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Rousell, DS and Williams, Dilafruz (2019) Ecological Aesthetics: new spaces, directions, and potentials. In: Research Handbook of Childhoodnature: Assemblages of childhood and nature research. Springer International Handbooks of Education . Springer. ISBN 978-3-319-67285-4

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Version: Accepted Version

Publisher: Springer

Please cite the published version

<https://e-space.mmu.ac.uk>

Ecological aesthetics: new spaces, directions, and potentials

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Abstract: In this final section of the Handbook, we turn to ecological aesthetics in response to radical changes in both *the nature of childhood and the nature of nature* in the contemporary world. Artistic and aesthetic approaches have become increasingly relevant as children encounter a world typified by the acceleration of social, technological, and environmental change, and the mutually reinforcing conditions of planetary instability, inequality, and precarity. Anthropogenic climate change, the mass extinction of plant and animal life, and the chemical contamination of air, food, soil, and water resources are transforming not only what we might think of as “the environment”, but also the aesthetic qualities and environmental sensibilities that constitute the experience of *being alive*. For many scholars these changing conditions of Earthly life have taken on the name of ‘Anthropocene’, an epoch defined by the total imbrication of human life with more than human planetary systems and technologies. The authors in this section take up ecological aesthetics as a relational, experimental, and theoretically adventurous field which aims to grasp the experiential qualities of life under these changing conditions, and to imagine alternatives. With chapters focusing on the role of movement, nature-study, poetry, pattern, sense-awareness, and the creation of experimental works of art, this section highlights interdisciplinary research and pedagogy which attends to richly textured compositions of childhoodnature experience through a diverse range of material, social and conceptual practices. In drawing together a range of Indigenous, speculative, sensory, cultural, empirical, and artistic approaches, the range of chapters collected in this section attests to the diversity and emergent shaping of ecological aesthetics as a field that is still very much in the making.

Keywords: Ecological aesthetics; Indigenous philosophies; Childhoodnature; The speculative turn; New empiricisms

The black moon
turns away, its work done. A tenderness,
unspoken autumn.
We are faithful
only to the imagination. *What the
imagination
seizes
as beauty must be truth.* What holds you
to what you see of me is
that grasp alone.

-from 'Everything that Acts is Actual', Denise Levertov (1979, p. 43)

Introduction: A (Re)turn to Aesthetics

It seems that our world becomes more strange with each passing moment, refusing to settle into any recognisable pattern that might conform with our previous intentions, expectations, or understandings. Is it any surprise that we find ourselves (re)turning to poetry, art, music, dance, and philosophy as ways of feeling, imagining, and thinking the world anew? In this final section of the Handbook, we negotiate such a (re)turn to **aesthetics** in response to radical changes in both *the nature of childhood* and *the nature of nature* in the contemporary world. We live in times, now, where there is growing concern about qualities of life at the planetary scale. Anthropogenic **climate change**, the mass extinction of plant and animal life, and the chemical contamination of air, food, soil, and water resources are transforming not only what we might think of as "the environment", but also the aesthetic qualities and environmental sensibilities that constitute the experience of *being alive*. What's more, today's children inhabit a world in which the very nature of life is being reconstituted through **biotechnological transformations** associated with genetic manipulation, ubiquitous computing and machine learning, such that the boundaries between human and nonhuman, life and non-life, natural and artificial, have become eroded if not completely dissolved (Braidotti, 2013; Povinelli, 2016). We (re)turn to aesthetics at a time when we are "living in suspense" amongst social and environmental catastrophes, a time which calls upon us to develop "new powers of acting, feeling, imagining, and thinking" (Stengers, 2016, pp. 22-23).

For many scholars these changing material conditions of Earthly life have taken on the name of '**Anthropocene**', an epoch defined by the total imbrication of human life with more than human planetary systems and technologies (Rousell, 2016; Steffen et al, 2015). Other scholars have been hesitant to adopt a term so saturated with the association of 'Anthropos', and its aftertastes of human dominance, supremacy, and exceptionalism (Colebrook, 2014). Some have characterised the total subsumption of Earthly processes under a capitalist political economy in terms of '**Capitalocene**' (Moore, 2017); others have emphasized the chthonic, nonhuman powers of the Earth itself under the terms of '**Cthulucene**' (Haraway, 2016); and still others reject the Anthropocene as a conceptual and material artefact of Western (mis)thought, which continues to deny the profound insights of Indigenous cultural practices and metaphysical understandings (Demos, 2017; Horton, 2017; Todd, 2015).

Despite their differences in terms of emphasis and approach, a number of arguments are loosely shared across these various accounts of the contemporary moment. First, there is a general consensus that we live in a time that is radically different from previous times on Earth. The illusions of psychic, social, political, and climatic stability have dropped away, and we are faced with a world that is intricately entangled, complex, precarious, unpredictable and messy (Morton, 2013). Second, there is an agreement that these disorientating conditions call for a complete overhaul of dualistic conceptual categories and onto-epistemological hierarchies which have dominated Western thought for millennia. Any kind of a priori separation between nature and culture becomes untenable under these new conditions. This has led to renewed engagement with **Indigenous and non-Western philosophies**, as well as a growing series of rapprochements between the environmental arts, humanities, and sciences (Cajete, 2006; Haraway, 2016). Third, there is an emerging sense that a more expansive, experimental, and theoretically promiscuous account of *aesthetics* is necessary if we are to grasp the experiential qualities of life under these changing conditions, and to imagine alternatives (Shaviri, 2014). This makes such a (re)turn to aesthetics intrinsically ecological, as it is concerned with an aesthetics of relation and co-existence. In other words, it is an aesthetics that is concerned with the sensible qualities of relations between and amongst bodies, environments, societies, and technologies within complex assemblages that exceed the limits of human cognition and knowledge. The (re)turn to aesthetics is thus a (re)turn to the wonder of felt relation, to the sensibly distributed *nature* of experience as entangled with the wild variety of other creatures with whom we share our ecological worlds.

In some ways this movement constitutes a return to the ancient Greek roots of the word '**aesthetic**':

- 1) *aisthētikos*, meaning "of or pertaining to αἰσθητά, things perceptible by the senses, things material', as well as 'perceptive, sharp in the senses"; and
- 2) *aisthanesthai*, meaning "to feel, apprehend by the senses". (Oxford English Dictionary, 2017, n.p.)

In these two ancient definitions of aesthetics, we see the original inclusivity of meaning which combines the material causality of the empirical world with the subjective experience of feeling and sensuous apprehension. *Aesthesis*, in this originary sense, includes both the subjective act of perception and the objective nature of that which is actually perceived. To take up aesthetics in this key is to resist what Alfred North **Whitehead** (1967) diagnosed nearly a century ago as 'the **bifurcation of nature**'. This is the bifurcation that separates the objective world of natural causality out from the subjective world of qualitative experience, imagination, and interpretation. 'Everything perceived is in nature,' Whitehead writes. 'We may not pick and choose. For us the red glow of the sunset should be as much a part of nature as are the molecules and electric waves by which men of science would explain the phenomenon' (2004, p. 20). In resisting the bifurcation of nature, the red glow of the sunset is both *what* it is objectively and *how* it appears subjectively, at one and the same time. The colour red, the sensation of red, the feeling of red, the intensity of red, the idea of red, the molecular materiality of red, our past associations with red, the way that a certain shade of red appears at this particular time and place: these all become elements of nature as inseparable from aesthetic experience, or *aesthesis*.

In the seventeenth century the study of aesthetics came to be associated with dualistic theories of cultural ‘judgement’ and ‘taste’, and was relegated (at least in mainstream Western philosophy) to specialised subfields associated with the philosophy of art. However, over the last ten years there has been a veritable revival, what some have even called a *renaissance*, of interest in aesthetics as the basis for speculative realist and materialist theorisation (Debaise, 2016; Hansen, 2015). Often drawing extensively from philosophers such as Whitehead, Deleuze and Guattari, scholars and artists associated with the current **speculative turn** have brought aesthetics back into the centre of philosophical thinking and inquiry (Debaise, 2017; Kalazova, 2016; Shaviro, 2014). This speculative expansion of aesthetics to encompass both the cultural and the natural, the subjective and the objective, the artistic and the scientific is what we name an “**ecological aesthetics**”. It is an aesthetics that operates across scales of space and time, from the microtemporal entanglement of quantum events to the geo-social movements of planetary epochs and evolutionary life processes (Yusoff, 2015).

The Indigenous and the Speculative

We concur with scholars such as Protevi (2013), Haraway (2016) and Debaise (2017) who have argued that the geo-eco-onto-bio-cultural transformations of contemporary life call for an aesthetics that is radically environmental, speculative, empirical, relational, and inclusive of all forms of life and modes of existence. We also note the particular resonance of such a (re)turn to aesthetics with Indigenous ontologies, cosmologies, and practices that have been in existence for millennia. **Geo-ontological** analyses of Indigenous art, philosophy, and culture by feminist scholars such as Grosz (2008) and Povinelli (2016) highlight an emerging sense of compatibility between the ‘traditional’ aesthetics of Indigenous peoples and the ‘new’ aesthetics proposed by today’s speculative theorists, artists, and scientific practitioners. We acknowledge that many **Indigenous cultures** have already been thinking and working through such an ecological aesthetics for millennia, and offer a plethora of place-based and culturally-responsive resources for grappling with the challenges of social and ecological crises at the planetary scale. We can also thread a speculative history of ecological aesthetics back to prehistoric cultures and the territorial behaviours of the animal world, including the cave art of early hominids and the ritual performances and habitat constructions of mammals, birds, and myriad other forms of life. And yet we also acknowledge that the material conditions of the contemporary world are *undeniably new*. As Hansen (2015) notes in his analysis of the experiential impacts of 21st century **media technologies**, “we literally live in a new world, a world characterised by a vastly expanded and deterritorialised sensorium” (p. 161). There is no place on Earth that is unaffected by human enterprise and technological expansion. The sheer number of human bodies continues to grow, even as the numbers of other Earthly creatures continues to decline. The cumulative sensing capacities of microcomputational media networks have become powerful agencies and elemental components of everyday existence. Nobody has ever experienced anything like what we are experiencing at present. So what do we do? Can we (re)turn to the past and the future at the same time? Can we collectively craft an old/new ecological aesthetics that co-implicates the Indigenous and the speculative?

While there are strong resonances between the theoretical positions of speculative and Indigenous thought, their modes of aesthetic actualisation can also appear to be in tension. Some of these tensions become palpable in

reading across the chapters that make up this section. We find tensions, for instance, between rapid acceleration and deceleration; between acknowledging the past and imagining the future; between symbolic representations and worldly sensibility; between cultural traditions and technological mediations; between biographies and multiplicities; between practical engagements and theoretical speculations; between the “Great Mystery” (Cajete & Williams, this section) and the “aesthetic order of nature” (Rousell & Cutter-Mackenzie, this section). Rather than setting up these terms as binary distinctions between categories, we would like to think of them as tensions that produce new potentials for aesthetic experience. We would like to think of them as *productive tensions* that stretch and blur the “frictional spaces” between different modes and manners of existence.

Rehabilitating the concept of “Nature”

What remains central to our approach to this section is a focus on **aesthetic modes** and processes, rather than on ontological substances or essences. We are specifically interested in how this theoretical shift can provoke renewed or rehabilitated concepts of “nature”. As Rousell and Cutter-Mackenzie write in their chapter *Uncommon Worlds* (this volume, p. 5), ecological aesthetics is concerned with “differences in *becoming* (as the aesthetic mode or manner of existence) rather than differences in *being* (as the ontological essence or substance of existence)”. This shift in register recognises the primacy of embodied experience as a constitutive process, a movement that finds resonance with many Indigenous traditions as well as recent findings in the life sciences. **Postgenomic** research in contemporary **biology**, for instance, reveals the ways that environmental and social conditions have transgenerational impacts on biological functioning, cultural development, and gene expression (Frost, 2016). This means that place-based and culturally-situated experiences have effects on the biological constitution of living bodies not only over the course of a single lifetime, but across generations and also across species. Recent findings in **embodied cognitive science** further reveal the ways that sentient, perceptive, cognitive, emotional, and social experiences are inseparable from biological processes, such as sensory-motor activity, directional motility, biochemical gradients, and pre-cognitive affective responses (Protevi, 2013). These findings gesture towards the capacity for entire bodies and societies to sense the world aesthetically, including the ability for cells, proteins, and even genes to sense and dynamically respond to the environments and milieus within which they are embedded.

However, if we are to maintain a commitment to a *speculative* ecological aesthetics then even our embodied, culturally-situated, and sensory experiences can’t reveal the whole story. If ecological aesthetics is to graft onto “nature” as the immanent ground, plane, or continuum for all experience, then it must also account for the speculative conditions under which experience occurs, conditions which *are never directly perceived or experienced* by humans (Debaise, 2016; Hansen, 2015). Perhaps it is in the speculative space of pure potential that **the concept of “nature”** might be rehabilitated for our times. Nature would, in this sense, simultaneously compose, sustain, and vicariously exceed experience in every direction. As Cajete and Williams discuss (this section), nature is *intrinsic* to all experience even as it remains ‘the **Great Mystery**’ of existence itself. Drawing on Whitehead, Rousell and Cutter-Mackenzie (this section) theorise nature as the “**aesthetic order**” of the universe, an extensive continuum of vibratory intensities and potentials that includes all things and their felt relations. Phillips (this section) describes feeling the “infinite alterity and ethicality” of nature in the touch of a child’s hand in the streets of Chiang Mai,

Thailand. In each of these speculative accounts, we encounter a “nature” that is never static, passive or predictable, but always changing *as our experiences change* (along with the experiences of all other creatures, cultures, places, and times). The speculative conditions under which life takes place are revealed to be just as contingent as life itself, just as permeable, malleable, and intricately enmeshed. Perhaps the Indigenous and the speculative have always been intertwined within the aesthetic “[matrix that embeds](#)” us all (MacDonald, this section). And maybe the emerging field of ecological aesthetics can offer a nexus or meeting place for conceptualising and working with this matrix; for bringing a speculative metaphysics of nature into direct and consequential contact with embodied, sensorial experience – in all its wild proliferations and potentials.

Ecological Aesthetics, Childhood, and Learning

This brings us to the focus of this section of the Handbook, which is the intersection of ecological aesthetics with childhoodnature relations, encounters, and learning experiences. To our knowledge this is the first book-length treatment of ecological aesthetics as applied to the learning experiences of children. As demonstrated by the chapters collected in this section, ecological aesthetics provides fertile grounds for interdisciplinary research and pedagogy which attends to richly textured compositions of childhood experience through a diverse range of material, social and conceptual practices. Such approaches have become increasingly relevant as children encounter a world typified by the acceleration of social, technological, and environmental change, and the mutually reinforcing conditions of planetary instability, inequality, and precarity. In attending to the sensuous, creaturely, and affective qualities of children’s encounters with and *as* nature, multiple sites are opened up as vital spaces for children to respond to these changing material conditions of everyday life. As the chapters in this section attest, these sites expand beyond places commonly associated with “nature”, such as national parks, remote wilderness areas, nature schools or community gardens. They also include art galleries, museums, urban landscapes, everyday domestic spaces, science laboratories, and digital environments, among many other settings. Each of these sites of encounter can be considered intrinsically ecological and aesthetic environments that condition the very possibilities for children’s movement, learning, sensation, perception, imagination, feeling, and thought.

While this ecological aesthetic perspective supports methodological turns towards artistic, creative and sensory practices across diverse educational and research contexts, it should not be confused with an advocacy for “arts-based methods” as narrowly and instrumentally defined in relation to “nature”. Rather, this section works to expand the purview of aesthetics to encompass the rich histories of the [environmental arts, humanities and sciences](#), along with Indigenous practices of making and knowing that are associated with bioculturally-embedded understandings of place. Hence, we see the turn towards ecological art and aesthetics as a turn towards environmental awareness as a mode and manner of sensory attunement and response. To become attuned to one’s environment is to inhabit an artful disposition, a sensory apprenticeship with the naturalcultural environment that establishes the very conditions under which learning becomes possible. This is to embrace nature itself as a creative force that is embodied in the fearful wonder of a child as a lightning storm approaches, or the subtle adjustments of a child’s body to catch a different perspective on a vista, or a painting, or a science experiment. Such an ecological aesthetics lurks

everywhere, in the potentials for a more artful **attunement** to the everyday experiences of children, and indeed, to all forms of life.

Drawing together the seed bag

In drawing together the chapters for this section we sought contributions that put aesthetic experience at the centre of ChildhoodNature research. We saw this as a process of gathering experiential seeds of potential to spread with the wind, akin to Haraway's (2016) "**seed bag**" approach to collecting and crafting new figurations, tropes, and concepts through speculative philosophy, science, art, biography, and fiction. Rather than delimiting the field through pre-established criteria and boundaries, we wanted to see how ecological aesthetics might sprout new possibilities for understanding the interconnectedness of childhood and nature through sensory, affective, and creative practices. We cast our net as widely as possible, and were fortunate to receive submissions from scholars, artists, educators, and practitioners hailing from diverse cultural and geographical locations. The authors of the chapters in this section also represent a wide range of academic career stages, including early- to- mid-career researchers, artists, and educators as well as substantially established scholars and internationally-recognised experts in various fields. The range of chapters collected in this section attests to the diversity and emergent shaping of ecological aesthetics as a field that is still very much in the making. We feel that this incipient curiosity for what the field might become stirs at the heart of each of the chapters to follow.

The section opens with a chapter entitled **Sticky: Encounters with Touch**, as Louise Phillips presents a series of eco-aesthetic encounters with *touch* drawn from her lived experiences of child-led walks in Chiang Mai, Thailand. "The Walking Neighbourhood Hosted by Children" is a project that has been held in several countries across three continents, and is designed by a team of artists to rethink the geography of fear that limits children's access to public spaces and that devalues children's capacities and competence. Phillips shares her sensory ethnographic research by bringing to life a series of "human-plant-place relations" as she is led by children on three walks. Through her embodied and emplaced sensorial research, she captures how children's attention to the sensuous and affective qualities of nature come to matter through material affordances and constraints. She develops an eco-aesthetic account of ChildhoodNature touch in relation to Karen Barad's quantum physics-informed theory of agential realism, in which "all particles are entangled in the void, so that every degree of touch is touched by all possible others," (Phillips, this section). As we walk with Louise and the children we are invited to imagine their entanglements and appreciate the stickiness of touch.

In **Rachel Carson's Childhood Ecological Aesthetic and the Origin of *The Sense of Wonder***, David Greenwood traces the history of Carson's development of a "sense of wonder" through her immersion in nature, in the nature study movement, as well as in early 20th Century children's literary magazines such as *St. Nicholas*. He invites us to consider two of Carson's most significant teachers: her mother and a sixty-four acre rural property that had "orchards and gardens, groves and fields, hills and hollows," with ample room to wander. While known for *Silent Spring* (1962), in prior years Carson had published *Under the Sea Wind* (1941) and *The Sea Around Us* (1951), and published her final book, *The Sense of Wonder*, in 1965. Examining the evolution of her works, Greenwood finds that "what made

Carson's nature writing unique was not her politics, but her rare ability to combine the skills, gifts, and discipline of a scientist with those of a literary artist." For Carson, books of nature study encouraged not just curiosity for natural objects but also immersive experiences as well as aesthetic and ecological imagination. He points to the significant role of an adult (her mother) in facilitating her sense of wonder even as opportunities were available to Carson "to combine recreation, environmental learning, and an ethic of reverence toward the natural world." In asking, "What does Rachel Carson have to teach us that we might have to remember?" this chapter foregrounds the significance of *aesthetic experience* in evoking a sense of wonder.

In their chapter **Uncommon Worlds: Towards an Ecological Aesthetics of Childhood in the Anthropocene**, David Rousell and Amy Cutter-Mackenzie draw upon Alfred North Whitehead's speculative philosophy of nature to develop an alternative theoretical approach for posthumanist studies of childhood. In the first part of the chapter, the authors make the case for a new aesthetics of childhood that is responsive to the environmental changes of the Anthropocene epoch, highlighting the need for a more intensive and affirmative engagement with non-anthropocentric and non-representational aesthetic theories and practices. Combining Whitehead's philosophy with recent research in the life sciences and media studies, the authors theorise the relationship between the "common world of nature as a vibratory continuum", and the "uncommon worlds" of children as "creatures of becoming". The second part of the chapter extends this theorisation through the analysis of children's photographs produced during the three year *Climate Change and Me* project undertaken in regional NSW, Australia. Rather than working with images as "representations or analogic signifiers for children's experience", the authors explore how each photograph "co-implicates children's bodies and environments through affective vectors of feeling". The chapter concludes by considering the pedagogical implications of children's photographic practices, focusing on Whitehead's (1967) concept of the "art of life" as a guiding proposition for the aesthetic cultivation of environmental awareness.

Lucinda McKnight's chapter **Tin Shed Science: Girls, Aesthetics and Permeable Learning** further develops a relational and diffractive approach to environmental learning in the suburbs of Melbourne, Australia. Combining "fragments of original pedagogical intent" with the polyphonic voices and material agencies of a backyard Science Club, the chapter works to assemble a posthumanist conceptualisation of learning that emphasises the radical permeability of human and non-human bodies and environments. The chapter not only draws on new materialist theories of embodiment, aesthetics, and agency, but also puts these theories to work in the construction of a multi-layered and diffractive account of learning that "is always about the earth, and an awareness of the processual making of earth through intra-action". In doing so, McKnight works creatively to disrupt her own authorial voice and pedagogical intentions with "the voice of the earth", including the geological ruptures of poetic utterances and theoretical "unearthings and blendings". The chapter thus offers a strikingly original take on what science education might become if exposed to the wildness of posthumanist aesthetic practices, as the "becomingearth" of the child provokes a (re)turn to dirt and the permeability of organic bodies.

Discussions of Indigenous ecological knowledge and aesthetics are largely missing from mainstream sciences education, arts education, and environmental education. **Eco-Aesthetics, Metaphor, Story, and Symbolism: An Indigenous Perspective** presents a conversation between Tewa scholar, educator, and artist Gregory Cajete and eco-

educator Dilafuz Williams of East Indian origin, about the nature of eco-aesthetics, metaphor, story and symbolism in Indigenous thought and reality. Aspects of the Indigenous mythopoetic tradition are discussed as part of the traditional education practices of Indigenous cultures. The conversation draws upon the lived cultural experiences of the authors as they discuss the rich use of metaphor, story, symbols and art to convey notions of eco-aesthetics in the teaching and learning process and the education of children. Acknowledging that oral traditions “used stories for millennia to evoke a sense of place and a deep understanding of interconnectedness of all life,” they point to stories also as a means for “connecting past with the present and encouraging imagination.” Exploring the environmental, mythic, visionary, artistic, affective, communal, and spiritual dimensions of Indigenous education through Cajete’s writings, the conversation concludes with a discussion of how Indigenous ecological thoughts may be expressed through contemporary art forms to show possibilities for childhood and nature as interconnected.

The section’s engagement with Indigenous ecological aesthetics continues through the contribution of film-maker and ethnomusicologist Michael MacDonald. In his chapter **CineMusicking: Ecological Ethnographic Film as Critical Pedagogy**, MacDonald develops “Cinemusicking” as an ecological approach to ethnographic filmmaking that he has developed through film projects with Indigenous elders and urban youth. Drawing on theories of biosemiotics and “the matrix that embeds” from ecological thinkers such as Bateson, Luhman, Maturana, and Varela, this chapter offers both theoretical and practical insights into ecological aesthetic education as a transformative process of co-creation and interpenetrating systems. A series of richly drawn examples are portrayed through MacDonald’s ethnographic descriptions of musical and cinematic engagement, including the rhythmic ciphers of inner city “hip hoppers” and the traditional ecological knowledge (TEK) practices of Cree peoples in Northern Canada. In linking systems theories with critical pedagogy and Indigenous philosophies, MacDonald writes that “the process of engaging with the *matrix that embeds* is part of the practice of life called *Pimachihowan*, experienced as sacredness”. This chapter thus offers a fresh vision of ecological aesthetic education that links the sacred with everyday embodied experience and aesthetic practices of life-living.

Teacher educators Shelley Hannigan, Anna Kilderry and Lihua Xu bring their diverse disciplinary lenses from arts education, early childhood education, and STEM to challenge the dominant anthropocentric view and paradigms in education as they explore **Patterning in ChildhoodNature**. Critiquing the discipline-based compartmentalization of education, they conceptualize ChildhoodNature through patterning as a transdisciplinary approach for exploring the intricate relationships between organisms and their environments. Patterns, for them, are the “regularities and repetitions of actions, units, or shapes in space, time, and/or behaviour.” They discuss how children’s bodies are physically made up of biological structures and patterns, as are children’s behavioural patterns, movements and cognitive schemas. Highlighting patterns of sameness and difference through examples from Indigenous culture and contemporary art, they propose a biophilic and transdisciplinary approach to pedagogy and curricula to revive the aesthetic knowledge of patterning among children. For these authors, knowledge about patterning could enable children to make complex connections with their selves and the environment as ecological and aesthetically engaged learners.

Questioning the educational trend that considers the child and nature as a narrowly constructed dichotomy, Patti Pente offers alternative configurations of childhood in education by theorizing how the nanoscale can expand the imagination of what our human relationship with the planet might become. In **Nanotechnology, Anthropocene and Education: Scale as an Aesthetic Catalyst to Rethink Concepts of Child/Nature**, she invites us to consider “what we might create with our bodies in space and time if the perceptions of the world stretch to the nanoscale and geological time.” Jogging our memories, she reminds us of scale, explaining that nanotechnology is the study and use of materials at the small range of 1-100 nanometers, where 1 nanometer is equal to 1 billionth of a meter. With this awareness of the invisible nano-world, we are encouraged to consider how, “through a shift in scale to include the very large and the very small, dichotomous thought is eschewed for a concept of life understood as continual, material process.” Pente posits that nanotechnology can surface the relationship of “invisible” materials at the small nano-scale with the visible character of the human-scale, offering a challenge for educators to enlist the creative imagination in order to confront our taken-for-granted Anthropocentrism. Scale therefore serves as an aesthetic catalyst to rethink childhood and nature concepts and relationships for education, art, and research.

Exploring concepts of childhood and nature in motion, Martha Eddy and Ann Moradian propose an aesthetic of embodied movement as both the physical and metaphysical ground for learning. In **ChildhoodNature in Motion: The Ground for Learning**, they advocate the moving body as critical to celebrating and deepening ChildhoodNature relationalities. In proposing a life-long somatic relationship with our bodies in motion, they support a reclaiming of wholeness that “intensifies not just self-awareness, self-knowing, self-care and self-regulation, but also moves us to act and interact with greater awareness and care for others and our world, including the places we inhabit and share.” The role of movement is crafted as a reminder that the body itself holds many of the lessons in establishing life-affirming relationships. Through a series of vignettes, they offer examples of problems, solutions and research through an analysis of intervention into bodily disassociation and disembodiment, and propose an ecological revitalization of thinking, feeling, and living through the body *in* and *as* movement. Their deep and wide-ranging treatment of an ecological aesthetics of movements provides a valuable resource for educators and researchers interested in childhoodnature studies and embodied practices.

Movement also serves as the basis for inquiry in the section’s final chapter, entitled **Propositions for an Environmental Arts Pedagogy: A/r/tographic experimentations with movement and materiality**. In this chapter, authors David Rousell, Lexi Lasczik, Rita Irwin, and Peter Cook undertake a series of creative experimentations that investigate the relations between movement and materiality in the development of an environmental arts pedagogy. Drawing on new materialist theories of matter and movement as vibrant and creative forces, the authors devise a series of four experimental art processes that “explore the relational spaces between art, environment, and pedagogy”. As a methodology that operates through relational practices of artmaking, researching, and teaching/learning, they take up a/r/tography as “an ecology of practices in which human and non-human agencies are always entangled with distributed processes of co-composition, negotiation, and constructive functioning”. Through a/r/tographic renderings that combine elements of speculative theory, poetics, and visual imagery, the authors put the concepts of “corridor”, “flight”, “viscosity”, and “construction” to work in ways that connect

“movement with matter, body with environment, and imagination with empirically-observable phenomena.”

Bringing together creative practices associated with choreography, drawing, installation, and social practice art, the authors conclude with a series of speculative propositions for an environmental arts pedagogy.

Frictional Spaces and Relational Overlaps

The editorial process of drawing together this fertile “seed bag” of chapters has revealed to us the rich diversity of theories and practical engagements that are currently being undertaken to shape the field of ecological aesthetics in relation to childhoodnature studies. As mentioned in the opening sections of this introduction, we have welcomed the relationships and the tensions that have emerged between and amongst these diverse offerings. Indeed, we have endeavoured to actively multiply the possibilities of how ecological aesthetics might transform studies of childhoodnature rather than attempt to achieve a consensual framework or agreed upon set of parameters. In closing this section introduction, we highlight some of the dynamic frictions and discontinuities, along with relational overlaps, that have emerged through the differential concepts of childhood, empiricism, sensation, pattern, and movement.

We can see various relationships emerging in the spaces between Greenwood’s biographical treatment of Rachel Carson’s early 20th Century **childhood**, and the diffractive multiplicities of 21st Century childhood that we encounter in McKnight’s “Tin Shed Science club”. In the “frictional spaces” between these two chapters we see onto-epistemological differences being multiplied across decades, as civil rights, literary, artistic, and environmentalist movements coincide with radical technological revolutions, and catastrophic ecological destabilisations coincide with post-truth political regimes. While the early 20th Century world of Carson’s childhood may no longer exist, the transformative power of her sense of wonder lives on in McKnight’s Tin Shed Science club, even as the authorial control of the human(ist) voice “collapses into soil, understands the child as soil”. We are reminded that there is no going back after each turn. The environmental turn, the feminist turn, the material turn, the ontological turn: each of these turns is not simply a shift in human ideology and ethics, but a turning of the Earth itself that never turns back.

The frictional spaces between the speculative and the Indigenous also begin to coalesce over the course of reading this section to inform different variations of an ecological aesthetic **empiricism**. Rousell and Cutter-Mackenzie’s speculative account of nature as a vibratory continuum both resonates with and disturbs the traditional ecological knowledge (TEK) systems invoked by Cajete and Williams, and in MacDonald’s account of the ‘matrix that embeds’. Each of these ecological aesthetic accounts pivots relationally on the centrality of embodied and enactive engagement with the world as empirically experienced. The friction between these approaches emerges in the different ways that they resist reductive understandings of empiricism rooted in Western scientism. For Rousell and Cutter-Mackenzie, the development of a “speculative empiricism” allows them to account for the virtual, immanent, indeterminate, and unknowable elements of potential that form the underlying conditions for childhoodnature experience. Cajete, Williams and MacDonald, on the other hand, evoke the “Great Mystery” of nature through Indigenous spiritual beliefs and practices that are intimately connected with transgenerational experiences of place, community, art, and ritual. These authors describe what might be called a “sacred empiricism” that infuses everyday

aesthetic practices such as breathing, walking, and noticing with a profound spiritual significance and connection with the whole of nature.

Another frictional space can be found in the ways that various chapters focus on the role of **sensation**, a space where sensory experiences of childhood and nature make aesthetic contact. Phillips writes of the “sticky sensation” of holding a child’s hand while walking through the streets of Chiang Mai, while Rousell and Cutter-Mackenzie describe the “ecologies of sensation” that emanate from the surfaces of children’s photographs. In thinking the sensation of childhoodnature beyond the human, these two chapters provide alternative perspectives on the ways that nonhuman senses and sensors are entangled with childhood experiences, including the sensorial agencies of plants, buildings, mushrooms, and digital cameras.

Pattern also emerges as a frictional space that problematizes aesthetic issues of scale, complexity, and differentiation, as emphasised in chapters contributed by Pente and Hannigan, Kilgerry, and Xu. Pente brings our attention to the nano-scale as a potential catalyst for childhoodnature pedagogy and artistic practice, while Hannigan, Kilgerry and Xu draw out the life-size implications of patterning across biological, cultural, and ecological systems. These chapters offer productive tensions between patterns of repetition and patterns of difference, revealing the ways that patterns operate across multiple levels and scales of organisational complexity, many of which are ordinarily hidden by habitual modes of perception and thought. Both chapters share a commitment to extending the connections between science and art, using pattern and scale as conceptual figures that can transform the ways that children learn through aesthetic engagement with the elements and forces of the natural world.

The final two chapters in the section each contribute to a frictional space concerned with the ecological aesthetics of **movement**. Both chapters acknowledge the primacy of movement in matters of life, learning, aesthetic experience, and environmental awareness, but the differential contrasts between their approaches also generate a series of productive tensions. Focusing on the centrality of the moving body as the experiential locus for environmental learning, Moradian and Eddy offer a complex range of theories and empirical examples that link embodied self-awareness with ecological sensibilities and capacities for interconnection. For these authors, the body operates as a phenomenological conduit and interface for engaging with the whole of nature through movement, leading them to propose a somatic pedagogy predicated on the dynamic balancing of psychological, social, and ecological systems. Rousell et al, however, take an alternative approach that experiments with movement as a distributed environmental force that is inextricably linked to dynamic material processes and interactions. Rather than emphasising the conscious movement of the individual human body, these authors foreground the intercorporeal materiality of choreographic movements that come to compose an environmental arts pedagogy.

We hope that this brief introduction to the section’s core components has provided a helpful series of entry points for thinking within, across, and amongst the various chapters collected here. We conclude by extending our deep gratitude to all of the contributors who have made this section possible, as well as the lead editors who have supported our efforts to bring a fresh, experimental, and in many ways, untested approach to childhoodnature studies.

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