

Theorising with the mycelium in the commingled world of young children's musical play

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Inspired by Sheldrake's study of fungi (2020) and Barad's idea of entanglement (2007) this paper explores music-play with young children and artists, a practice that resists adult-centric approaches. As an embedded researcher within an early years arts organisation, I play with a diffractive methodology to read through ideas of Froebel with posthuman writings. Using slow-motion viewing of a video extract of musical play the vibrant agency of materials and sound emerge in micro-moments of playful music-making. Theorising with the mycelium produces ideas of extravagance, music and sound understood as lively intra-active and wild. It communicates through, and within, living and non-living matter. This view of music asks for artists to 'do' and say less, watch more, and to hold the space for the bursting forth of ripe and ready musical expressions. Through this pedagogical approach children and adults can experience a sense of becoming-with music, with the world.

Keywords: posthuman; new materialism; early childhood music education; musical play

Introduction

Young children's musical play has been the subject of music research studies in recent decades. Scholars have demonstrated that young children have their own musical culture with aims and purposes (see for example Barrett, 2006; 2009; Marsh and Young, 2006; Campbell, 2010; Barrett and Tafuri, 2012;). Studies have also investigated the variety of musical play (Littleton, 1998), the educator's role as play partner (Young, 2003), and music educator as collaborator in varied learning pathways for children's music making (Niland, 2009; Huhtinen-Hildén and Pitt, 2018).

These research findings support the importance of including children's imaginative, self-directed music activity as part of a largely play-based early childhood curriculum (DfE, 2023). It also provides an argument for the work of socially engaged arts practice

that seeks to work in ways that raise awareness of young children's musical creativeness, competence and capacity.

A recent reading of Sheldrake's (2020) 'Entangled Life' drew me evocatively into the world below the forest floor. Sheldrake's explanation of the rich communicative network that comprises the mycelium, from which fungi and mushrooms sprout, sparked connections in my thinking as I worked simultaneously on writing-up a small-scale research project that brought together the philosophical ideas of Friedrich Froebel with the artistic practice and ethos of an early years arts organisation that was the location of the research (see Pitt and Cavanagh, 2023). This reading-with the research writing seemed to help me serendipitously to make sense of some of the ideas that were unfolding in the research project. These ideas that had been coagulating for some time as we (the research associate and I) sought to articulate, with our artist colleagues, what was to be learned about music and education from the rich, communicative expressions of young children that were evident in their music-play. The coagulations were gathering around a desire to express knowledge – what can be known about the world – in ways that are not necessarily tied up with language or words. Young children's embodied ways of knowing, with sound and materials, needed to be shared through findings that included everything that matters in young children's music making in a non-hierarchical manner. That is to say to report research that does not privilege adults' actions over children's; humans over non-humans; human-human connections over those between human and non-human connections in music-play events.

As the title of this paper suggests the non-plant, non-animal system of the mycelium offers an ecological framing for music education research. Drawing on the wide interdisciplinary field of ecology that studies the interactions and relationships among all living things, I theorise with the mycelium to open ways of knowing and doing research that are focused on the interdependence of humans with the world.

Previous seminal studies from developmental psychological scholarship, for example Urie Bronfenbrenner (eg., 1977; 1994) strove to widen research approaches from laboratory-based experimental studies of human development to include the social and environmental contexts as integral to the human's changing relations with their environment. This was driven by a desire to understand and better articulate the complex, interconnected relationships within young children's development. He conceptualised his theory in ecological systems terms, describing a process-person-context model (1994, 38). The interactions through *proximal processes* (1994, 38) that Bronfenbrenner describes as operational within the model include human and non-human bodies such as objects in the child's microsystem layer, and institutions, policies, and even time across the layers of the ecosystem. The focus and central point to the model is the human and their development. This model has raised awareness of the diverse influences and contexts of young children's lives, increasing understanding of the importance of early childhood as a formative phase in the lifespan.

By turning to posthumanism there is the opportunity to orient the gaze away from the human at the centre of a model of development drawing into the field of vision non-human materials as active participants. The ecological frame here is to view all matter in the environment: human and non-human, living and non-living with potential for performative agency in the ongoing process of bringing the world into being through their interconnectivity and interdependence. With this positioning in mind, my thinking with the mycelium and its mechanism of commingling (Sheldrake, 2020, 61) with other matter becomes an interconnected process of composing and decomposing of my thoughts and ideas about music, young children, and research. By means of hyphal strands reaching out from the mycelial network interconnections with other matter proves fruitful and nourishing. I adopt this approach as I search for fulfilling ways of theorising with music-play events. This turn to the natural world for insight and

inspiration is enriched further by scientific understandings of the intra-active properties of matter at the atomic level.

Drawing together several strands of thinking: ideas that have been generated by thinking across time with the pioneer educationalist, Froebel; investigating with current understandings from science about the properties and agency of matter; and a connected relationship with the non-plant, non-animal system of fungi, mushrooms and the mycelium. These commingled notions have been put to work in a study of young children's playful creative encounter, asking what can we learn with young children, educators and artists when sound is the playful medium?

This framework brings with it some concepts and neologisms that I present now to situate the research in its terrain. First of which, and integral to the study, is the term intra-action.

Intra-action and Entanglement

Two key concepts that run through the paper are Karen Barad's neologism 'intra-action' (2007) and the notion of entanglement (Barad, 2007; Haraway, 2016). Intra-action arises from quantum physics research that has found at the fundamental atomic level, matter is not fixed, but in a state of becoming through an ongoing process of intra-activity. The science of Newton that compartmentalized and separated things is challenged as a worldview by these recent scientific findings. Matter is not a fixed independently existing object, not a thing, but a dynamic process of *phenomena* acting in an ongoing state of materialization (151). Agency of matter is 'doing' or 'being' in intra-action. Possibilities exist for intra-acting with other matter at every moment in the world's becoming. The idea of entanglement relies on this understanding of matter.

Barad considers "the primary ontological unit to be *phenomena*" (333). Her agential

realist view (2007, 132-185) does not see independent determined objects with boundaries, and the notions of observer and observed as separate, but rather it is the relationality, through specific intra-action that “the boundaries and properties of the “components” of phenomena become determinate and that particular material articulations of the world become meaningful” (333). Phenomena she describes as “*the ontological inseparability of intra-acting agencies*” and therefore as “*ontological entanglements*”(333, italics in original).

Haraway (2016) uses storytelling to describe entanglement. Stories of ‘companion species’ and their ‘knotting’ entanglements in an ongoing process of “relentlessly becoming-with” (13). Becoming-with is how the partners in the process become who and what they are. “Natures, cultures, subjects, and objects do not preexist their intertwined worldings” (13).

This has implications for notions of learning – rather than thinking of learning as separate from the world taking place within the learner’s mind or between people the intra-active notion of learning brings the idea of porosity between the learner and their world, not apart from one another, both being of the world in a state of co-dependency. Learning and understanding is thus dependent on the material world; it acts on our thinking as much as we act on it. Research is also reoriented, utilising objective methods to perceive the world are less useful when the world is seen as an entanglement of inseparable phenomena with research and researchers caught up amid this intra-activity.

Adult-Child

Murris (2016) and Murris and Kuby (2022) present the binary notion of Adult/Child as a “power-producing binary” (underline in original) that “works to keep children at a distance, and exclude them epistemologically, ethically and politically” (Murris &

Kuby, 2022,4). The writers argue that definitions are important, using the example of the etymology of infant, *in fantia* - not speaking – they indicate that this positions the child as lacking in relation to the adult and their use of words (5). Words and oracy are highly valued in adult culture, hence young children under three might be termed pre-verbal, or non-verbal, these terms introduce a hierarchy of ‘not-yet’, of a work in progress, or a problem of not talking to be overcome (see Blum, 2017; Quinn et al., 2021) which conceives of the youngest in society as deficient in being verbal thereby producing the talking adult as powerful in the binary notion of adult-child. Arts practices that focus on ways of knowing that are not dependent on oracy can foreground the embodied nature of knowing, creating and being in the world. This approach situates young children as abundantly knowledgeable and competent.

An approach to early childhood music-arts practice

The pre/non-verbal realm - where words are not the main focus of attention offers a rich play-sphere, not concerned with finding words to represent things and explaining doing with things, rather playing with and being curious with objects and materials, bringing unrelated things together to learn, know and think. Capacity and competence are evident in communication that happens beyond words in rich, complex, multi-modal expressions. Hackett and Somerville’s (2017) posthuman examination of literacies found through observations of young children that the sound and movement inter-relationship was entangled with the more-than-human world posing questions at the interface of young children’s play (eg., the speed and texture of objects as they fall, the force of drumstick as it bounces on stretched drumskin) which generate words and / or vocalisations as a result (386).

Findings from the SALTmusic project (Pitt and Arculus, 2018; Pitt, 2020; MacRae and Arculus, 2021; Pitt and Welch, 2023) a research study with young

children, their caregivers, and an interdisciplinary team of speech and language therapists and artists, supports the claims of arts-based pedagogy for children's communication and musical expressiveness. The music-play environments and the pedagogical approach for the project were founded on Trevarthen's (2000) understanding that musicality is a form of human interaction with people, objects and spaces. Children's musical expressions were foregrounded in this music environment which became "a (re)colonised creative space of liberation and freedom for all (children, carers, artists) to express, to be heard, and valued – a music space for being, becoming, and belonging" (Pitt and Fox, forthcoming). By offering this sound-music-play space with open-ended loose parts (Nicholson, 1972), and a watching, listening, waiting-before-responding pedagogy young children were found to increase the number of words they used, and they used them more frequently (Pitt and Arculus, 2018). Music offers a mode of expression that is beyond words, it is therefore an ideal medium for working with young children and their families with a pedagogy where music is the expressive mode, in a "relational networked world" (Murriss and Kuby 2022, 4) that resists adult-centric approaches that depend on giving instructions or talking about music.

Literature Landscape

Early childhood education perspectives

This paper's terrain also includes an education perspective that has its roots in the philosophical ideas of the founder of the kindergarten, Friedrich Froebel. In recent years, his ideas from the 19th century have been re-visited to explore their potential for contemporary early childhood education. Two research studies are particularly relevant to the focus of this paper. Firstly, Listening-2 project (MacLure and MacRae, 2021) scrutinised play events in the two-year-old room of a nursery with practitioners and

parents/caregivers. Innovative use was made of slow-motion video-based methodology (MacRae, 2019) to gain insight into the sensory and felt aspects of young children's learning. By reading Froebel's ideas of unfolding and self-activity with this methodological approach, the researchers found that the iterative watching of the films drew from within them a kinaesthetic receptiveness, vision tapped into other senses of touch and proprioception (MacLure and MacRae, 2021).

This methodological approach of slow-motion viewing of video materials offered rich potential for our research project's design, as did the researcher positionality. The ways that the methodological approach connected the researchers physically with the entangled assemblage (Barad, 2007) of the play events was a phenomenon with which I could identify. The connectedness that exists between research and practice in my sphere of work feels symbiotic and interconnected. Orienting my research methodology towards this approach allows me to acknowledge that my research process with data affects me, and I affect the data in its collection, analysis and interpretation in an entangled and inextricably linked way.

Clark's (2022) study 'Slow knowledge and the unhurried child', looked at the concept of time in relation with Froebel's principle that early childhood is important and should be valued, not seen as accelerating towards the next phase of development. Testing and assessment of learning can lead to hurriedness in settings and with children. The study looked at slow pedagogical approaches with a focus on the timing, pace and rhythm of practice that celebrated play. By slowing down teaching it was possible to give time and space for every child's ideas to be seen, heard and valued.

Clark's study resonates with my research of music-play events where practice is based on children's leading, guiding and shaping of the creative encounter. Attunement to the child's tempo and pace is fundamentally important to the artistic practice and

pedagogy which relies on synchronous attention to what matters within a child's temporality and intention.

The important role of materials in arts-based pedagogies has been worked with by Lenz Taguchi who proposes an intra-active pedagogy (2010) for early childhood education. This requires educators to attend closely to what children bring into the play-learning situation, to make this visible and do it justice. There is an emphasis on listening and negotiation of meaning and ways of doing things. Observations turn towards the performative agency of materials used in play-learning events transforming them from passive objects of children's play to intra-active bodies. They use the example of a young child moulding a clay figure to illustrate how the material of the clay works actively (intra-actively) both with the child's hands and ideas, and against these, in a process of the clay figure's moulding, in what they describe as a "borderless mutual relationship" (59). The possible ways that lumps of clay resist or respond with human hands and discursive thinking are part of what becomes materialised as the clay figure. This example of Barad's (2007) concept of intra-action is used by Taguchi to illustrate matter making itself known to other matter – "knowing in a state of 'being in the world'" (58).

For early childhood music-arts pedagogy these ideas open possibilities for thinking about sound makers and other objects used in music-play episodes as agentic, influencing and influenced by humans, their ideas, and other materials in the process of music-making. Sound and music are created by the movement or vibration of matter. The sounding and listening occurs through the changing motion of atoms e.g., the tiny hairs in our ears are triggered by sound energy that send nerve signals to the brain and our body reacts in different ways as a result. The sounds and the sound makers producing learning-feeling-understanding through the intra-actions that emerge in a state of interconnectedness of human bodies with sound. This asks the educator to focus

intently on the present moment, listening, watching and being open to the “not yet known” (Davies, 2014, 32). This, Davies (2014) calls emergent listening, it demands letting go of assumptions, judgements and self-interest (28), rather giving attention to “micro-moments of being” (15), listening for meaning and the generation of something new (38) so that it becomes possible to make visible (and audible) children’s creative capacity in the intra-active engagements as “they do the ongoing work of bringing themselves and their community into being” (Davies, 2014, 15).

Froebel’s ideas for this research

Finally for this research, resonances were found with Froebel’s philosophical ideas for the contemporary early childhood arts practice that we were investigating. In later sections of this paper, I read through these ideas with posthuman notions of entanglement and intra-action, but firstly a presentation of Froebel’s principal ideas that we put to work in the study.

Unity, uniqueness and connectedness

Froebel speaks of nature unfolding its essence according to the laws of the universe, viewing humans as part of that system of unfolding. He acknowledges that every individual is unique in their expression of a united humanity (White, 1907, 41). Unity and the connectedness of all things, alongside individual uniqueness, appear as foundational principles. As a crystallographer Froebel understood that it was possible to have unity in diversity. Underpinning his educational philosophy is the idea that each child’s personality represents a unique expression of the universe, so it is imperative to enable every child’s unique potential to fully flourish (Fletcher and Welton, 1912, 37).

This philosophy finds representation today in one of the four overarching aims of the English Early Years Foundation Stage’s (EYFS) guiding principles to shape

practice “every child is a unique child, who is constantly learning and can be resilient, capable, confident and self-assured” (DfE, 2023, 6). To hold the uniqueness of each child’s (and adult’s) creative potential and their continued flourishing as a cornerstone for musical-artistic pedagogy their musical contributions become essential to the process of teaching and learning and the creation of something new. The practice hinges therefore on improvising in the moment, composition, collaboration and co-creation or making-with.

Importance of play

One of the characteristics of effective teaching and learning for young children aged 0-5 years found in the English EYFS (2023, 16) is ‘playing and exploring’, this statutory framework considers play essential for children’s development, confidence, curiosity, and relationships. There is an implied assumption that young children’s learning environments should be largely play-based and yet knowing how to respond and join in with children’s playful sound explorations may not be always clearly understood in practice.

Froebel pioneered play as centrally important for children’s learning, and as a self-motivated expression of their inner world (White, 1907, 45). Coining the term Freeplay, he realised that meeting children on their terms was most efficacious for practice, urging educators “Let us learn from the gentle hints of children” (Heerwart, 1891, 24). His theory of knowledge was that it emerges from children’s interests and is realised through their own activity (Hill, 1908). This notion, taken up by constructivist theorists, many years later, was a revolutionary idea in the 19th century where knowledge was conceived to be located firmly in the domain of adult teachers. This radical idea of Froebel’s that through self-activated play children are engaged in learning repositions the role of the educator in terms of knowledge transference. In play,

a linear pathway of adult-directed instruction is less obvious, it calls for a pedagogical approach that appreciates children's autonomy, employing tools of negotiation, observation, listening, guidance and support.

Importance of music

Froebel understood that young children's modes of expression begin with movement, revealed in their responses to pleasing impulses or thoughts, followed by song, not song with words but rather vocalising rhythmic sounds (Courthope Bowen, 1893). He saw these two, movement and vocalisation, to be utterly connected to one another.

Kendall (1986) explored Froebel and his mentor and educational guide, Pestalozzi, and their ideas in relation to music education. They believed active music learning, based on personal encounter, should seek to develop a balanced person alongside their musical capabilities.

“When a child thinks, feels and acts in terms of music, he is achieving something he cannot achieve in any other way. The whole of Pestalozzi's and Froebel's ideologies rest on real, first-hand, individual experience enabling organic growth; music is a fundamental dimension of human experience; without it a child's education is impoverished and seriously incomplete” (Kendall, 1986, 11-12).

These three ideas from Froebel's philosophical writings: Unity, uniqueness and connectedness; Play as centrally important; and the Importance of music, provided some of the underpinning pillars for our study. In addition, we brought our learning from the SALTmusic project plus the turn to posthuman thinking about childhood and the world. These pillars helped to structure the research framework. Lastly, an unexpected addition of learning from the natural world contributed a final pillar giving fresh insight and dynamism to the theoretical thinking as outlined next.

Theorising with the mycelium

The mycelium – the network of filaments and strands of fungus that cover every forest floor - has become increasingly important to me in conceptualising research, researcher positionality and a way of knowing with the world. Merlin Sheldrake (2020) opened the world of the mycelium to me as a dynamic, agentic communicative force for connection and communication in the forest. The filaments (hyphae) of the mycelium wander towards what is appealing. Sheldrake describes this wandering as ‘extravagant’ i.e. outside or beyond its boundaries (55). The hyphal tips ‘commingle’ (61) with other matter in the forest, infiltrating tree roots - using a system of communication amongst itself so that one part knows what another part has found and reacts accordingly. This is not cognitive or intellectual, there is no brain to coordinate signals - but signals there are, and communication is very efficient, nonetheless. Nicholas Money has shown that fungi demonstrate a form of knowing that is evidence of problem solving, decision making, learning and spatial recognition (Money, 2021), i.e. knowing that is embodied.

Fungi are collaborative decomposers and composers, instrumental in the creation of for example, bread, alcohol, and many medicines, acting amongst substances in the creation of something new. Commingling is more than connecting, comprising entanglement with other bodies in streams of embodiment, rather than streams of consciousness (Sheldrake, 2020, 61). He conceives of the mycelium in musical terms, in particular polyphony (61), envisioning the extravagant commingling as different melodic voices sounding-around and entwining-with one another.

My engagement with the mycelium is as an ecological concept to theorise with, it is more than metaphor. As discussed earlier, ecology is concerned with the interrelationship of organisms and their environments. The mycelium as theory brings notions for playful sound improvisations as composing through action in the creation of something new. The mycelium’s embodied knowing about the world is highly relevant for conceptualising young children’s knowing and making with the world. The playful

music encounter seen as an interrelationship of organisms, human and non-human, amongst an environment, connecting with sound in ways that evidence embodied composing as a form of communicating and knowing a musical world.

My research processes and positioning are also entwining and extravagant. What previously seemed to be a limitation to my researcher positionality, in terms of detachment from the data, now appears crucial and important, that is the embeddedness of the research with practice. This reading of the world positions the researcher and the research process as ‘becoming with’ the data in a state of intra-action, commingling with the various elements of the assemblage in a process of knowledge-creation. Barad states that “..objectivity cannot be about producing undistorted representations from afar; rather, objectivity is about being accountable to the specific materializations of which we are a part” (2007, 91).

This framework offers a new way for me to conceptualise music and education with the youngest children through a (re)orientation that causes a metaphysical disruption. This disruption opens a new ontology, an onto-epistemology, where “knowing is a material practice of engagement as part of the world in its differential becoming” (Barad, 2007, 89). Music making/learning can be seen as an emergent event with human bodies, non-human instrument bodies, and sounds performing with agency. Leading me to a renewed awakening that “to participate in any kind of music making, then, is to participate in the creative emergence of the universe” (Shoben and Mantie, 2019, 395).

Diffraction Methodology

The turn to posthumanism prompted a hunt for an appropriate methodology. The paradigm calls for careful consideration of the positionality of the human and non-human in the data, analysis and reporting to ensure that the performative agency of

things (see Bennett's thing-power, 2010, 2) both material and energetic are equally considered. Diffractive methodology (Bozalek and Murris, 2022) is based on ideas from Donna Haraway (1992) and Karen Barad (2014) who suggest that reflection, as an optical metaphor, merely mirrors back what one is looking at, whereas diffraction offers multiple diffractive patterns that can give varied insight on an event or issue. Using diffractive methodology, theory or philosophical positions are read through each other rather than against the other. This precludes setting ideas against each other, rather seeking to gain insights through an affirmative process of engagement with ideas through one another generating multi-faceted provocations that travel in different directions through an iterative process. I worked with these ideas as if looking from within a kaleidoscope, turns of the lens giving views of the same constituent parts in different ways. Importantly for this paper, it disrupts notions of the theory-practice divide, rather than practice being seen as an application of theory, the two are read through with each other (Bozalek and Murris, 2022, 56). This methodology gives voice to data that are beyond text-based methods found in and indivisible from practice. The music-play events read diffractively as theory in action. The approach encourages iterative looking, intense gazing at moments, images, film extracts from an entangled positionality.

Putting the diffractive methodology to work for our small-scale study¹ (for detail see Pitt and Cavanagh, 2023) I took the writings of Froebel (Heerwart, 1891; Courthope Bown, 1893; White, 1907; Hill, 1908; Fletcher and Welton, 1912; Kendall, 1986) with contemporary authors (Barad, 2007; Lenz Taguchi, 2010; Davies, 2014; Haraway, 2016) and read them through each other with the mycelial lens in response to iterative slow-motion playback (MacRae, 2019; MacRae and MacLure, 2021) of music-play film

¹ Ethical approval for this study was granted by the Royal College of Music Research Ethics

episodes, semi-structured interviews with two early childhood artists, and an in-person observation of music-sound-play with children, caregivers and artists. In this paper I focus on one short sound-play episode. The diffractive patterns section that follows presents the analysis from different turns of the kaleidoscope. Firstly, through the mycelial lens with my personal response to the film episode; secondly, reading through contemporary posthuman notions with Froebel's selected writings.

The film vignette lasting less than one minute (see appendix for a text description) of extant film materials were viewed iteratively at normal playback speed and in slow motion. Throughout there is no adult talk. The vignette comes from an early years artistic residency, it is a fragment of film taken by a videographer (one of the residency artists). The location was one floor of a repurposed department store with the event offered for one family at a time, because of Covid-19 restrictions.

Diffractive Patterns

Sound as hyphal strands

As I watched the film it was the sound that stretched through the porous boundaries of computer screen, time, and space. Sound filaments (or hyphae) searching extravagantly to commingle with my body. I watched the reverberations of the drum's sounding with the dinosaurs as they jumped and danced on the drumskin and then as that sound rippled through the adult's body – the whole assemblage seen to me as “worlding-with” or *sympoeisis* (italics in original Haraway, 2016, 8) and yet while I was able to watch the interconnectedness between materials, hands and movements, it was the sound with which my body reacted in a compositional process of synchronous attunement with the event. The mycelial hyphae, strands of sound, drew me across time and space into a listening-feeling-with. I became part of the assemblage through my entanglement with the sound.

In this watching-listening process, and at many other times, music/sound strands have entered my mind and body commingling amongst my memories and feelings to cause physiological changes, igniting thoughts and my feeling state in an instant. It is a process of decomposing and composing within me. I find sound to be what Bennett (2010) describes as vibrant matter, it has dynamic agency and is highly intra-active. The boundaries between bodies are very porous where sound is concerned, crossing over to another is very lively and happens very easily. It leads to music being an inescapable environment (Pitt, 2014) and therefore particularly challenging in a free flow early years setting, it is noisy and pervasive, presenting an obstacle for early childhood educators and music teachers who might need to control sound levels in a classroom.

Unity and connectedness

The diffractive reading of Froebel's ideas of unity and connectedness through the notion of intra-action gave a view of everything in a mutual ongoing relationship. This sense of unity crossed species boundaries. The porosity of hands holding objects, and/or objects animating hands and bodies all experienced as fluid and alive. The matter of dinosaur toy making itself known to other matter (Taguchi, 2010, 58): hands, drum, bodies.

The dinosaurs, agents of performativity, brought adult hands together with the child's actions, the dinosaurs' movements on the drum together with bodily reverberations from the adult. The drum and the dinosaur moving together in an act of animation which reverberated through the body movements of the humans. It was not possible to disentangle the dinosaur from the drum and humans, they were together moving in an unfolding relationship, what seemed to be a "borderless mutual relationship" (Taguchi, 2010, 59), in sounding the world in a vibrant, wild way.

The drum and its sounds united and connected every aspect of the episode through its presence as a large resonant play platform and with its sound filling the space, it amplified and sustained the activity of hands and objects.

Central importance of play

The child initiated this “micro moment of being” (Davies, 2014, 15) bringing the objects into the assemblage for the sound-play encounter. Froebel advised that “the child creates his own world for himself” and “this world is at once the expression of his inward realisation of his surroundings” (White, 1907, 118). A posthuman reading through Froebel produces the notion of the creative emergence of the child and their world as they become with music-play. Learning/understanding is expressed vocally, in movement, gestures and collaborations. Silences are as important as sound; the child’s timing leads the encounter. Play unfolds moment-by-moment with the potential to compose or decompose at any time. Seemingly random events e.g., the fall of the dinosaur towards the child on the drum led to an entwining again with the child and changed the direction of the activity for the adult who sensitively responded to the unexpected fall of the dinosaur on the drum and the child’s impulse. Play encounters seen as “emergent with the world” as the soundmakers and objects “question and redirect” the playflow (Hackett & Somerville, 2017, 386-7), The audible sounds in the play episode came from the drum and the child’s vocalisations. They occurred in the child’s temporality and intention, the other bodies, human and non-human, assembled and disassembled, within the child’s time and space sphere. It was a creative event without words where the commingling of bodies, human and non-human composed something new through action. The environment was planned and created in advance, what unfolded, through the child’s self-directed activity was a micro-moment of

originality, an onto-epistemological event of bringing into being the “not yet known” (Davies, 2014, 32).

My entanglement with this episode has helped my understanding of child-initiated musical play. By moving the humans from the central focus of my attention to expand my gaze I could become aware of thing power (Bennett, 2010) and its significance for children’s understanding and knowing. By reorienting my focus of child-initiated musical play it is possible to see the various taxonomies of play described by Littleton (1998) as just one part of a picture, the child depicted as a detached actor playing through stages of cognitive development. By altering my view and flattening the hierarchy between the human actors and materials I can see agentic bodies, human and non-human, in a process of intra-active vibrant being in the world. The child’s knowledge forming an integral part of the world’s ecology in its ongoing creative musical emergence.

Importance of music

White (1907, 67) recounts an older child’s (6 years old) singing lesson with Froebel based on the idea of spontaneity. The child is to have the feeling before she receives the words or melodies through which to express it. The instruction given is ‘to start from the pupil’s own life, and to proceed from it like a bud or sprout. It has to come from within the child,’ commenting that it must be unlike mechanical learning of songs and poems from which there is no response from the pupils. This notion of an inner feeling from within the child to generate spontaneous music making, before words or melody are even forming, can be theorised with notions from the mycelium, the human moving, sounding, playing, envisaged as a human-hypha (filament-strand of a system) steering towards appealing sound-movement-play prospects, embodying the communicative system that flows through them and

intermingles with all matter on earth. Music known in bodies as well as minds, play can be hyphal in its shape shifting and drawing together of unrelated things to commingle and learn more with, to find nourishment and be fruitful. Musical utterances, expressions and movements are constituted by, and entwine with material and human bodies, acoustics, and the environment in embodied polyphonic strands. Music in relationship with the world, intra-acting (Barad, 2007) and commingling (Sheldrake, 2020). Using this idea, young children can be seen with capacity for improvisational, embodied musical expression. This offers a starting point for music-arts practice that celebrates what young children already know and understand as they are now. A view of music education as playful encounter that is fruitful and nourishing to enable growth and thriving.

Conclusion

Not only is this orientation for research giving space for children and their music to be seen, heard and valued as knowledge, but the research practice is also an act of claiming the territory, eschewing normative, human-centred paradigms and procedures; instead colonising the space for an ecological research approach that flattens hierarchies between researcher-researched, adult-child, human-non-human, and theory-practice.

Fungi and the properties of the mycelium are highly pertinent to think with as we face an environmental global crisis; modelling flexible, creative and emergent ways of being and researching with other matter. Theorising with the mycelium generates a proposal of sound and music as extravagant wandering strands that intertwine and move around one another, seeking to entangle with other bodies and once there to commingle (Sheldrake, 2020, 61) in a decomposing and composing of thoughts, feelings and physiological changes amongst human bodies.

The ecological research frame sees music-play events as emergent entangled polyphonic assemblages of bodies, movements, and feelings. These are situated within a world of multiple assemblages of humans and non-humans in need of care as we materialize the world in its ongoing state of becoming. This onto-epistemological framing necessitates a concern for matters of care. This concern is informed by Bellacasa's (2011) interest in care from the perspective of science and technology research, turning from 'matters of fact' and socio-technological assemblages into matters of care. Her perspective is that "ways of studying and representing things can have world-making effects" (86). Caring becomes an ethico-political, affective state of doing (90), towards the generation of more caring relationships (100).

Braidotti's essay (2020) written in the midst of the pandemic calls for different ways of caring, "a more transversal, relational ethics that encompasses the non-humans" (466). She posits affirmative ethics which centre on the unceasing potential that exists in all living organisms to connect in multiple ways. This potential described by Braidotti as "the immanence of life that can only be co-constructed and jointly articulated in a common world" (468).

Caring thus extends to sound makers in the world we have in common: including for example, the sea, wind, birds to inspire music-play with young children, as well as their toys and sound making instruments. It includes matters of caring with the young children and adults that play together. Caring with the preservation and sustenance of sprouting networks that support creative, flexible emergent ways of being and researching music-play. This brings matters of caring for the sustainability of arts and music education into the tangle and the ethico-political affective actions that are needed to preserve their fragile eco-systems.²

² The concerns of care go beyond the scope of this paper, they will be explored more fully elsewhere.

This paradigm has opened seams of knowing differently for early childhood music education and research, not only about what adults may be missing by applying adult centric music norms and expectations to under three-year olds' music, but also the ways in which children's funds of knowledge about creative knowing and being in the world may be subjugated and quietened by adults. With a concern for the present moment, not focusing on future prospects it is possible for artists (including musician-educators), caregivers and researchers to meet and create in the child's temporality.

Music education for young children can be found framed around imitation and recall with songs, rhymes and activities written by adults, for children. This is needed and there are excellent pedagogical approaches for this practice. However, I have become aware of the opportunities to learn about childhood, about music and sound, and its emergence, when the gaze in observations of children's music-play is turned to the connections and engagements with non-human elements and the active role that they exert in the interrelationship. By adopting an iterative and slow-motion methodology (MacRae, 2019) I could become entangled with moving bodies to understand how music emerges in bodily form, and to consider sound as a vibrant agent in this embodiment.

The arguments made in this paper raise some questions for which I do not yet have answers: Is an education system predicated on taming wild children at odds with working with open ended child-directed playfulness, a centrally important aspect of learning for young children in early childhood? How can pre-defined adult-driven targets of measurement and assessment value and take account of children's own music knowledge and understanding?

Implications for practice are subtle and require the artist-educator to do and say less, leaving space and time for children's expressions with their bodies and sounds. This might bring non-linguistic communication to the fore, and/or it might bring silence

and feelings of awkwardness. The temporal arts present opportunities to slow down the tempo and flow of a lesson bringing the focus towards being in the moment, giving space for things (polyphonic strands) to emerge in their own time. Young children's music may include tapping, scraping, rhythmic play with objects, repeated patterns with body, voice or object, gesture, vocalisation and movements, both gross and fine. It can be unstructured and may not look like our concept of music.

Critical thinking, problem solving, and curiosity are important qualities for the future of the human species on earth. The play world of the youngest children is a site for practising these qualities. Young children are experts in all three. The challenge for research and practice is to 'be' in the child-time-space – be curious, listen, wait and watch in anticipation of the unexpected, then to respond from within the entanglement with authenticity, reaching outward to what is pleasing in the play.

Laura Huhtinen-Hildén's (2012) continuum model for music learning and teaching proposes moving away from the traditional binaries of teacher-directed or learner-centred approaches towards a more fluid and flexible positioning according to what is needed in the moment, dependent on the care-full teacher's values and actions. The model presents an holistic understanding of teaching and learning music as improvisation in pedagogical moments as part of the co-creation of holistic interactive art pieces. By speculatively reading this model through a diffractive lens a non-hierarchical assemblage of human and non-human agents is visible. The view is of an interdependent network (mycelium) of vibrant intra-actions. De-centring the humans situates the process of teaching and learning amongst a care-infused assemblage where everything matters, and music education is rather an encounter that is "emergent with the world" (Hackett & Somerville, 2017, 386). The teaching-learning process can be seen as extravagant (moving beyond its boundaries) in entangled intra-action. We can reimagine with Donna Haraway music education as a multidirectional process of

learning - as worlding and becoming-with (Haraway, 2016). Through embracing embodied polyphonic commingling as relational creative encounter, we can frame both children and adults in a state of becoming-knowledge with music.

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Appendix A

Dino-Drum vignette (46 seconds)

A large gathering drum is at the centre of my screen, echoing the videographer's gaze, the camera capturing the moving lights as a backdrop. There is an adult (artist), a child (about 2 years old) holding two dinosaur toys (Tyro and Trice³), sitting with the drum. This assemblage fills the screen. The drum, humans and toys are seen as shadows against the moving, pastel-coloured lightshow backdrop. The adult drops their hands on the drum (quaver crotchet) the drum sounds in the resonant space, the child drops Tyro onto the drum and the drum responds, the adult lifts their hands off and the child kneels closer to the drum. The adult drums four even beats, Tyro begins to jump on the drum. The child takes hold of Tyro and adds Trice with an ensuing crotchet crotchet pattern sounding in the space as the two dinos sound the drum. The adult's hands go up. Child vocalises "grrrrr", the adult places fingers on the drum, silence, watching, waiting while the child picks up the dinos and looks at them, turning them in their hands, lifts their hands up, and shrieks; almost simultaneously the adult lifts their hands up, open mouth in reaction to the shriek.

The adult leans forward, hands on drum, child is holding dinos in their hands, puts Tyro on the drum with small grunts and lifts Trice upwards.

Child puts Trice on the drum, the drum sounds and the adult taps with fingertips, like legs walking. The child lifts Trice, vocalises 'sta!' and offers it into the adult's hand, as it leaves their hand the child vocalises 'sta!' again and sits back on heels, vocalising 'yeh, yeh.' The child moves back from the drum, looking at the adult who drops Trice on the drum, it bounces about on the drum and the adult moves their body in response up and down. They repeat this Trice falling on the drum towards the child. The adult moves hand and body towards Trice making to pick it up, but stops and sits back, as the child proceeds to manipulate the dinosaurs on the surface of the drum, which acts as both a platform for the play and a responder to the play. The adult leans on drum watching closely as the child focuses intently on their hands, and the dinosaurs on the drum.

³ Tyro and Trice are names I have given the plastic toys: one a Tyrannosaurus Rex and the other a Triceratops.