


ARTICLE

Resonances: tuning into the echoes of the ecological collective

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Abstract

Drawing on posthumanist and new materialism theorising, we take the concept of resonance for an *a/r/tographic* 'walk' to know, be and do differently, to challenge human-centric separatist ways that have resulted in our current socioecological crises. Beginning with Ingold's knotty thinking, we identify the notion of resonance as a node for exploring and thinking about interactions in the world. Guided by Barad's proposition of entangling ethico-onto-epistemic ways, our *a/r/tographic* thought experiments find resonances that echo through bodies, through connections as nature, through deep-time and modern spaces to notice and attend to intraactions within the ecological collective. Through art-full, thought-full scholarly enquiry, we explore diffractive encounters to consider resonance as a conceptual tool for tuning into and harmonising with the entanglements of body–mind–space–time–matter. We pose this exploration of resonance as the start of a knotty theory conversation for shifting into a new 'common world' knowing, being and doing.

Keywords: socioecological approach; arts-based; theories; emergent thinking; environmental philosophy; practice

Introduction

The goal of life is to make your heartbeat match the beat of the universe, to match your nature with Nature. (Campbell, 2011)

Perspective changes are identified as necessary in these times of pressing crises of environments and humanity, to promote just sharing of our collective socioecological commons and to halt increasing instability (White, Rudy, & Gareau, 2016). New imaginings for more ethical, equitable ways of thinking and being through posthumanism and new materialist theorising have emerged (see e.g. Barad, 2007; Braidotti, 2013) and been embraced by many environmental education researchers and practitioners (see e.g. Crinall, 2017; Malone, 2016). This is challenging work as it is hard to divorce oneself from our human prejudices and shift our thinking, and hard to put into practice. Our enquiry starts when a group of Australian environmental educators came together in the southern summer of 2018/2019 to grapple with philosophies, theories and practices for shifting our thinking and doing. We were looking for new ways of engaging in what Taylor (2013) terms 'common worlding' for entangled, ethical co-inhabiting of humans with nonhuman beings and entities in the Anthropocene world. Ingold's (2015) philosophical metaphor of lines and knots provided inspiration for following and entangling lines of theory and practice. We initially immersed ourselves in encounters of bodies, places and concepts through playful, embodied,

sensory, thoughtful and creative engagement with entangled lines of theory, with a focus on identifying knots/coalescences in our environmental education practice and theory. Knotty nodes emerged and were explored. ‘This resonates with me’ was a common reaction to the collective enquiry such that for four of us the notion of resonance became our focus for sense-making in theorising and practising common worlding.

Resonance and ‘to resonate’ is about sympathetic vibrations; an understood pattern recognition. Resonance applied to music, physics, chemistry or emotion relates to repetition; a resounding and echoing. Resonance has origins in Latin, from *resonantia* meaning echo and *resonare* meaning resound. (Oxford University Press, 2019)

Our group consists of four authors working collectively with this concept of resonance as a way of ‘being with’ the world, while our colleagues in the extended group engaged with other knotty themes for research and practice in a variety of ways (see other papers in this special issue). We draw from Barad’s diffractive methodology (2007) in conversation with an arts-based methodology of an embodied, conceptual and affective ‘walkography’ (Lasczik Cutcher, 2018). Our hybrid scholarship-arts practice (scholaristry) thought experiments to tune into resonances of the ecological collective took the concept of resonance for a theoretical and methodological walk. Initially, this was as an artful amble through university grounds, over busy highways and along yellow sandy beaches. We explored the multiple ways in which our bodies were intraacting (Barad, 2007) with ‘bodyplacetime’ (Crinall, 2017) and sought to capture what the concept of resonance meant for each of us and its application as a tool for interpreting our embodied encounters. As the second stage of enquiry, we followed different diffractive pathways to ‘walk’ with resonance for tuning into different dimensions of the ecological collective: through the body, through connections as nature, deep-time resonances of the universe and atoms and layered resonances of modern spaces. This paper shares the unfolding of our ‘walkography’ decentering work of thinking and being in the world differently. Through our diffractive encounters and artful musings, we explore and theorise resonance as a conceptual and practical theory for tuning in to the entangled knottiness of our ecological collective.

Knotty theory thinking and messy methodologies

Ingold (2007, 2015), in thinking about the interconnectedness of people and things, identifies intersections and tangles in the lines of life, with patterns of metaphorical weaving, stitching and knotting of the threads of lives and matter where coalescences create knots. In Ingold’s knots metaphors, we found synergies with Barad’s (2007, 2010) theorising about entangled spacetime-matter that signalled a contact zone for our walkography thought experiments to search for resonances, echoes and patterns between bodies, places, spaces, time and nature. Barad’s relational ontology that de-centres the human and poses intraactions where phenomena emerge from encounters within the socioecological collective indicated potential spaces for our exploration of resonances. Barad’s concept of entangled ethico-onto-epistemological approaches for common worlding, also gave us a framework for attending to ethical, flattening practices in our experiments, that we conceptualise in this paper as posthumanist/new materialist entanglings of knowing, being and doing.

Barad’s diffractive methodology (2007) for opening up disruptive encounters lent structure to our thought experiments. In this diffractive tradition, attending to disruptions and distortions in our encounters, and purposefully cutting through with contact concepts, underpinned our tuning into resonances exploration. The walkography thickened our methodology by diffracting and layering for generative intraactions. A walkography is an a/r/tographic living enquiry that is an active, multilayered, multimodal ‘moving-with and moving-through, a wayfinding’ in the crosscutting of art, research and teaching (a/r/t) (Lasczik Cutcher, 2018, p. xiv). This messy

methodology (Malone, 2016), infused with uncertainties, encouraged generative re/thinking in our encounters and also to be differently attentive through the inclusion of arts approaches in this scholarship. Most of us are not arts-based researchers, or even comfortable in this space. However, we engaged with poetic writing and visual representations to deepen and enrich our diffractive conceptualisations and to both reveal and represent our thinking experiments. Our efforts are included here not as products but as process outputs to enable readers to walk some of this experience with us in our openness to effect and affect of our diffractive encounters.

In keeping with a flattened ontology, our thought experiments that follow are recounted through an alternative textual voice of 'i' as a gesture to representation within the collective.

Uncertain territory

Sensory, embodied

Resonance as an author group

Resonance as a conceptual tool

'Walking' Resonance

Tuning into resonance as a pathway into thinking and being with/as the ecological collective *i* began with a physical walk in spaces of the built environment on the coast, trying to attend to and tune into what was there. *i* walked with the elements of the natural environment with its coastal foreshore shrubbery, the sandy soils and the sea birds. *i* walked with the buildings, the concrete pathways, wire fences, roads, carparks, cars and advertising billboards. *i* went walking and talking, open to resonance and wondering how to engender a state of flow or a posthumanist sense of 'being with' (Rautio, 2013) our environment, in spite of the many discordant elements that were its constituents. *i* found much that was antithetical to harmonic resonance through the soundscape, visual landscape, movement of cars and other people and we recognised these elements as the messy entanglements (Taylor, 2013) of the human and more-than-human co-existing in the same space. Discord between the built and natural in this beachside suburb was evident. In this walking living enquiry *i* considered the environment encountered from a diffractive perspective to tune into the layers of resonance.

Moving through the noise of the discord of the built landscape, *i* emerged at the beach and, as if moving through a diffractive prism, was drawn to spend time sitting with the wind, water and birds, but also to keep walking across the sand, to arrive, with a sense of relief, to merge feet with the water, watching the ripples and feeling the cooling effect. *i* ask, is this the pull of resonance: when we seek to go through the noise and distractions to find a more-than-human element that touches us and reminds us that we are inseparable from our ecological collective? The feeling of resonating with the assemblage of the beach sat well — it felt 'right' and tuning into 'being with' differently.

Making visible posthumanism meaning-making through this walkography with the concept of resonance to theorise and practise common worlding, *i* now story the encounter, inspired by learning story/pedagogical narrative techniques (Atkinson, 2012; Pacini-Ketchabaw, Nxumalo, Kocher, Elliot, & Sanchez, 2015):

The roar of traffic. Bridges, concrete and asphalt impede our progress.

Keep walking, the beach is calling. Seeking our natural self.

Token plantings host birds who call to us.

Keep walking. Towering buildings call another tune.

Come here for a fun time.

Discordant tunes. Which to listen to and follow?

*Heat ripples up from the pavement burning the soles of our feet.
Petrol fumes smell bad. Where to find shelter? Back to the building aircon?*

*Keep walking? Sparkles of light spotted through the gaps.
Sunlight dancing on the water sends us directions.
Then the wind whistles to us —*

*Keep walking, keep seeking.
The echoes of bird cries and rhythmic rush of waves draws us further away from the roar of
the cars.
Timeless music of nature that invites us to breathe with the rhythms and swap atoms with
the waves.*

*A big sigh as our toes touch the water. Feeling calm and peaceful.
We have found ourselves again. Touching, hearing, seeing, feeling like a jigsaw piece fitting into
the picture.
Becoming whole.*

i turn now to keep ‘walking’ further with resonance along diffractive pathways of tuning into resonances of the ecological collective to find more resonance patterns.

‘Walking’ with Body–Place–Planet Resonances: Tuning into Harmony Between Bodies

i ask: to what extent am *i* affected by the planet on which *i* live and how can *i* live with the earth in a state of conscious and harmonious entanglement in this time of the Anthropocene? (Crutzen & Ramanathan, 2000). How do *i* resonate with or ‘tune into’ existences as enmeshed with planet earth and find ways to be and become in a state of evolving regeneration with it as a human/earth species and what implications does this have for the education of our children?

The patterns in the sand in the image in Figure 1 have a rhythm to them that is overlaid by the shimmer of the sun on the water, darkened by the human shadow, with feet either side, ecologically sensing (Malone, Moore, & Ward, 2019) the way forward. It is almost as if *i* am trying to fathom what the patterns, echoes and resonance at this moment might be. This water on the edge of the Pacific Ocean, that wraps around the world, has its own patterns and rhythms but it too is part of an entangled collective of elements and dynamics that come together in a resonant earth phenomenon that is understood partly through science but largely experienced through intuition, arts and poetry generated through the diffractive rays of ‘bodyplacetime’ (Crinall, 2017) encounters. The question about living with the earth posed above has been commanding my attention for many years now. As a young primary school teacher working with year 3 children, and having exhausted the natural sciences curriculum material, we attempted to come to some understanding of the magnitude of being with the earth through creating poetry:

*Listen to the earth’s secrets,
Listen to the earth’s secrets
Listen to the earth’s secrets
There are footprints on the land*

*Listen to the earth’s secrets
Listen to the earth’s secrets
Listen to the earth’s secrets
There are messages in rocks and sand*

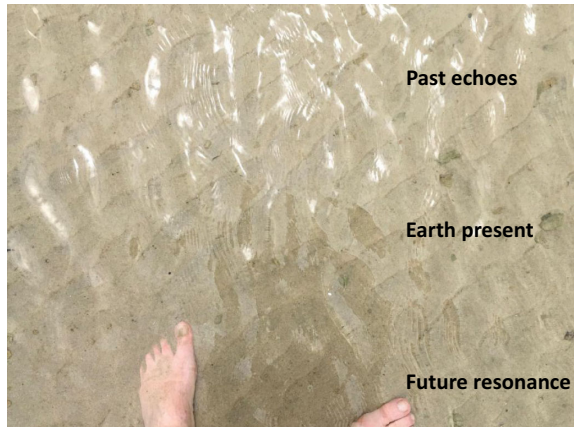


Figure 1. Resonance *six-word memoir* from Day 1 of the theory knotting Colloquium in Sydney with an image from embodied resonance encounters from Day 2 at the Gold Coast.

*Listen to the earth's secrets
Listen to the earth's secrets
Listen to the earth's secrets
Then you will understand.*

At the point in time above, neither the children, nor I, knew about the Schuman Resonance (SR) which was first detected by Winfried Schumann and Herbert Koenig in the 1950s (Zhou, Yu, Cao, & Qiao, 2013). Sometimes called the heartbeat of the earth, the SR is a frequency resonating in the cavity between the earth's surface and the ionosphere that is animated by lightning strikes and is also affected by solar winds and flares. The frequency at which the SR vibrates (7.83 Hz) is near the range of Alpha brain waves (8–12 Hz): a level of brain activity that is associated with a meditative state. A study by Alabdulgader, McCraty, Atkinson, Dobyns, and Vainoras (2018) found that there was a correlation between the variable diurnal and seasonal SR, the SR during times of cosmic winds or solar flares *and* crime, creativity and innovation. The SR was shown to be detectable in electrocardiograms (ECG) and to affect the autonomic nervous system (ANS) and heart rate variability (HRV). The SR can also modify perception and dream-related memory consolidation (Alabdulgader et al., 2018). Although the significance of the SR is often described through studies of electromagnetics in the planets in our solar system (Simões Grard, Hamelin, López-Moreno, & Schwingenschuh 2008), it seems the SR has some resonating influences or corollaries in human states of being and may help to describe the sense of 'being with' that deserve further exploration when discussing the idea of resonance with the earth as a theoretical concept. The following paragraphs make some attempt at reconciling the science of SR with the perceptions of resonance expressed through reflective states of being, through the arts, poetry and our *a/r/tographic* walk.

Reflective states of being such as meditation and mindfulness practices are common phenomena in our modern world. Stemming from ancient Hindu philosophy, meditation practice is aimed at calming the mind and coming to a point of stillness or equilibrium, which is experienced on a number of levels including physical (relaxed body), emotional (reductions in intensity) and cognitive perception (detachment from thought) in addition to calming the ANS (Joakar, 2012). Some meditation practices incorporate mantras and a common, but ancient mantra is the *Om*. This mantra is said to resonate with the same frequency as the SR (Forti, 2019). Is this ancient *Om* another way of tuning in to the SR or the heartbeat of the earth?

*Past echoes,
Earth present
Future resonance*

Relaxed or ‘in-tune’ states of mind are common or even expected in some forms of human activity such as artmaking, writing, music and dance where the participant’s directed attention is totally focused. Good acting is consistent with ‘being in tune’ with the character and fully immersed in a different reality. This state of ‘flow’ (Nakamura & Csikszentmihalyi in Snyder & Lopez, 2002) reflects the optimal encounter of concentration and includes: ‘Intense and focused concentration on what one is doing in the present moment; merging of action and awareness; a loss of reflective self-consciousness; a sense that one can control one’s actions . . . ; a distortion of temporal experience (typically a sense that time has passed faster than normal) and experience of the activity as intrinsically rewarding [also referred to as autotelic experience]’ (p. 90).

How then, do we enact a state of flow to optimise sensory knowledge and metacognition and perception of ourselves as enmeshed within the ecological collective, to tune into the resonances of nature? How do we live these autotelic or self-teaching moments with the natural world? In a recent pilot research programme, Children’s Bodies, Sensing Ecologically: A study of Pre-language Children’s Ecological Encounters (Malone *et al.*, 2019), walking and storying methods were used to observe the interactions between young children and their environments. These children were preverbal so the emphasis was on their sensorial responses to their environments and the extent to which the more-than-human world became ‘kin’ (Haraway, 2016), or an integral part of their being with the world, while at the same time recognising the temporal links the children had with the spaces they were inhabiting. From a resonance conceptualisation, the spaces that children encountered resonated with connections that included human, animal and more-than-human elements over time, including the deep-time of universal reassembling elements (Christian, 2017).

During the iterative sensory walks, the children tuned into and were ‘with’ their environments entering what Ward (2017) calls as a state of *econnection*. This is a state in which the sensory influences of the natural world engage us in an intraactive exchange with our surroundings, in which we find ourselves in a state of flow. This ‘bodyplacetime’ (Crinall, 2017) resonates with the forms, movement, smells and colours of the surroundings in an acknowledgement of common atomic heritage with the earth. These momentary entanglements serve to generate metacognition that goes deep into our bodies and our long-term memory to become part of our creative schema (often expressed through the arts) and the lens of perception through which we see the world.

i recall similar days of walking with primary school children on the winter solstice as we explored the escarpment on the north-eastern curve of the Mount Warning Caldera in the northern ranges of New South Wales. Again, as was our practice to go beyond the natural science elements of the walk, we captured the experience through poetry:

*Hidden in the shade
In the darkest of caves
Where breath nor footfall sound
I find in my heart
A new sun spark
Where light and laughter abound*

Resonances of rhythm

Listen to the earth's secrets . . .

While no footfall sounds in the poem above there is a sense of listening to and internalisation of the rhythms of the earth. Rhythm is a regular resonance of sound, in particular patterns that vary depending on the origin of the sound or the agency of the sound maker, be they footsteps of children, waves breaking on the shore or the earthly rhythms of the SR. Rhythms of the human body are also of note to consider for resonances between the SR planetary heartbeat and human heartbeats and body rhythms. The heart is fundamentally thought of as a pump that circulates the blood around the body, but research is showing that it is much more. The HeartMath Institute (Childre, Martin, & Beech, 1999), although at times criticised, has over the last 20 years explored many interesting aspects of the heart that relate to the fields of neuroscience, cardiology, psychology, physiology, biochemistry, bioelectricity and physics. They highlight the electromagnetic field of the heart as being the largest electrically detectable field in the human body and its role as the central 'pendulum' that ensures that all of the other body systems are in a state of entrainment or synchronicity with it (p. 39). Indeed, ECG research shows that electrical heart activity is affected by the SR and that the SR impacts on the HRV (Alabdulgader, 2017). A study by McCraty, Atkinson, Stolc, Alabdulgader, and Vainoras (2017) indicates the importance of the HRV:

Healthy levels of HRV indicate psychological resiliency, behavioural flexibility and capacity to effectively self-regulate and to adapt to changing social or environmental demands, one's sense of coherence, the personality character traits of self-directedness, and performance on cognitive performance tasks requiring the use of executive functions. (p. 2)

This seems to indicate that 'tuning into' a common rhythm, to coherence within the body with the heart's rhythm and the planetary heartbeat of the SR, is beneficial for bodily wellbeing and robust thinking and decision-making, a planetary body-human body resonance.

Echoes and resonances

It appears then that the notion of resonance is useful in helping humans to recognise their common heritage as earth beings and in being with the earth. There also seems to be a correlation between feeling this sense of resonance and spending time in the outdoors. This is echoed by attention restoration theory where the directed attention is revived when spending time in green spaces (Kaplan, 1995) and with the improvement in children's executive function when engaged in a programme of daily exposure to urban green spaces (Schutte, Torquati, & Beattie, 2017). However, the opportunities for spending time outdoors in our education systems are limited. When we take children outdoors to engage in encounters of being in and with the natural world, how do we bring this back to the classroom or, for adults, to the board room, so resonance with nature continues to affect thinking and doing? What can we do to ensure the echoes of these encounters continue to resonate, facilitating a tuning into the ecological collective?

This diffractive exploration of body resonances indicates that actions that promote a meditative state or a state of flow, being with nature or *econnection*, support a resonance with the earth rhythms. The urgency of the current climate crisis is calling for new ways to tune into and recognise our agency and intraactive relationships with the earth. Such processes that promote common world body-place-planet coherence and resonance may be a beginning towards generating new ways of understanding and being with our environment in a manner that leads to the care of the common ecological collective.

'Walking' with Sensory Connections as Nature

We can only find nature outside us if we first know her within us. What is akin to her within us will be our guide. (Steiner, 1995, p. 25)

i identify resonance through a sensory connection to the ecological collective, connecting *as* nature (Cutter-Mackenzie-Knowles, Malone, & Barratt Hacking, 2019), prompted by long engagement with holistic Steiner education and philosophies (Childs, 1991). Foundational to Steiner's educational framework is the use of body senses to promote the essence of wonder and resonance with/as nature (Haralambous & Nielsen 2013), so engaging body senses to resonate within nature assemblages is familiar. *i* found in the initial walkography stage that the entanglements of solid structures created by humans with nature left an unsettled feeling as *i* moved along from a frazzled busy road environment to a tranquil beach setting. *i* found the interruptions of the built landscape conflicted with my personal sense of wonder and resonance with/as nature. This sensory connection with nature was restored when *i* reached the relatively undisturbed beach. Thus, tuning into sensory resonances with/as the ecological collective presented as a diffractive pathway to explore.

i teach to cultivate a 'meaningful wholeness of nature; a wholeness from which the human being is not separated or alienated' (Østergaard *et al.*, 2008, p. 113) and use creative practices to bridge humanity and nature. *i* have explored how a history teacher embeds environmental education in the classroom to show themes of interconnectedness as nature (Carapeto, 2018), so sensory body-place entanglements for nurturing knowing of self as nature make sense.

Inspired by De Reus (2018, p. 83) describing the importance of sensory connections, stating, 'I personally love it when I am in a meditation, a walk along the beach, or in nature, and I am so connected, still, and at one, with myself and everything around me', *i* explore and contemplate the possibilities of sensory resonances further through another beach walkography. One Sunday morning *i* went on a solo walk to the beach, extending exploration of nature connectedness and resonances. *i* played with the sand and the stones for a long time. *i* thought about my life, dreams and imaginings over time. As my thoughts danced in my mind, awareness grew of how my body resonated with the different elements of nature — the soft warm sand through my fingertips, the sensation of each round smooth stone, the gentle sea breeze upon my skin and the fresh ocean air cleansing my lungs through every breath. *i* felt lost in time and in this void, floating in a unity with nature while my hands worked creating a mandala of stones, a circled beach mandala made simply of the natural environment surrounding me (Figure 2) and traces of poetry. In my journal *i* wrote, 'I lost my sense of self on that beach. Both time and space no longer had the same meaning'. My body no longer felt separate but woven into the fabric of the beach, air and water.

With time on the beach, *i* felt a resonance with the natural world around me through a purposeful sensory entanglement. A sense of the vulnerability in the human, the nonhuman and their interconnectedness emerged that was reflected in poetic words in my journal:

*I had no water.
I had no food.
Only that big blue sky,
The hovering angelic clouds,
The nurturing cradle of sand beneath
And the never-ending rolling ocean dancing*

The mandala that emerged from the sensory-full encounter of the beach (Figure 2) shows repeating circular patterns in the sand of indents from pressing bodies, layered with stones, smoothed into small rounded shapes by the wave patterns, that assembled in the mandala as fingers sifted through the sand grains — unmaking and making sand patterns of circle resonances as *i* sense as nature. A



Figure 2. Beach mandala created during a resonance walkography.

sensory, intraactive ‘in-tune’ state of flow that aligns with Ward’s state of econnection (2017) identified earlier when walking body–place–planet resonances. This sensory body–place encounter gave rise to ‘an ontology of self becoming-other in the space between self and the natural world, composed of humans and nonhuman others, animate and inanimate’ (Somerville, 2010, p. 11). Openness to such encounters of “sensuous enchantment”, as Rautio describes in children in their “aesthetic-affective” encounters with materialities of place (2013, p. 395), nurtured wonder, awe and sensory resonances as posthumanist/new materialist inter-actions with beach entities. As Braidotti’s contends:

... posthuman ethics urges us to endure the principle of not-One at the in-depth structures of our subjectivity by acknowledging the ties that bind us to the multiple ‘others’ in a vital web of complex interrelations. This ethical principle breaks up the fantasy of unity, totality and one-ness, but also the master narratives of primordial loss, incommensurable lack and irreparable separation. What I want to emphasize instead, in a more affirmative vein, is the priority of the relation and the awareness that one is the effect of irrepressible flows of encounters, interactions, affectivity and desire, which one is not in charge of.

This humbling experience of not-Oneness, which is constitutive of the non-unitary subject, anchors the subject in an ethical bond to alterity, to the multiple and external others that are constitutive of that entity which, out of laziness and habit, we call the ‘self.’ (2013, p. 100)

The sensory resonances *i* encounter in natured places, as *i* have been using in my Steiner teaching and my beach intraactions, signal a resonance practice *i* can use in my teaching and ways of being in the world to tune into the ‘no-oness’ of the ecological collective.

‘Walking’ with Resonances of Time

The time of lives is sensed differently to bodily sensory inter and intraactions. *i* am challenged by the nonlinear, tangles of universe-scale time, that is so different from the conventionally linear, short-term human view of time, and now take a diffractive turn with resonances of time for being and knowing beyond a human-centric narrative. Time resonances beyond human time are

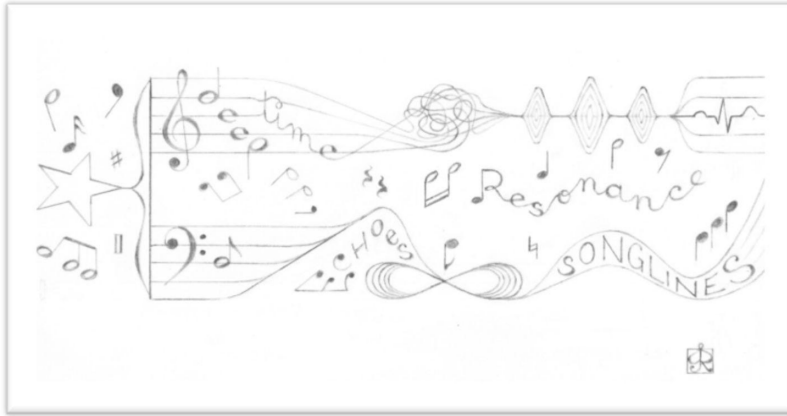


Figure 3. Resonating with entanglements of the deep-time image by Reynoldson (2019) (with permission) after conversations between author and artist.

complex. Dimock's explanation of dynamic relational exchanges of text with time provides a way into seeing how time tangles with ways of knowing the world:

I want to emphasize the extent to which the text, as a diachronic object, yields its words differently across time, authorizing contrary readings across the ages and encouraging a kind of semantic democracy. (Dimock, 1997, p. 1067)

Dimock's concept of time as intraactive in shaping and reshaping thoughts, with entangled vibrations of both past and present and fluidity of 'contrary readings', shifts knowing of being in the world into the understanding of nonlinear time entanglements. Similarly, the folding and unfolding of everything (all matter) with time gives a deep-time gaze to the history of our universe (Christian, 2017). As atoms mesh and mix in different patterns they resonate through time with rich layering of the past–present–future inseparability of materials.

i grappled with following an ethico-onto-epistemological way tangled with time, with how to represent knowing of the entanglement of 'spacetime matter' (Barad, 2007). Dimock's use of words to represent text-time weavings, although helpful, also reveals the inadequacy of language to represent encounters through a posthumanist/new materialist gaze. As *i* continue thought experiments with diffractions from the beach walking, textual representations and deep-time resonances, a scholartistic twist on musical notation emerged (Figure 3).

Reynoldson's illustration (2019) in Figure 3 depicts songlines of knotty lines and entanglements as a disruption to, and a representation of, collective inter- and intraactions that resonate and echo through bodies, nature and consciousness of placement within deep-time. Entangling *i* as a recycled part of the common universal history of a 13.8 billion years old universe disrupts the straight temporal timeline so many people have learnt, reaching beyond a simple understanding that humans now hold the fate of the earth in our hands. Finding resonances with the deep-time grand narrative (Christian, 2017) that diffracts and entangles other cultures and landscapes alongside postanthropocentric future uncertainties, shifts to tuning into self-universe resonances. Feynman's 'universal mystery' of humans who are composed of atoms, contemplating the nature of atoms, is a helpful and playful deep-time fundamental entanglement of atoms:

in the futility of trying to understand what this atom in the universe is, this thing—atoms with curiosity—that looks at itself and wonders why it wonders. Well, these scientific views end in awe and mystery, lost at the edge in uncertainty. (Feynman, 2009, Section 1)

In my high school science, *i* learnt ‘atom’ and ‘element’ as isolated terms, nothing that related to my immediate world. Now as *i* connect those terms to deep-time they resonate with me beyond the Anthropocene. Those atoms interact within my body and all other bodies and the materiality of nature, in intraactions extending towards an uncertain future. Dimock’s view of text can again assist in conceptualising this past–present–future materiality resonance, ‘For since readers past, present, and future are not the same reader, a text can remain literary only by not being the same text. It endures by being read differently’ (Dimock, 1997, p. 1067). Continuing to search for resonances, *i* tune into echoes of deep-time, through alternative text forms, diffracting text and concepts:

What’s POSSIBLE? *Explore possibilities for interpreting resonance with our universe –
Ponder on the entanglement of timeframes in my lifetime ...
Encounter the mystery, wonder and awe my memories invoke ...
Focus on the lenses of memory, song lines, knots and entanglements ...
Linking to the emerging grand narrative of deep time ...
Hope to tune in to resonating future possibilities ...
Imagine if the Anthropocene era is tuned out to embrace the post-human era ...*

Resonances of memory, imagining and deep-time

It’s a long way back I’m gazing, and the stage has changed since then; Just an echo finds me sometimes, bringing back the scene again. (O’Brien, 1921)

Those words, often recited by my mother, became infused into our family’s cherished memories, encompassing one or two generations past and the future fears and dreams for the generation growing up around us. Although this verse and associated memories remain precious, as *i* am becoming attuned to more ethico-onto-epistemological ways my memories entangle with a wider worldview incorporating the grand narrative of deep-time and possibilities for a future posthumanist era. Barad’s words resonant with my family memoirs to make room for risks associated with inheritance and the Anthropocene:

Time can’t be fixed. To address the past (and future), to speak with ghosts, is not to entertain or reconstruct some narrative of the way it was, but to respond, to be responsible ... for that which we inherit (from the past and the future), for the entangled relationalities of inheritance ... to put oneself at risk ... to open oneself up to indeterminacy in moving towards what is to come. (Barad, 2010, p. 264)

Diffracted memories tangled up with deep-time risk resonances inspires me to write to my young grandchild:

Your place

*Child of my heart,
Grow, feeling kinship for the earth under your feet
The wind and sun caressing your face, the majesty of vast landscapes,
Awe for our universe and emerging knowledge yet to fathom*

*Find your own map
 Traverse the fullness of life, but chart in your heart the directions back,
 Resonate with the landscapes that form and connect you
 To deep-time*

Deep-time echoes

First People's deep-time resonances with an ancestral landscape:

We have a living, spiritual connection with the mountains. We retain family stories and memories of the mountains, which makes them spiritually and culturally significant to us. Our traditional knowledge and cultural practices still exist and need to be maintained . . . Our people travelled from many directions over long distances to gather peacefully on the mountains for trade, ceremony, marriages, social events and to settle differences. The cycle of life and many seasons influence the movement of our people through the mountains to the sea and the desert. The stars, clouds, sun and the moon guided people to and from places of importance. These travel routes continue to be used and spoken about today . . .

Let us not forget the past while we look forward to the future. Past and present practices make us strong and we are committed to making this a better country for all. (Extract from New South Wales National Parks and Wildlife Service, 2006, p. ix)

Deep-time resonances can be heard echoing through First People's narratives, such as in the extract above, of songlines that intrinsically link land, place and people, and embrace past and future time as an essential part of the storyline. Such Indigenous ways of knowing are recognised as being more in-tune with ethico-onto-epistemological ways than Western-centric, human exceptionalist ways of thinking, being and doing (Malone, 2016), and resonate with my posthumanism-time thought experiments. Irvine poses that the understanding of deep-time is limited if it is perceived through one society's narrow image of itself (2014). The resonances of Indigenous songlines, that help shape the understanding of ancient Australian landscapes, in contact with deep-time histories of the universe demand *i* broaden thinking to a chronology of time away from the Christian history the early settler brought to this land. This diffractive contact zone of time framings prompts renewed text twisting as *i* experiment with these thoughts:

Pondering time-space from my window (inspired from Irvine, 2014)

*Echoes of temporality
 past interacting with the present
 deep time — uncertain impacts on the future.*

*No longer independent objects
 olive tree grove . . . hurrying people . . .
 city skyline . . . an iconic bridge . . .
 sprawling suburbs . . . distant Botany Bay . . . 1788 . . .
 Songlines, the dreaming.*

Echoes of disparate timescales
 Interacting elements **s t r e t c h i n g** through time
 One leaf ----- Life on earth ----- Extinction???
 Deep time of elements -



Past...present...future...
...yet
to be realised!

The web we weave — lines, knots and entanglements!

Space-matter-time: a flaring forth Stars: blazing fireworks
Elements: the building blocks for everything Solar systems: echoes of complexity
Life: interpreting deep-time Humans: resonating deep-time
The future: embracing our universal heritage

i portray the quintessential representation of a knotted and the entangled universe in Figure 4 with deep-time resonances from the earliest moments of the universe. The Anthropocene, the now, is represented by my pregnant daughter, who is entwined among deep-time atoms, entangled with nature and technology, resonating with calls to a posthumanist future . . . inclusive of her yet to be born son . . . a future embracing the conscious and unconscious common world of entanglements. Followed by a final text tangle for deep-time resonances.

**birth - life -
 death-
 -entangled,
 -recycled**

Connections

Deep-time, as a diffractive interruption to this a/r/tographic walk seeking resonances with the ecological collective, entangles past–present–future encounters for generative, new materialist ways of knowing.

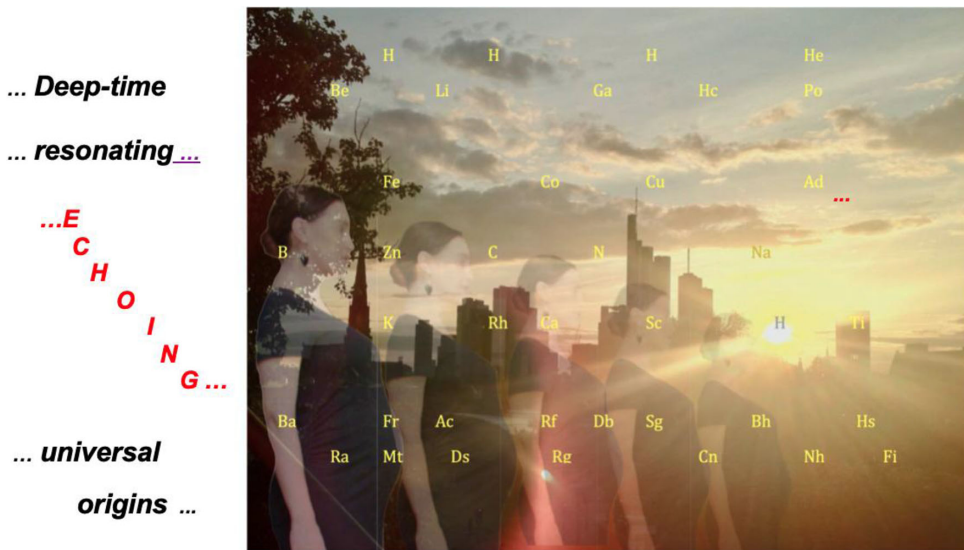


Figure 4. Collaborative deep-time entangled image created by author and photographer (Smith, 2019, with permission).

‘Walking’ with Resonance in Modern Spaces

Deep-time resonances harmonise with new materialist theorising, however, where there is resonance, there may also be dissonance. As described earlier, *i* encountered assemblages of disharmony during the coastal urban spaces phase of this a/r/tographic walkography. Built environments are many, prompting the question: what ecological collective resonances reverberate through modern places, spaces and lives in our liquid modernity of digital mediation, ephemera, consumption and change? (Bauman, 2013). The photograph in Figure 5 indicates an assemblage of built material entities and ecological entities encountered on the walk.

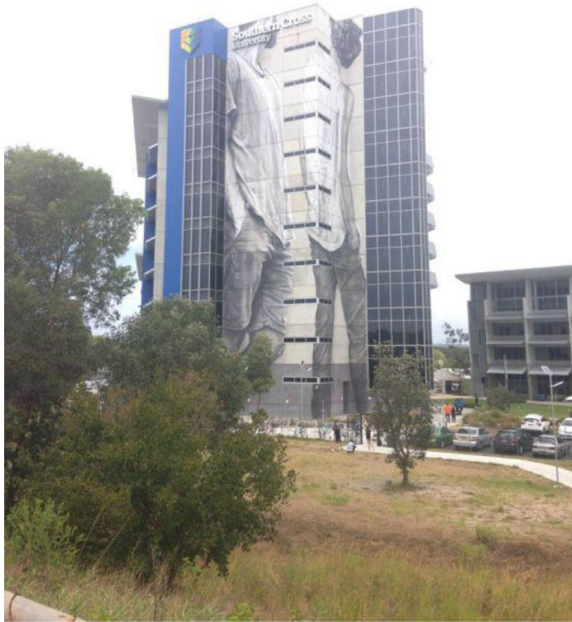
Encountering these modern spaces through a posthumanism/new materialist ‘walk’ prompted these reflections on resonances encountered:

disrupting wetland and sky
interrupting, superimposed
marketing message overlaid

Structures, activities and symbols all teach and communicate their own messages — the systems, visuals, built and natural

Seeing, hearing, touching, smelling
Feeling, thinking, learning
Overt and hidden — all ‘teach’

Vibrations, reverberations and resonances
Ripples in the pond of lifeworlds
Rhythms of seasons, of tides, of sunrise and sunset, birth and death
Rhythm of places echoing but disrupted, overwhelmed, drowned out by modern noise.
Discordant
Silenced, ignored but echoing still



resonating juxtapositions

Figure 5. Natural-built ecological resonances.

*The songlines of lives
Who is listening?
Is it noise or song?*

The notion of resonance is simultaneously simple and complex. Simply, resonance can be described as synchronised or sympathetic vibrations. Yet this notion of vibratory patterns is put to work in explainers of matter, social phenomena and existential experience (Rosa, 2018) and even communication of ideas (Haraway, 1988). Atoms vibrate; media, cultural messages and ‘truths’ ripple through our social fabric (Mills-Brown, 2008); and experiences of religion, arts or nature connect us (Rosa, 2018).

Through imaginings of resonance *i* attune to the patterns and echoes of the way things are that shape us, shape our way of being in the world, and the world itself in all lively and material dimensions. Places hold meaning and messages that resonate through lives (Greenwood, 2013; Piersol, Russell, & Groves, 2018). The structure pictured in Figure 5 is ‘animated’ through the image imprinted on the material of the building that is itself inscribed on the natural landscape. The built landscape is at the same time ‘nature-ed’ with planted vegetation. The natural and the social ecologies enfold each other, entangling form, positionality, material, nature, culture and media. The framed and the framing entwine, resonating in conceptual, affective, sociocultural, ecological and physical dimensions. Tuning into the neoliberal growth resonances of Figure 5 connects with marketing messages and meaning, promoting the university’s expansion agenda. Whereas tuning into the ecological resonances of this scene elicits possible harmonic restorative responses to the presence of nature (Kaplan, 1995) or, alternatively, the discord of disrupted natural systems.

When *i* consider this building scene through the concept of resonance, diffracting posthumanism theorising within this space of liquid modernity, *i* can focus and shift attention to the

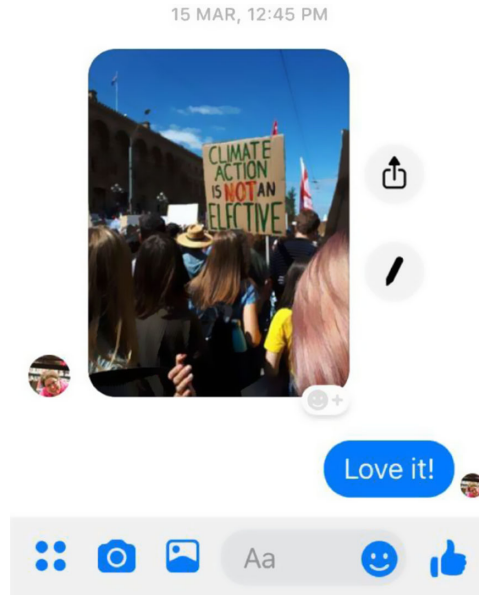


Figure 6. *Messenger* communicate from the School Strike 4 Climate in Melbourne.

entangled ecologies but this takes determined effort among the discord of the modern human lifestyle. Tuning into (attending to) the resonances of all the social and ecological assemblage *i* am immersed in can rearrange perceptions and enable muting of the loud, penetrating reverberations of capitalist growth and human exceptionalism (White *et al.*, 2016). Being attuned to the resonance of the natural world requires some ‘deep listening’ in modern spaces. Tuning into the subtle resonances of flows of matter through the porous boundaries of bodies and places — water, gases and other atoms that move across and through bodies, systems and time (Barad, 2007; Malone, 2016; Neimanis, 2016) — highlights the essential entanglement of all things, living and material. Attending to these ecological system resonances disrupts the dominant pulse of neoliberal modernity and the tendency of modern urban life for decoupling from nature and shifts into a more ethico-onto-epistemological way (Barad, 2007) of being in the world.

In contrast, modern spaces of almost instantaneous, global communications can harmonise and amplify ecological system resonances as the young people in the recent waves of Global Climate Strike (2019) demonstrate (see Figure 6). Millions of young people are tuning into resonances and disharmony in natural systems and creating new worldviews about the position of humans within the ecological collective, tangling with and knotting the straight line of the controlled modern world (Ingold, 2007). As part of these young people’s search for where they belong in the world (Halse, 2018), they have strongly indicated belonging attachments with their ecologies, negotiating this through the practices of collective demonstrations.

Ecological resonances in our entangled, messy, modern world align with Ingold’s notion of humans not as separate, static beings but as ‘becomings’ (Ingold & Palsson, 2013) through resonances of both nature and culture. Retuning and synchronising with these ecological resonances, as the young climate activists have, may be a way of shifting modernity into the (re)connection with the ecological collective necessary to address the widespread crises of the Anthropocene.

‘Walking’ Our Resonance Connections

Our walking resonance research at the beginning of our enquiry highlighted the need for tuning into and recognising what had been present over time and what is present in human-made and more-

than-human assemblages of place. We found ourselves in a Chtulucene (Haraway, 2016) debacle: in a damaged environment with a yearning to find ways to connect, understand and learn something about how to move forward. If we are to find new ways of thinking and knowing the planet, living in a harmonious state of being with it and incorporating these principles into sustainability and climate change education for children, this ‘staying with the trouble’ (Haraway, 2016) is needed. With this in mind on our physical walk, we discussed what used to be present before the car park, how we felt about the buildings, how the landscape must have looked before this built environment was here and the different aspects of resonance that might help to find a way into this ‘tuning in’ dilemma. Our sense of frustration echoes the environmental despair that Macy (1995) describes as a recognition that the planet is in irreparable decay and our helplessness as a species to take constructive action to make the earth a better place for our children and grandchildren. As we walked, there was a palpable rhythm to our steps and our turn-taking in expressing and responding to each other’s utterances about what resonated with us — what this embodied encounter was teaching us about this post-humanist entanglement, and how we felt about it, with a growing sense of tuning into resonances as an ethico-onto-epistemological way forward.

Our learning story from the urban-beach encounter portrays the physical intraactions between our human bodies and other bodies and matter layered with insights from iterative and reflective phases of the walkography, capturing a deeper understanding of resonance as a guide and perspective to attend to. The following ‘walks’ sought to notice and attend to diffractive encounters with concepts, bodies, places and time to open up to resonances of the ecological collective. The notion of resonance has given us a tool and direction for what, how, where and when to pay attention to our ecological collective. Individually and collectively we engaged artfully, bodily, thoughtfully and time-sensitively to reflectively un/knot and explore the work the concept of resonance can do in shifting our thinking, being and doing. Through the exploration of resonance of the physical vibration of the earth, the SR, and the relationships this has to the human body, the brain and the world of emotions and experience, attention is drawn to seeking out harmony, discord, rhythm and echoes between human bodies and the natural world. Sensory experiences of the no-oneness of being as nature resonate with a sense of belonging to the ecological collective. The tuning in beyond our short-term human perspective, into a deep-time layering of beings, knowledge, atoms and experience over varying periods of time and space grapples with the very nature of being in and with the universe as we resonate with all that has gone before and generate all that is yet to come. Troubling the entanglement of built, natural and cultural spaces reinforces the importance of taking this deep, layered and diffracted perspective to tuning into our way of being in the world, seeking beyond the flash and overt resonances of modern life to attune to the subtle pressure of our ecologies.

Attending to the resonances around us have enabled disruptive re/thinking of our taken-for-granted, human-centric perspectives. Thickening our initial walkography, with the richness of extended diffractive, arts-infused ‘walks’ with resonance encounters, advanced a shift in attention to challenge and reconstruct how we think and engage with our ecological collective. Musical metaphors emerged through our resonance enquiry. In common with Ingold (2015) and Barad (2012), the language of sound and music helped us articulate the entangled inter- and intraactions of body-mind-space-time-matter, aligning with Barad’s (2007) spacetimemattering and Crinall’s (2017) bodyplacetime entangled explorations. Perhaps it is the connection between music and emotion that attracts us to voice resonances through musical metaphors of harmonies, discord, echoes and patterning. Emotion infused our enquiry from the starting stimulus of the ‘this resonates with me’ comments. Emotional connections are implicated in place and nature connectedness, in feelings of attachment and belonging (see e.g. Greenwood, 2013), so an affective dimension to resonance is not surprising. Affective responses signal a wellbeing dimension to people-place-planet resonances that may have implications for responding to pervasive socioecological crisis narratives, which warrants future explorations.

We posed the query at the beginning of our enquiry of what can be done to facilitate living in conscious harmony with our ecological collective. As we have demonstrated here, the concept of resonance brings into focus the complexities of our entanglements with our ecologies and highlights the need to engage with multiple knowledge and ways of being to become attuned to ourselves as nature. While recognising that we can never truly transcend our humanness, the notion of resonance was useful as an apparatus for enabling common worlding coherence by tuning into all actors and actions that ripple and echo in our ecologies, and for finding resonances between all life and materials in spatial, perceptual and temporal relations. This tuning in and seeking through resonance we suggest as both a theoretical and methodological tool for new thinking, doing and being in our efforts to create a resilient ecological collective.

Conclusion

Taking resonance ‘for a walk’ has been about breaking new theoretical and conceptual ground, to open up to different ways of thinking for creating worldviews that step away from dominant human separatist ways of knowing, being and doing. Both our collective and individual diffractive encounters of working with resonance have offered insights into the rhythms, harmonies and discords of becoming attuned to the ecological collective. Self, other, material and conceptual vibrations and echoes of past–present–future, remembered–experienced–imagined resonances connected us through bodies and minds, systems and matter. Our experiments with resonance as a theory and practice node tuned us into resonances with exploratory sciences through encounters with the SR planetary vibrations and through deep-time recycling of atoms. Resonances were encountered beyond text, through embodied, sensory, affective and arts-based tuning into the tangled, sometimes uncomfortable meshwork of our ecological collective.

In the uncertainty and knottiness of engaging in our walkography methodology, resonance became both a philosophy and a practice. Attuning to resonance opened up diffractive body–mind–space–time–matter encounters for exploring boundaries and contact zones within the throughline of connecting ourselves into ecological systems. Tuning into resonances exercised our physical, emotional and conceptual entanglements with the world. Resonance weaves us into the fabric of nature, the cosmos and temporal being, and in doing so validates resonance as a knotty theory conversation for venturing into new ‘common world’ knowing, being and doing.

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