete at my back, coming together. … I can feel [it] with a deep breath all the way down my back, and suddenly there is this sound.' The player guided us in detail through the emergence of oneness. Strong bodily sensations in a specific body part (here 'at my back') were expressed in the first and second statements. The cellist described the movement, the direction, and how everything came to one particular point as 'flowing'. She perceived how their body flowed together with her breathing and highlighted this breathing as immediately entangled with the feeling of wholeness. Again, the direction of this breath bundled in her back.

Another cellist stated: 'Everything, my whole body, felt completely together. It was oneness.' Rather than noticing different parts, the cellist emphasized that she sensed her body as a undivided ('everything'). Further, she distinguished the quality of the sensed body as 'completely together', summing up the experience as 'oneness', which we read as a felt *bodily* wholeness.

Wholeness as floating is key in this statement:

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[66] Among the publications on cello schools still relevant and as cited in Alfia Nakipbekova, 'Contemporary Cello Technique: Performance and Practice', *Music & Practice*, 6 (2019–2020), DOI: 10.32063/0611; Diran Alexanian, *Complete Cello Technique: The Classic Treatise on Cello Theory and Practice* (New York: Dover, 2003), Paul Tortelier, *How I Play, How I Teach* (London: Chester Music, 1975), Gerhard Mantel, *Cello Technique: Principles and Forms of Movement*, translated by Barbara Haimberger Thiem (Bloomington: Indiana University Press, 1995).

[67] Elizabeth Le Guin, *Boccherini's Body* (Berkeley: University of California Press, 2005), 14–37.

> When it builds on each other, and everything is just right straight away, the intonation is just perfect, and no one has to press somehow to hear themselves and to be sure, but the chord just floats. … When that happens right away in the first piece, any attention to the exact position is gone because when the sound is already floating in the first note, because it's just perfectly right, everyone is happy with themselves. With everything. Now you can do magic and play extremely softly and let it float very close.

This cellist described how she experienced the beginning of a piece and how the different parts of her ensemble came together in the chords. The core of the statement describes how sounds become when the cellist loses the technical focus on one body part ('attention to the exact position is gone'). That de-focusing of one specific body region is characterized as a moment of floating sound ('already floating in the first note').

In these conversations, bodily entanglements appear as both a focus on a particular body part and a whole-body experience. The latter has been described as a merging, flowing, or floating of one's body. Within the frame of agential realism, we argue that this bodily awareness of one specific body part or togetherness describes the moment in which the entanglement of sound, material, and body takes place. As one cellist described in detail, the shift from a technical view of the body ('no one has to press somehow') makes way for a bodily knowing, a knowing with the body. Relating these descriptions with the researching gesture applied in artistic research, the body is a de-controlling and unfolding intra-acting agency. The openness of enacting bodily togetherness should not be confused with a state of being lost. Instead, we argue that the materializations of the perfect sound in the descriptions of the cellists entail a focused-while-being-open bodily attunement, by which the other human and non-human agencies involved can come into being. The knowing and reflexive body, as artistic research theory would name it, becomes in a state of searching and performing at the same time and 'meets' the intra-acting body in agential realism.

Material Entanglements

The instrument itself, the strings, the bow, the co-performers' bodies, their clothes, the rosin, the chairs, the music stands, the pencils, the scores – these are the materials for creating the perfect sound. As we suggest, they are important not only as a means but as the matter with which cellists intra-act.

One cellist expressed her connection with the bow as follows: 'Here [*points to her chest*] are the emotions, and they flow through my [right] arm. And then they flow through the contact points into the bow and right over the string.' This description points to a crucial part of the bow hand: the part of the fingers that touches the bow (the cellist calls them 'contact points'). She characterized these points of holding the bow with the fingers as a transition of emotions (the emotions 'flow through' the contact point) from the performer's to the instrument's body and back to the strings and the instrument. This characterization narrows down to a moment when the bow and the body become porous, and the physical boundaries become blurred. The touch of the finger on the bow or the bow being touched by the fingers – these descriptions capture the exact moment: the becoming with the material. Also, the fingers of the cellist's left hand intra-act with the materials of the cello: 'my hands are then in contact with the instrument – the contact points

of my fingers with the fingerboard and the bow – and become one with the material, they merge into each other'.[68]

Another cellist spoke of how the transition between the performer and the instrument relates to the creation of sound: 'when something is released here [*pointing to his chest*], I have my arms, and through them, the stories go into the wood and steel. My muscles, through the movement and the contact, allow what I feel to be translated into a movement that creates sound without me having to think about it'. Again, the 'stories' or, as in the first example, the 'emotions', flow through the bodily parts and the material. The porous body-material carries the 'story' the cellist wants to tell.

Besides the merging of human and non-human bodies, the entanglements with the co-performers' bodies were also tangible in our interviews. One cellist introduced the perfect sound as a strong relationship with her co-player:

> I am then … not so much with my feelings. I notice that I am just totally relaxed, just totally at ease. Then, I hear and see how my colleague opposite me smiles and feels the same way. … With her, I see the totality, everything. When we play, little bow changes, little dots together. And I see her face and where she is with the bow, and when I then notice how we do it together, … without us having to show it off, … it just flows by itself. There is just such a feeling of joy that we are in harmony and celebrating this … That's just the way it is! We don't look each other in the eye …, but you just perceive it like that.

This description captures the merging of two human bodies despite their being physically separate. The co-performers' movements of arms and fingers, gestures, mimics, and also joy ('feeling of joy', 'harmony') happen with each other 'at ease' ('without us having to show it off', 'just flows by itself').

Reading the conversations with the six cellists through agential realism, we become attuned to the complex intra-actions of matter and discourses of human and non-human bodies, matter, and language as productive agents in phenomena such as the perfect sound. By asking what entanglements created the moment when the sound became 'perfect', we realize how the involved materials matter and become agencies. We read in the descriptions that the way how materials become-with each other is specifically narrative. For example, the points of the bow where the fingers lie 'tell stories'. Mostly, those stories are about an emotional state while being immersed in the perfect sound. Once again, we read the narrative quality of the material entanglements in the descriptions of our interviewed cellists as the way how matter ('a congealing of agency'[69]) becomes with. With the story, the non-human material becomes an active role in playing the 'perfect sound'.

[68] We are aware that 'intra-action' and 'merging' do not have precisely the same meaing. But 'merging is the term chosen by the cellist, and it is a common one in musical discourse.

[69] Barad, *Meeting the Universe Halfway*, 822.

Sensory Entanglements

Visual and tactile materializations of the perfect sound were present in nearly every conversation we held with the cellists. One cellist described the perfect sound as a light: 'The sound was bright, full of overtones … as if the sun was filling the room with light. … The sound was warm and bright like light'. The salient motives in this statement are the brightness ('sun'), the overtones' richness, and the sound's warmness. The sensory perceptions overlap – the sonic becomes visual, the visual becomes sonic, and the sonic becomes tactile ('warm'). The cellist locates this multisensory happening in space ('as if the sun was filling the room with light'). Here, spatial and sensory entanglements coalesce. As we can see, the borders of our set configurations are fluid and are only a medium to structure our material. The apparatus transforms our method.

One cellist recalled the tactile quality of the perfect sound: 'It sounded like velvet. It was not an angular sound, not creaky. It was soft and like that velvet'. Another described the bow's guiding: 'The bow felt like I was dipping it into the water, like a ship into the water'.

The realization that sound is described as 'bright' or 'velvet' is in fact hardly surprising, given the power of translation when talking about music. However, our interviews capture the moment *before* musicians think of sound as coherent. In that case, the interviews show that sound materializes in entanglement with the tactile perception of touching and dipping.

In these conversations, sensory entanglements appear as tactile and visual materializations. We realize that the cellists perceive their sounds as if they were touching (velvet) or dipping (into water). It is not the velvet or the water that is important, but the practice of touching the material or dipping into it. To put it differently, the handling of the material merges with the sound and not the material itself. By focusing on the practice of touching (and dipping), new details and thus new ways of playing the cello come to the fore: it transforms the guiding of the bow, the tempo of how the cellist moves the bow on the string, whether far from or close to the bridge and how firmly the cellist puts the bow on the string. These details relate to the richness of touching velvet. Don't we all know how that feels? Enacting sound as touching velvet is more than a metaphor. The cellist enacts and performs the sound as touching, meaning a velvet touch is connected with all the components.

Becoming-With Each Other in Sound

The conversations with the cellists entail situations of playing in which various agencies intra-act: musicians, their background and education, knowledge and expectations, the cellos, the bows, the strings, the spaces, the scores, sometimes other players with equivalent apparatus, and the listeners. We asked the cellists to describe the 'perfect sound', a formulation that pays tribute to the feminist conviction of the subjectivity of experiences or a strong objectivity.[70] The feminist new materialist micro-phenomenological interview method was well suited for scrutinizing the sound. In yet another measuring apparatus (the interview), the musicians cut-together-apart the various components of the apparatus-in-play-and-research to describe the intra-acting agencies in

[70] Harding, *The Science Question in Feminism*.

the ‘perfect sound’. The cellists described the variety of matters of the room, the instruments, their bodies, colours, or (body) language, and their agencies.

The conversations can confirm Nina Sun Eidsheim’s understanding that sound is always multi-sensorial, which means feeling like fabric on the skin, like a dip in body-warm water, sunlight, or the room itself. To further the concept that Eidsheim has subsumed under the term ‘relationality’, we have applied the feminist and posthuman theory of agential realism to our materialized entanglements of knowledge and being, as which we understand the six micro-phenomenological interviews. With agential realism as a thinking tool, we cannot uphold the separation of playing and researching. When it comes to describing the playing apparatus, it was not important that the materials were experienced as being in harmony or beautiful (whatever that might be). Frictions (as in an ‘ugly room’, a misunderstanding of how two players should play together) or resistances (as challenging acoustics) were mentioned in the interviews and subsequently registered at an early stage of the playing situation. How friction or even collapse of performance enhances or blocks the becoming with in the sonic has to be the topic of further artistic research.

What emerges in our research setting is that the body, the material, the sensorial, and the space develop as knowing partners in creating sound. They become meaningful besides technical or functional tasks. The body floats, flows, and becomes (one) also with others; a bodily region booms, hums, or vibrates; the sounds move, and the space corresponds; the fabric invites a specific touch, and the light challenges a warm timbre. Based on our data, we suggest considering the multifaceted and vital bodily, spatial, material, and sensory apparatus when seeking the creation of the ‘perfect sound’.

The question posed in our title gives rise to a change of thinking about the sound–performer relationship: It is an invitation to turn from representational to performative thinking.

Conclusion remarks

When performing and analysing our interview material, we were engaged in two processes of knowledge creation: firstly, the playing of the ‘perfect sound’ itself, and secondly, the inquiring process, which we as investigators created before (through the theoretical and methodological outline), during (through guiding and enacting the conversations with the cellists) and after (through analysing the material) the becoming with of the players. Both processes were situations of knowledge creation through which our interview partners, the cellists, and we ourselves were in ‘the material conditions of possibility and impossibility of mattering; they enact what matters and what is excluded from mattering’.[71] Through listening to them and reading their voices through the theories of agential realism, we can understand the cellists’ knowing-in-playing.

Further, future research might engage in the ethico-political aspect of entangled becoming. We therefore suggest a critical engagement with the genealogy of the music[72] and instruments’

[71] Barad, *Meeting the Universe Halfway*, 148.

[72] Robinson, *Hungry Listening*.

material.[73] Finally, and most importantly, we hope that our findings can inspire us to develop new teaching methods and materials in cello lessons. We wish to advance learning and playing circumstances that provide creative alternatives to dichotomic power structures (human/material, teacher/student, knowing/being, music/vernacular, right/wrong, mind/body, study/practice) and value the diversities of human and nonhuman bodies, matter, and knowing. By considering entanglements and intra-action as lived experiences, we aim to explore creative approaches in learning and teaching situations, instructions, rehearsals, and performances. That would mean understanding sound as the intra-active becoming with of human and nonhuman agencies and discarding hierarchical and anthropocentric orders.

[73] Aaron S. Allen, 'Ecomusicology from Poetic to Practical', in *Handbook of Ecocriticism and Cultural Ecology*, vol. 2 of *Handbooks of English and American Studies* (Berlin: De Gruyter, 2016), 644–63.