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# The Listening Body: Sound walking, wearable technologies, and the creative potentials of a vibrational pedagogy

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## The Listening Body: Sound walking, wearable technologies, and the creative potentials of a vibrational pedagogy

Wearable biosensors are becoming increasingly prevalent and agentic social technologies, used primarily to serve dominant medical, health, and commercial agendas. This chapter explores alternative possibilities of wearable sensory technologies, as creative media for walking-based research and pedagogy with young children. Drawing on experimental practices of urban sound walking developed in a project called the Listening Body, we describe a series of walks that explored the use of wearable technologies as devices for collectively attuning to the more-than-human environment. In these sound walks, wearable technologies augmented our collective capacity to sense the urban environments we encountered with children, while also generating data related to the vibratory relations between bodies and environments in movement. Bringing together theoretical perspectives from bioaesthetics, posthuman media ecology, and biosocial studies in education, we outline some of the implications of wearable technologies as creative media for a vibrational pedagogy that extends beyond the limits of the human sensorium.

Keywords: wearable technologies; walking; sound art; affect; pedagogy; biosensing; media ecology

### **Introduction**

This chapter explores the creative potentials of biosensing technologies in the construction of new methods and conceptualisations of sound walking as a practice in arts-based research and pedagogy. We draw on our collaborative research project the Listening Body, which involved a series of sound walks with children (aged 5-10) attending an after-school visual arts program in the inner city neighbourhood of Hulme, Manchester, UK. The sound walks enabled children to develop creative listening practices through playful experiments and sonic interventions within a range of local

environments and spaces. In order to research the affective and embodied dimensions of the soundwalks with children, we collected data from wearable biosensors (Empatica E4), body-mounted GoPro cameras, and high fidelity sound recording equipment. Breaking with clinical and reductive uses of these technologies, our approach is aligned with creative, critical, and socially-engaged applications of wearable biosensors in the fields of contemporary art (Umbrellium, 2017; Nold, 2009), participatory design (Coenen, Coorevitz, Lievens, 2015) and human-computer interaction (Schnadelbach et al, 2014). We believe that the Listening Body is one of the first projects to explore the creative and pedagogical potentials of biosensing technologies through collaborative sound walks with children in public spaces.

Increasing attention has been given to sound in critical studies of childhood and education (c.f. Philo, 2016; Mills, 2017), including research into the political, aesthetic, and cultural implications of the sonic in children's everyday lives and educational environments (c.f. Gershon, 2015; 2019). Much of this new work has developed in conversation with philosophical movements associated with critical posthumanism, decolonial theory, and the new materialisms, leading to emerging analyses of sound in terms of more-than-human listening practices (Brigstocke & Noorani, 2016; Engelmann, 2015), vibrational affect (Thompson & Biddle, 2013; Gallagher, 2016; Gershon, 2013), queer ecologies (Shannon & Truman, 2020), racialisation (Henriques 2011; Stoeve 2016), resonance (Wargo, 2017), indigeneity (Robinson 2020), justice (LaBelle 2021; Schuppli 2020), and performativity (Powell et al, 2017). This chapter contributes to this wider field of critical sound studies by exploring how speculative acts of *walking* and *listening* can generate all kinds of multi-sensory, more-than-sonic sensations and affects, and how the use of wearable sensory technologies can effectively

augment these speculative listening practices beyond the thresholds of human perception and consciousness (de Freitas & Rousell, 2021).

In the following sections, we begin by contextualising the *Listening Body* project within posthumanist approaches to sound art, listening, and sound studies, while also making connections with recent developments in bioaesthetics (Mitchell, 2010), media studies (Hansen, 2015), and biosocial research in the social sciences (de Freitas et al, 2020). We conceptualise our use of biosensing technologies as creative media for sound walks that contribute to an expanded environmental awareness and affective sensibility. In conversation with Mark Hansen's (2015) "radically environmental" theorisation of 21st century media ecologies, we suggest that biosensing technologies provide access to sensory data beyond the narrow bandwidth of human sense perception and consciousness. In this respect, the *Listening Body* can be understood as an adventure into "expanded listening" practices that extend the affective dimensions of listening across a "spectrum of different kinds of responsiveness that includes but also goes beyond active human audition" (Gallagher, Kanngieser, & Prior, 2017, p. 622). We develop these ideas through the analysis of a "micro-event" from the *Listening Body* project, drawing on synchronised biological, audio, visual, and geographical data collected during the sound walks. This micro-event forms the basis for a discussion of the pedagogical implications of biosensing technologies, with a specific focus on how these technologies might contribute to an understanding of sound walking as a "vibratory pedagogy".

## **The Art and Science of Listening**

The *Listening Body* project emerged from a series of experimental research initiatives in the Manifold Lab, a transdisciplinary research hub housed within the

Education and Social Research Institute at Manchester Metropolitan University. The Listening Body was co-funded by a Leverhulme Artist in Residence grant (Gallagher and Wright) and by the Manifold Lab (Rousell). The Manifold Lab provides a creative space for developing new research methods and theories of learning through projects that work across the arts, social sciences, life sciences, computer sciences, and (post)humanities. As founding and affiliated members of the Lab, we have a shared interest in sound walking as a method for arts-based research and pedagogy. This method brings together our varied experiences in the fields of sound art (Wright, 2017), sound studies and sonic geographies (Gallagher, 2016), and post-qualitative inquiry and speculative pedagogies in educational research (Rousell, 2020; 2017; 2015).

Sound walking is a practice often used by artists, geographers, and anthropologists to explore the sonic aspects of environments (Gallagher and Prior, 2017). In its simplest form, it involves a group of people walking along a pre-planned route through an environment, paying close attention to whatever sounds can be heard along the way (Gallagher et al, 2018). Sometimes sound walks include additional instructions, protocols, interventions or technologies designed to elicit responses from participants, or bring attention to particular aspects of sonic environments. These methods have been in use since the 1960s (Drever, 2009), but there is little research into how soundwalks operate, and more specifically, how they affect learning and behaviour. It is often claimed that sound walks develop people's listening skills, enable them to hear noises that they would ordinarily filter out, and give them a new appreciation of the diversity of beings and processes in everyday environments. Such claims tend to be based more on anecdotal “reflections” and language-based evaluations, however, and there has been little investigation of the non-conscious,

affective, and somatic dimensions of sound walks (e.g. Berglund and Nilssen, 2006; Jeon et al, 2013).

The Listening Body took a different approach by bringing sound walking into conversation with bioaesthetics (Mitchell, 2010), media ecology (Hansen, 2015; Gallagher, 2020), and biosocial research in education (de Freitas, 2017; Youdell, 2017; 2016). Mitchell (2010, p. 11) describes how the fields of bioart and bioaesthetics have linked “artistic goals and techniques with biological technologies”, while also framing participants in arts-based events “as themselves media for transformative powers of life”. Bioartists often experiment with the ethical, aesthetic, political, and social implications of biotechnologies by reconfiguring the “ecology of innovation” that surrounds these developments (p. 61), while also posing broader philosophical questions regarding the shifting agencies and relations between media, technology, life, the human, and the more-than-human (p. 11).

Biosocial research has also been explored within education and the social sciences, but with a focus on how biotechnologies, life sciences, and social discourses are all implicated in the emergent phenomena of learning (Youdell, 2017, p. 12). This biosocial turn in education has blurred traditional boundaries between qualitative and quantitative research paradigms, establishing new empirical methods and posthuman theorisations of learning as a dynamic, multi-sensorial and environmentally distributed process (de Freitas, 2017; de Freitas, Rousell, & Jager, 2019).



Figure 1: Listening to the more-than-human environment through earplugs and paper tubes

The *Listening Body* project aimed to make new connections between sound art and biosocial research through a series of experimental sound walks in collaboration with children attending an after-school arts program (see figure 1). Rather than framing the project in terms of specific research goals or objectives, we allowed the project to be guided by an open-ended series of interests that informed the co-production of sound walks through collaborative research with the children. Our *first interest* has revolved around the exploration of wearable biosensors as creative media in the production of sound walking events with young children. We are interested in developing and testing new methods of co-production that combine walking, listening, and biosensing as ways of making art, learning, and doing research with children. Our *second interest* is in the use of biosensing technologies to “plug into” and “crack open” the affective dimensions of the sound walk as a pedagogical event that produces new potentials for learning. This interest is aligned with biosocial research in education, as it questions the nature of sound



walking as a sensational pedagogy that co-implicates somatic, social, and environmental milieus. Our *third interest* is in how sound walks might give children new ways of expressing what could be called the “sonic imaginary” – the playful and creative potential of sound to spark the imagination, as compared to the traditional orientation of sound walks to what actually exists within a location. We are interested to explore how this sonic imaginary might affect children’s sensorial engagement with their everyday environments. This interest leads us to explore how sound walking can open up a more nuanced understanding of children’s sonic worlds, including an awareness of the nonhuman agencies, elements, and forces that populate children’s urban environments and communities.

### **More-than-human Senses and Sensors**

The *Listening Body* project explored these three interests through a series of sound walks that integrated the use of biosensing wristbands with GoPro body cameras and high-fidelity sound recording equipment. The recent development of clinical-grade wearable biosensors offers unprecedented potentials for plugging into site-specific patterns of affective, sensory, and somatic interactions as children move through time and space. To date our project has focused on exploring the potentials of the Empatica E4 wristband, a product developed by MIT’s Affective Computing Lab in conjunction with the companies Empatica and Affectiva. The E4 uses unobtrusive wearable sensors to collect and transmit biological data in real time, including electro-dermal skin activity (EDA), heart rate, body temperature, and rates of motion, acceleration, and activity that are associated with changes in affective responses and emotional intensity (Pijeira-Diaz et al, 2016; Sano & Picard, 2013). The mobile and non-invasive nature of the E4 wristbands means that they can be seamlessly integrated into walking-based artworks, fieldwork and learning environments, opening up new possibilities for participatory art

and research events that are responsive to the sensory and affective experiences of bodies in movement.

Drawing on ideas from Hansen (2015) and de Freitas (2017), we are interested in how biosensing devices like the E4 operate at microtemporal processing speeds that exceed the thresholds of human sense perception. Rather than seeing the wristbands as prosthetic extensions of human perception and consciousness, we are interested in how these technologies physically and directly mediate and reconfigure the “sensory continuum” of the environment by altering the “concrete texture of experience” (Hansen, 2015, p. 48). By rendering access to sensory data beyond the limits of human language and cognition, biosensing technologies like the Empatica E4 can be seen to operate within a vibratory continuum of “worldly sensibility” that is, quite literally, *more than human* (Hansen, 2015, p. 2). Electro-dermal skin activity (EDA) sensors are particularly interesting in this context, as they register unconscious changes in the electrical conductivity of the skin that are associated with affective engagement, attention, and arousal of the sympathetic nervous system (Pijera-Diaz et al, 2016). As de Freitas (2017, p. 297-298) argues:

Skin conductance is a way of attending to the neurological periphery – the far-flung electrical activity of the body- rather than what is assumed to be the centre and administrator of that system- the brain... The EDA skin data is thus perfect for showing how the bounded individual is always being broken down, dissembled, remade, intensified, and charged... The EDA data points to our biochemical relationality, our bioaffective dispersal.

In advancing sensory data as an indicator of the “dispersed nature of affect and thought” (p. 298), de Freitas calls for researchers to experiment creatively with biodata in order to study and participate in “the distribution of more than human sensation” (p. 284). Our

work on the *Listening Body* project took up this call, as we endeavoured to explore the use of biosensing wristbands as creative media in conjunction with other sensory technologies, including wearable GoPro video cameras and sound recording devices.

### **Biosensing Practices**

The use of clinical-grade biosensing wristbands has recently received critical attention from education scholars. Researchers have questioned the bio-ethical and biopolitical implications of capturing data from children's bodies (de Freitas, Rousell, & Jager, 2019; Webb, Sellar, & Gulson 2020), and the normative utilisation of this data to reinforce pathologising discourses of childhood (de Freitas, 2017). In decoupling biometric data from a pathologised and clinical view of the bounded individual subject, we have used wearable biosensors as vital media that operate within a vibratory ecology that is distributed across multiple scales, degrees, and intensities of experience. Rather than attributing biosensory data to the individual body or child, we attribute this data to the sensory environment, or "atmosphere", which is always a collective achievement (de Freitas, Rousell, & Jager, 2019). In doing so, we have adopted an expanded understanding of the term "biosensing" to describe "any *practice* that uses information technology to understand something about bodies or the environments in which they live" (Nafus, 2016, p. xiv, emphasis in original).

Thinking about *biosensing as a practice* allows us to approach the event of a sound walk as a network of "listening bodies in movement" that mutually affect one another within a vibratory ecology of sensation (Manning, 2012). We understand this ecology of listening to propagate through an economy of vibrational affects, in the Spinozan sense of bodies simultaneously affecting and being affected by one another. "A focus on sonic affect and atmospheres then expands listening beyond human perception, cochlear listening, and consciousness, to how sound impinges on bodies, including (but

not limited to) human bodies” (Gallagher, Kanngieser, & Prior, 2017, p. 632). This orientation allows us to think about E4 wristbands, GoPro cameras, children, and ourselves as listening bodies, each capable of registering, mediating, and affecting one another through practices that both include and exceed human perception and consciousness. Even a sensing body as ubiquitous as a digital camera is capable of capturing and rendering the sensory data of a sound walk in ways that elude conscious, human perception. Similarly, we found that extremely sensitive microphones were able to pick up sonic layers and elements of the walks that exceeded our human capacities to hear at the time.

We can of course expand this analysis further, and imagine the vast and teeming networks of sensing bodies that both surround and intermediate one another as they go about their lives. As perceived through the speculative philosophy of Alfred North Whitehead (1978), we begin to encounter the “world as medium”; in other words, a world that is quite literally *made of sensations* (what Whitehead terms “prehensions” or “feelings”) which comprise the universe as a vibratory continuum. It is in this sense that we see biosensing practices contributing to an expanded environmental awareness and sensibility that both exceeds and includes the human senses within a vibratory continuum of affective resonances, attenuations, and reverberations (Rousell & Cutter-Mackenzie, 2020). This “radically environmental” (Hansen, 2015) theoretical approach has been a touchstone for our collaborative work with children, as well as our emerging understanding of sound walking as a vibratory pedagogy that connects visceral sensations and speculative concepts within the matrix of a “sonic imaginary”. The following section describes the *Listening Body* project in more detail, including the analysis of a “micro-event” which provides small windows into the layers of sensory data and mediation that were fielded over the course of project.

## Becoming Listening Bodies

The *Listening Body* project took place over six months in collaboration with 30 children and 3 arts educators at a community arts facility in Hulme. Hulme has a distinctive history as home to a working class, multi-ethnic and racially diverse community notable for its social activism, subversive music and art cultures, and anarchic political movements. The area has also been a site of continuous waves of urban demolition, mass clearance, and rehousing, through large-scale governmental attempts at social housing and urban renewal. The arts centre occupies one of the few remaining historic buildings in Hulme only four blocks from the Manifold Lab at Manchester Metropolitan University, and has provided a diverse and inclusive program of multi-arts education for children and young people for over 25 years. In 2014, Manchester Metropolitan University's new campus was constructed on what had previously been public space in the middle of Hulme. This contested campus infrastructure, and associated influx of university staff and students, can be seen as part of the ongoing transformation of Hulme's urban fabric, arguably contributing to attempts at gentrification.

The *Listening Body* was the first in a series of small projects that brought local children together with artist-researchers from the university to collaboratively explore the shifting sensory dynamics of this local urban ecology. The project involved four phases of artistic co-production and participatory research with children from the community centre in Hulme. In the *first phase* we introduced children to the process of sound walking as an art form, and worked with them to develop different ways of listening through the body in conjunction with various materials, objects, and spaces. The children were excited by the GoPro body cameras and E4 wristbands; we explained how they worked, and discussed with the children how these biosensing technologies could be used as creative media for making art over the course of the sound walks. In the *second phase*,

the children, led by the artist, explored the sonic properties and qualities of their everyday environments around Hulme, including the sonic geographies of schools, parks, and neighbourhoods. They also worked closely with us to analyse the data collected from the initial series of sound walks, including biodata from the E4 wristbands, GoPro video, photographs, and sound recordings. This work served as the basis for the *third phase* of the project, which involved children designing their own sound walks around Hulme using a variety of media and performative interventions. These walks included child-generated activities such as rattling the metal fences surrounding a nearby school, listening to the sounds of the arts centre through a bowl of jelly, and disrupting the sonic texture of the university building with balloons (see figure 2).



Figure 2: Montage of still frames from GoPro videos created by children during sonic disruptions in the local university building



Then, in the *fourth phase* of the project, we created a series of multi-sensory cartographies with the children, which included layers of video, sound, biodata, and geographical data collected from satellite images of places in Hulme we had visited. This involved the creation of multi-sensory maps by projecting satellite images of the area onto paper attached to a wall, and inviting children to use drawing, collage, and annotation to map their sonic encounters and experiences (Figure 4). This final phase also involved discussions with children regarding their experiences of connecting with the sonic imaginary, and how their engagement with the project had affected their understandings of sound, art, technology, learning, movement, environment, and place.



Figure 4: Children layering multimodal data onto a projected image of Hulme

In our ongoing analysis of sensory data and artistic material generated over the four phases of the project, we have teased out certain “micro-events” that have emerged

through the layering and synchronisation of multiple data types. This approach involves a speculative and relational approach to data analysis, that focuses on identifying particular ‘blocs’ of data with multiple layers and dimensions that are mutually affecting, drawing on post qualitative approaches associated with “immersive cartography” (Rousell, 2020; 2019; 2017) and “biosensory ethnography” (Rousell & Diddams, 2020). In the following vignette, we analyse a micro-event that illustrates some of the vibratory properties and intensive qualities of sound as a sensory and affective force of mediation.

*Micro-Event: Sound as Vibratory Affect*

The micro-event we have chosen to focus on here emerged within an initial series of environmental sound walks that introduced children to the idea of thinking and making art through creative listening practices. These walks began by exploring the historic inner architecture of the community arts building, which has numerous galleries, performance spaces, meeting rooms, spiral staircases, cinemas, theatres, and a café. We used one of the gallery spaces to explore the nature of sound as vibration as it passes through different bodies, materials, and acoustic spaces, and discussed how children experienced these vibrational qualities of sound in their everyday lives. Children were invited to place the ends of a length of cotton string into their ears, hang a metal coat hanger on the string, and then explore the vibrational qualities of the room and each other through playful interactions. One of the interesting renderings to emerge from this micro-event was the sense of vibrations conveyed by the photographs that were produced as children experimented with the coat hangers and string (see Figure 4).





Figure 4: Children experimenting with coat hangers in the Z-Arts gallery space

These images reveal a blurred “technicity” of the sensing body in motion (Manning, 2012), a process of becoming-vibrational that almost seems to transduce the sensation of sound as it passes through, and re-arranges, the vibratory structures and potentials of bodies. These photos alerted us to the ways that a sound walk could become multi-sensory and performative, with children’s bodies, gestures, and expressions becoming vital media for the production of sonic works of art and pedagogy. Rather than viewing these photographs as a visual documentation and discursive representation of the walks, we see

the images drawing out unexpected sensory and aesthetic potentials from a vibrational field of environmental sensibility. These images gesture towards the process of becoming a new kind of listening body, more attuned to the visceral dimension of sound as a vibratory medium (Duffy and Waitt, 2013).

We also analysed this micro-event from the perspective of EDA data collected from the E4 wristbands, in conjunction with GoPro video data from cameras worn by children during the walk. By synchronising the EDA data with video data using a software package called Chronovis, we can witness the fluctuations of skin conductance as children engage with various phases of the sound walk event. Figure 4 shows a 5-minute section of biodata collected from one of the E4 wristbands which obtained a clean and uninterrupted signal<sup>1</sup>. We have annotated and narrated several phases in the data as it proceeded in order to demonstrate our present thinking about this data in relation to the sound walk event.

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<sup>1</sup> There are a number of technical issues associated with the collection of EDA data, including “noise artefacts” generated by excessive movement or an irregular fit of the bracelet around the wrist of the child.



Figure 5: Screenshot showing annotated GoPro video data synchronised with EDA data from the Empatica E4 wristband

Figure 5 exhibits a number of resonances and contrasts between the sound walk activities and the EDA data collected from the wristbands. If we follow the movement of the EDA data from left to right, we can see a steady and relaxed increase in bodily engagement as Mark engages the children in an initial discussion of sound's vibrational qualities. We also see minor fluctuations in the EDA signal when the children offer their own examples of sounds that they had heard during the day, and collectively voice the sounds of wind. When Mark asks them to pick up the string and coat hangers there is a further increase in the intensity of the EDA signal. This is followed by a distinct shift to a much more dynamic and fluctuating vibrational reading from the EDA signal as the children place the string in their ears, begin to explore the sonic potentials of their bodies and the space. We also note a particular "burst" of EDA intensity when the children

discover an improvised practice that involves rhythmically bouncing the coat hanger against the walls of the gallery. This practice generated what the children described as a “weird” sensation, which they variously articulated as “vibrational”, “like a drum”, “a clock”, “a bell”, “a body”, and “a heartbeat”.

### **Discussion: Sound walking as Vibrational Pedagogy**

What becomes apparent through this brief micro-analysis of the EDA data is the embodied and affective nature of sound walking as a pedagogical event that registers, quite literally, on the surface of the skin. We would like to avoid making reductive readings of such data, which would figure these fluctuations as individual somatic responses to external environmental stimuli, inferring a cause and effect model of bodily affect. Rather, we find it more generative to read this data as fundamentally *biosocial* and *bioaesthetic* in its connection with the distributed pedagogical force of the event as it unfolded. Our aim in engaging with this biosensory data is not to make causal claims about this micro-event, but to add additional empirical layers of thick description to what might be termed a ‘biosensory ethnography’ (de Freitas & Rousell, 2018). In conversation with recent work by Rousell and Diddams (2020, p. 432), our aim is “to use EDA data to help render the *qualitative* sense of an affective atmosphere that is environmentally dispersed within events”, where biodata helps to “tell speculative ethnographic stories that reveal otherwise invisible movements and intensities”. In the micro-event discussed above, biodata helps tell the story of how the listening body participates in an event in ways that are imperceptible and yet *sensible* at the “quivering periphery” of the “electric body” (de Freitas, 2017, p. 298), at the surface of the skin where sound registers as vibrational affect.

This theoretical focus on the environmentally distributed and vibratory nature of sensation also carries implications for rethinking the role of pedagogy in sound walking events, and creative learning events more broadly. Our work in this chapter turns away from cognitive and phenomenological orientations towards learning and pedagogy, that rely on positing a cohesive individual subject and its representations as the units of analysis. As Ellsworth (2005, p. 7) argues, “such notions are underwritten by assumptions that there is an identifiable self, a locatable point of view or subject position from which meanings are made and through which experience is organised and held together”. It is certainly possible to view the sound walk participants (the children, ourselves and the workers from their arts group) as bounded individuals in this way, but to do so neglects something that seemed far more salient to us as the walks unfolded: a sense that these events involved bodies *resonating together in sound*, in ways that seemed to create new vibrational relations between bodies, objects and spaces. Rather than reducing teaching and learning to “personal experiences” driven by the intentionality of bounded subjects, we are interested in developing new concepts of pedagogy as an environmental process that takes shape within a vibratory ecology of sensation. The EDA data, for instance, suggests that children are “learning” on the surface of the skin in ways that are unconscious, imperceptible, and yet *sensible* through wearable technologies.

Our focus on the sensibility of learning also raises questions about how sensation comes to be pedagogically choreographed, composed, and, in certain ways, *orchestrated* through practices of sound walking. One of the implications of this line of thinking is that pedagogy is decoupled from the intentionality of the teacher, artist, or other facilitator of learning, and realigned with the distributed environments through which learning emerges. Ellsworth (2005) describes this in terms of “sensational pedagogies” which operate through embodied and affective attunements with works of art, media, and



architecture. For Ellsworth, a sensational pedagogy is nothing less than the “orchestration of forces, sensations, stories, invitations, habits, media, time, space, ideas, language, objects, images, and sounds [that] move the materiality of our minds/brains and bodies into relation with the other material elements of our world” (p. 24).



Figure 6: Attuning to worldly sensibility through the *Listening Body* as sensational pedagogy

Sensational pedagogies are defined by their capacity to disrupt and reconfigure the sensorial relations between body and environment, individual and collective, feeling and thought, matter and meaning. They do so by operating through a logic of sensation that redistributes the possibilities for participation, process and affective engagement. As Ellsworth (2005, p. 7) further explains:

Pedagogy, like painting, sculpture, or music, can be magical in its artful manipulation of inner ways of knowing into a mutually transforming relationship with outer events, selves, objects, and ideas. Or, it can be used to

simply manipulate, through congealed forms, unresponsive shapes, and derivative logics.

To the extent that sensation can be located within a vibratory continuum that extends well beyond human cognition and perception, sound walking can be considered a “vibratory pedagogy” when it attends to the environmentally distributed nature of this “worldly” sensation or sensibility (Figure 6). Sound walking comes to operate as a vibratory pedagogy when it foregrounds bodily participation in ecologies of movement, sensation, and affective resonance that extend beyond the human senses. An openness to sensory difference and noncompliance with expectation is crucial to understanding sound walking as having this potential to resonate as an ecological, aesthetic and multi-sensory pedagogic process. This also means that the pedagogical value of a sound walk can never be specified or even knowable in advance, but must be left open, pragmatically, to the vibratory play of affectivity and movement as it takes shape in and through events. Our use of wearable technologies in this project is aligned with this vibratory pedagogical approach, demonstrating how biosensing technologies can expand the “sensory confound” (Hansen, 2015) of sound walking through the event of its vibrational occurring.

### **Conclusion: Toward a vibratory pedagogy**

In this chapter we have described a sound art project called the *Listening Body* which involved a series of experimental sound walks with young children in urban environments. We have focused on the artful use of wearable sensory technologies as vital media for registering the otherwise invisible play of vibrational affect and intensity through these walks. Drawing on theoretical perspectives from media ecology, bioaesthetics, and biosocial research in education, we have analysed data generated by a

micro-event within an experimental sound walk. Based on that analysis, we have developed the idea of a “vibratory pedagogy” which places human sensation (including listening) within a vibratory continuum of “worldly sensibility” (Hansen, 2015). This chapter therefore proposes a shift in the emphasis and enactment of sound walking. Rather than understanding such walks phenomenologically, as walking subjects listening to an environment, we suggest that sound walks involve more-than-human vibrational processes that cut across and mutually envelop bodies, environments, discourses, feelings, sensations and ideas. This is necessarily a political as much as an aesthetic shift, as it disrupts the normative distinctions between teacher and student, researcher and participant, artist and audience, body and environment. Our proposition for a vibratory pedagogy shifts attention to how learning arises through the orchestration of a much wider range of affective forces, tonalities, and events. While we maintain that this orchestration of affectivity cannot be controlled or predicted, we believe it can be more modestly intervened in, played with, choreographed, and pedagogically attuned through ethically responsive modes of creative experimentation.

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