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Aesthetic knowing and ecology: cultivating perception and participation during the ecological crisis

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ABSTRACT

This paper develops the concept of *aesthetic knowing*, its significance in perceiving and participating in ecologies writ large, and challenges that arise in engaging it during a time of ecological crises. I define aesthetic knowing as *perception of the quality of relationship*, and suggest it offers insight into how ecologies are intra- and/or inter-connected. Aesthetic knowing is the epistemological basis of a *relational empiricism*, a philosophical position which foregrounds the capacity to receive and respond to otherness, and I claim it offers an antidote to the isolating overreach of some theorising prevalent in environmental education (EE). My main purpose is to clarify the scope and nature of the relationship between aesthetic knowing and ecologies, so to offer methodological and theoretical context for educators and education researchers seeking to attend to healthy and threatened ecologies. Cultivating aesthetic knowing is necessary for responsive participation with/in any ecology, but can be emotionally difficult. As ecological destruction escalates, sustaining aesthetic knowing demands perception of, and participation with fear, while working with fear in turn requires aesthetic openness. I discuss approaches to cultivating aesthetic openness given this apparently wicked recursion.

1. Introduction

In this paper, I explore and develop the concept of *aesthetic knowing* and its role in human perception and participation in ecologies writ large. Briefly now, but with more to follow, I define aesthetic knowing as *the perception of relationships, felt as a quality of integration and/or disintegration*. Aesthetic knowing sheds "insight into how things hang together" (Zwicky, 2019, 5) by sensing the form of relationship, or to use a prevalent twentieth Century term, its *gestalt*[1]. It is, for example, what happens when we hear a melody rather than a mere sequence of notes, or recognise someone's face. Perceiving a gestalt means sensing, however vaguely or strongly, a "pattern that connects" (Bateson 1979). As such, the scope of what I call 'aesthetic knowing' is both more general and more specific than the kind of attention to sensory experience commonly associated with the word 'aesthetic' in environmental education (EE) (ex. Carr, 2004;

Ostergaard 2017; Iared et al. 2017). Along phenomenological lines[2], advocating for aesthetic sensibility is sometimes approached through pitting 'knowing' against 'being,' suspiciously viewing knowing as a process that 'imposes meaning,' while asserting that aesthetic experience instead opens people to things as they are, and are becoming (ex. Quay 2013; Yi 2019; Bonnett 2021). Such aesthetic experiences involve relationship with otherness, and tend to focus on the quality of relation between the experiencer and the place or world they inhabit. Aesthetic knowing is also concerned with how humans encounter otherness in these ways, but it does so by engaging in an ecological encounter with otherness that is much more widespread, ongoing and resists knowing/being dichotomies.

While a necessary connection between aesthetics and knowing is prefigured in diverse theory, from pragmatism (Johnson 2007), phenomenology (Merleau-Ponty 1945), Gestalt psychology (Whertheimer 1938), tacit knowing theory (Polanyi and Prosch, 1975), (some) anthropology (ex. Bateson 1972), neuroscience (McGilchrist 2009), and ecophilosophy (Zwicky 2019), explicit consideration of aesthetics as a way of knowing is largely confined to art subjects. For example, within EE, many scholars also approach aesthetics through practices of making or experiencing art (ex Mantere 1992; Song 2012; Inwood, 2013; van Boeckel 2017). While such work is crucial, aesthetic knowing's reach goes far beyond art. Aesthetic knowing refers to perceiving and responding to the quality of *any relationship*, perceptual, cognitive, and/or somatic and affective. It is as present in mathematics and science as it is in art, phenomenology, dancing or ethics, as well as any rejoinder between these severed domains. It is vital for inquiry that attempts to perceive and respond to relationships, be it within phenomena or between them. In particular, *aesthetic knowing is vital for perceiving and attending to ecologies*, from forests and streams to those animating the mind and heart. And yet, however necessary or ubiquitous, aesthetic knowing is under-emphasised in schools and poorly understood.

Aesthetic knowing is core to an epistemological approach seeking to overcome one-sided constructivisms[3] and other "subjectivist" conceptions of knowing. Through arising gestalts, we contact and receives otherness. But not comprehensively or 'once and for all.' Like any empirical pursuit, aesthetic knowing is fallible and fulfils its promise only as an ongoing process of perceiving and responding to that which it encounters. For example, we shall consider how although aesthetic knowing produces a number of ecological concepts (*italicised* in section 1, below) and their associated "ecoliteracies" (ex Capra (1995)), it is also what helps us transcend the abstractionism such descriptions easily entail. Finally, I claim aesthetic knowing can be cultivated (Nassar 2022), although there are increasing challenges in doing so. For these reasons, the epistemological, ontological and pedagogical significance aesthetic knowing holds particular significance for environmental education, but in this context too, its nature and role in perceiving and responding to ecologies has not been sufficiently articulated (though see Affifi 2014b; Derby 2015[4]; van Boeckel 2017; Affifi 2020a; 2020c). This paper seeks progress in these directions.

Aesthetic knowing is crucial in engaging with ecological relations *in all domains,* from the conventionally 'biological' to the ecology of the self. Repeated ecological motifs play out across the genesis and destruction of relationship in diverse ecologies. In each case, aesthetic knowing is important to sense and participate in what is happening. This does not mean concrete particulars and their dynamics do not vary widely across these domains, and indeed aesthetic knowing aims to sense and respond to the unique arising of whatever ecological process it encounters. What I develop as *relational empiricism* is a position that trusts, and seeks to develop, the human capacity to be in contact with the living world, in all its ecological dimensions. Fundamental to this process is the continuous and appropriate recharging of relational concepts through aesthetic knowing's bootstrapping capacity to re-perceive and interact anew as it engages ecologies. How this happens and the challenges it faces will be made clear in what follows.

The paper is organised into several sections. To establish the framework in which aesthetic knowing can be seen to perceive and participate, I begin by building up an understanding of ecology, moving from relatively abstract to increasingly concrete ecological gestalts. My strategy

is to develop the concept of aesthetic knowing, beginning by considering how it underpins simple "conventional" ecological gestalts, while also promoting movement towards more concrete and complex relationalities. I present the ontological ground for relational empiricism, an epistemological position which explicitly acknowledges the role of aesthetic knowing in achieving ecological "contact and conviviality" (to use Abram's 1996 expression) in the context of the "ecology of knowing." In later sections of the paper, I am led to consider courage, not to showcase the scope of aesthetic knowing, but because aesthetic knowing requires engaging with fear to keep itself 'open' to the concrete relationalities that arise. However, working with fear requires aesthetic openness, which in turn calls for its own courage. Put more generally, the ecology of human knowing has an aesthetic dimension, which itself intersects with the ecology of our emotions, including fear, and our various responses to it. The concluding section of the paper situates the discussion in the context of EE research.

2. The ecological context

A contested term in environmental education (EE) research (ex Korfiatis, 2005), "ecology" is defined here as *the concrete living process where multiple entities co-constitute each other and a shared context across time*. Ecologies can persist or change (Ives and Carpenter 2007), be healthy or not (Rapport et al. 1998), and have crisis points (Dakos et al. 2019). Further, there are ecologies within, and between ecologies (Loreau, Mouquet, and Holt 2003). Finally, I suggest ecologies are inherently meaning-making as they are co-constituted in part through life's semiotic activity (Hoffmeyer 2007; Affifi 2013; 2014a; 2015; 2016b). I shall argue that each of these aspects are relational and so are perceived and responded to through aesthetic knowing. In the following subsections, I clarify terms and their relevance, building from simple and abstract ecological concepts to more textured aesthetic gestalts. By the end of this section, the reader should see how a deeper understanding of ecologies requires a continued process of perceiving concrete relations, which will be fleshed out in the subsequent subsections on aesthetic knowing (see p. 6, below).

2.1. Stability, change and context in ecologies

Life co-constitutes ecological relationships. To *co-constitute* means the structure and activity of entities in an ecology adjust to one another, leading to relations with *varying* levels of coherence. Through aesthetic knowing, we can perceive these relations, such as patterns of stability, relative stability, and destabilising change, as well as patterns between these. For example, feedback loops, such as "dynamic equilibrium" (Kauffman, 1993) or "structural coupling" (Maturana and Varela, 1980), are perceived aesthetically. Dynamic equilibrium occurs when changes at one level contributes to stability in another, like in homeostasis. With structural coupling, two entities dynamically affect one another to co-constitute a shared trajectory, such as the co-evolution of a bee and a flower. Of course, no ecology is a mere thermostat or isolated Red Queen duo (Van Valen 1973), but these examples already show how even simple ecological relationships are invisible when the system is broken into its component parts. They also reveal a development dialectic in life -and the need for further aesthetic knowing. I use the word dialectic to indicate that even simple ecologies involving two interacting entities give rise to a qualitatively new third element (Bateson, 1979), in these cases a homeostatic norm or evolutionary trajectory. The shared context is different from the parts that co-constitute it, but once it arises, what happens is in part influenced "by inner structural laws of that whole" (Wertheimer, 1938). This context is a pattern in the world and we can perceive its gestalt.

Ecologies are not only stable in various ways. They are also alive: changing, growing, developing, evolving, resisting, decaying. Interacting relata co-constitute not only dynamic

stabilities or mutually specifying trajectories, but also quantitative and qualitative disruption (Levins and Lewontin, 1985). Or, in Bateson's (1979) language, ongoing relations generate differences, and these differences can, in turn, 'make a difference.' Change can occur in the relationship between entities, cascade, and disrupt other integrations. This process is also dialectical because it opens the possibility of new integrations, such as when cyanobacteria invented photosynthesis, generated toxic oxygen, and set the conditions for the evolution of cellular respiration and multicellularity (Margulis and Sagan, 1997). Relationships sometimes destabilise, and incorporate changes that arise into further development. This is part of the ongoing *creative reconciliation* that happens at many ecological levels, from gene mutations exapted for new purposes (West-Eberhard, 2003), to new ideas disrupting existing mental ecologies while setting the context for new integrations. While systems theory-inspired approaches to EE aim to understand and conserve stable or semi-stable ecological relationships (ex. Orr 1992, Capra 1995), attempts to "think with" Deleuze and Guattari often emphasise boundless difference making, nomadic ventures, or the creation of 'lines of flight' (ex. Gough 2006).[5] But aiming for stability or becoming *per se* is equally unecological. Life maintains itself, tears itself apart, and heals itself. It dynamically integrates order and wildness, and people can perceive the quality of the metalevel relation between these poles aesthetically. For example, in aesthetic contexts, the adjective 'organic' is often used to depict living form or behaviour manifesting the integration of order and wildness.

2.2. Ecological levels

Describing co-constituted contexts of stability or change is at a *higher level*, or as Bateson calls it, a higher 'logical type' (1979), than either the stability or change of either participant in the relation. I will refer to Bateson's logical levels as 'ecological levels'[6] and understand aesthetic knowing as crucial for perceiving pattern both within, and between, such levels. Bateson realised nested levels occur in biological development, evolution, learning and thinking, and were crucial for perceiving ecological pattern. For example, Bateson understood evolution as a multigenerational process of learning at a higher (species) level than a single living being's learning. However, it is up to aesthetic knowing to perceive the patterns that might connect what happens across ecological levels. For example, whether an organism's learning contributes to evolutionary learning might depend on if organism learning buffers against adaptation (Levins and Lewontin, 1985), or alters the organism's adaptive context, as in niche construction (Lewontin 1983; Odling-Smee et al. 2003) and evo-devo theory (West-Eberhard, 2003)[7].

These ecological descriptions of stability, change, or some combination of both at different levels, are *abstract*.[8] While aesthetic knowing underpins even these simplified descriptions, it hollows out actual relations and their co-evolutionary dynamics, and offers a more or less stable pattern between a few foregrounded relata. However, all actual ecological phenomena are *concrete* and more multitextured than these concepts suggest. For instance, like the melody discussed in the introduction when describing gestalts (p. 1), an ecological phenomenon has a duration that cannot be temporally compressed without missing what it is 'about.' Moreover, any ecology is always in the process of 'ecologising', continually re-establishing and/or altering the nature and quality of its relations. By further *cultivating* our capacity to aesthetically know, humans can perceive the texture of these relations more deeply, widely and fully. Doing so sobers trust in existing depictions, while rendering more nuanced depictions freely available when appropriate. In other words, "to attain a living understanding of nature, we must become as flexible and mobile as nature itself" (Goethe 1995, 64). Aesthetic knowing must be an ongoing process or it ossifies into the *anaesthetic* products of its own devising.

2.3. Crisis, dysecology and health

I use *ecological crisis* to refer to the period an ecology upheaves one set of organising relations for another, specifically from relations of *health,* where coherence reconstitutes itself in the face of change, to *dysecology*, where relations instead co-constitute increasing dis-integration. Whether in an organ's physiology, the dynamics of a meadow, or the phenomenology of one's inner life, healthy ecologies, dysecologies and ecological crises co-constitute perceptible relations with concretely different felt qualitative characteristics. Far from merely concatenations of positive and negative feedback, they have distinctly felt relational textures arising (for example) in their pace, harmony, and melody. Dysecologies, however, can sometimes be part of health (and vice versa). For instance, a dying body's co-constitutive relations decohere but may sustain organising relations at another ecological level[9]. The relational contexts co-constituted between healthy ecologies and dysecologies across ecological levels can themselves be perceived aesthetically, and also felt as variously healthy or not. Dysecologies can also arise through the co-constitution between different ecological domains, summarised in Bateson's vision, "if Lake Erie is driven insane, its insanity is incorporated in the larger system of your thought and experience" (1972, p. 492). One way to understand *the* ecological crisis, is to extend this idea globally, suggesting Earth's life-sustaining relationships are pivoting towards co-constituting disruption across diverse ecological levels and domains, from forests and fields, and social communities, to hearts and minds. It is difficult to know to what extent this is so. Regardless, its threat incorporates itself into our ecology and needs to be contended with.

Ecologies arise within, and between, ecologies. A fox's habits participate in the watershed she inhabits, while her cells participate in the ecology of her organ tissues. Moreover, the ecology of that watershed interacts with the ecology of its adjacent river system, as well as that of the sea it feeds (Loreau, Mouquet and Holt 2003). In discussing the relationship between developing phenotypic traits, Simon (1973) noted that 'everything is connected, but some things are more connected than others' (p. 23). This point is crucial when thinking about *any* ecology, or ecology of ecologies. Some connections happen, or matter, more than others. Ecologies are not indiscriminately interconnected relations. They are variegated and modularising, which is why healing ecologies and dysecologies are even possible, let alone discernible. Aesthetic knowing catches "patterns that connect" (Bateson 1979), and by implication then, also patterns that do not connect much, and indeed patterns that disconnect. Aesthetic knowing is therefore crucial in diagnostics.

Fox's (2004) ethical theory asserts the need to protect what he calls "responsive coherence" in the world, a term similar to my description of a healthy ecology. When one thing's "internal coherence" conflicts with the broader "contextual coherence" upon which it depends, Fox proposes a normative guideline: one 'ought' to ensure the coherence of that bigger system. It is easy to say we should protect our biggest coherence, which for Fox is the ecological level of the biosphere. However, given ecologies arise at different, interconnected spatiotemporal levels, determining whether a disruption is part of a broader healing ecology is complex (Affifi 2020a; 2020b). Like forest fires, how often does disturbance turn out to cryptically contribute to a broader integration? Sometimes disruption of larger contexts is crucial for future ongoing life process. In recommending attention to quality of relations Fox aligns with my position, but generalising an ethical guideline has the same character as pulling an abstract ecological description from a field of concrete relations. So too does the counterthought that all alleged dysecologies might be faux villains in "the grand scheme". Cultivating aesthetic knowing bypasses the static logic of each pole, making possible ongoing perception and response to different kinds of integration within and across different ecological levels. Such openness is necessary for participating in the creative reconciliation discussed earlier.

2.4. Ecologies inside and out

Ecologies arise in and constitute *any* living process, from host-microbiome relationship, to bees and flowers, the carbon cycle, gene regulation (Brookfield, 2005), the immune system (Blaser 2006), and organism-environment transaction (Gibson 1979; Heft 2016). Human ecologies (Hawley, 1986), and those of other species (like the Great Pacific Garbage Patch's evolving microbial community (Dussud et al. 2018)), also emerge through material, political and economic changes, themselves enabled by the ecological context within which they emerge. Moreover, the so-called 'inner world' of thoughts, feelings, and memories contributes to its own ecologies, interconnected to the ones occurring 'outside' (Bateson 1979). Ecologies arise within, and between, ecologies. This aligns with proposals for a *general ecology* (Hörl 2022) recognising the pervasive scope of ecological relationships (but without that author's attempt to devitalise the concept). Rather:

> a human being is itself already a complex ecological community, a mixture of different species, things, thoughts, meanings and values. Emphasizing such connections begins to deconstruct the ontological certainties and absolute distinctions that have supported the belief that humans were somehow exempt from the *liveliness* of the world. (Malone 2018, p. 87, italics added)

Considering "thoughts, meanings and values" as ecologies is not new (ex. Windle 1995, Naess 2008, Bateson 1972, Bronfenbrenner, 1979, Zembylas 2007). My aim is to further articulate what 'ecologising' means and seek methodological and ontological unity in the biosphere without being reductive (Affifi 2015; 2023). This approach resonates with *half* of new materialist emphasis on decentering the human, and questioning dualisms. My concern is many Deleuzian concepts are insufficiently ecological. They tend to de-emphasise important differences which obfuscates the unique role *life* plays in co-constituting relation, seeing the whole world, and life too, for example, as 'machinic assemblages.'[10] Conversely, such theorising can over-emphasise other differences, such as the difference-making inherent in knowing itself, which can veer towards solipsism rather than attention and kinship with otherness. Both simplifications are interconnected because not seeing what differentiates ecologies from other assemblages is also what occludes perception of the living logic that binds the organic world together in its many manifestations and transformations. Moreover, both simplifications result from an overly abstract representation, one that severs rather than enriches contact with the world. By contrast, the concept "ecology" foregrounds homemaking through living relationship, and aesthetic knowing ensures perceptions of such relationships are continually recharged by their concrete arising. Exploring ecologies uncovers patterns within differences, and differences within patterns, and is part of participating more responsively in the living world. The aim is not to acknowledge mere interconnectedness (ex Morton's 'ecological thought' [*sic*] (2011)), but to take seriously relative connection and disconnection (as per Simon (1973) above), and how the interaction between these gives rise to both ecologies in the world and perceptions of them. This goes beyond the nomothetic/idiographic distinction, seeing both as necessary and complementary (Affifi 2020c; 2020d), and is crucial for reintegrating science education into EE (Wals et al. 2014).

3. Ecologies of aesthetic knowing

In this section, I directly explore aesthetic knowing, fundamental for perceiving and participating in ecologies. I discuss these ideas: Aesthetic knowing is an ecological process co-constituting the perception and participation in relationships between things. It is *fallible*, yet can perceive gestalts *resonant* with patterns it encounters. Relationships are perceived within and across any context, not only in 'the senses,' and are perceived as *quality* occurring in phenomena and *felt* in bodily experience. This felt quality is *valenced*, compelling diverse responses. Further, all living beings engage in aesthetic knowing, which is as essential for their perceiving and participating in ecologies in ecologies, as it is for our perceiving and participating in the ecologies they constitute.

Cultivating aesthetic knowing develops what Goethe calls "living understanding," enabling flexible perception and response. This does not mean abandoning abstract knowledge products entirely, nor fetishising change as a guiding principle. Some ecologies change so slowly that aesthetically stable relations are appropriate to participate in them. Aesthetic knowing catches *gestalts,* and replaces them when necessary, while its tempo and manner feed back into the ecologies it participates in. Cultivating aesthetic knowing involves 'organically' shifting gestalts when proposed by the ecologies one engages. Living understanding arising to understand life arising.

3.1. The ecology of knowing and the aesthetic field

If environmental educators believe ecologies exist and are worth trying to know, they need tools to overcome philosophical positions denying worldly relations, and/or humans knowledge of such relations. Rejecting knowing's contact with the world exacerbates human isolation and orients people anthropocentrically towards human discourse rather than attention to the world. For example, both postmodernist and analytic reductionistic approaches tend to conceive "wholes" as mere heaps. For postmodernists, perceived relations are seen as imposed on matter, often for implicit or explicit agendas. Notwithstanding obvious differences, this view aligns with Locke (1689) and Hume's empiricist epistemology, which holds that information comes into the senses in bits and pieces, and whatever connections seen between these primordial dots are treated as inferred or imposed rather than resonant with the world itself. For reductionists, relations are real but causally irrelevant bi-products of underlying process (Rosenberg 2006).[11] In both cases, organisms, ecologies, melodies, and relationships of all kinds are equally contrived, leading to diminished "contact and conviviality" with not only others and the world, but with the otherness within even one's own self. In my view, analytic and postmodern worldviews dominate the discussion about the ontology of ecologies and the human ability to encounter them (Affifi 2020b; 2016a). As ecologies unravel, denying that ecological relations exist or that humans can perceive and respond to them, is aesthetically (and ethically) obtuse and amounts to "severing the vocal cords of the world" (Evernden 1993, 16). Luckily, people can experience dynamic unity in things. Consider a murmuration of starlings, which teaches a different conception of humans, the world, and their relation. As Zwicky explains, "[s]ome wholes are indeed mere aggregates (A deck of cards, a pallet loaded with bricks). And some are like symphony performances: they have an explicit *antecedent* and overarching form" (2019, 8).

Whether an image, an explanation, or even a bodily habit, a gestalt arises within an *aesthetic field*, which is the ongoing organism/environment co-relation. I use the term 'aesthetic field' (cf Berleant 1970) to describe the total field of qualitative relations, the continuous and concrete ecological event out of which particular things foreground as knowledge (see Heft 2016). This event is the "pure experience" of radical empiricism (James 1912/1976). There is an indefinite range of relations in the aesthetic field, some clear, others murky or liminal. Just like the feedback loop unifying the parts and the whole of an organism, so too is there a feedback loop unifying this organism/environment relation. This relationship is felt as having a 'pervasive quality' (Johnson's 2007 term for Dewey's 1943 point). Certain relations arise and foreground as gestalts, but always in the context of the aesthetic field whose texture contributes to the meaning of what is foregrounded. However, once a gestalt arises, it also feeds back into and alters the texture of the aesthetic field. Polanyi (1962) speaks directly about the reciprocal relationship between such foci and their background. While the background (for him, 'subsidiaries') contextualise the foci, foci are also an expression of their contexts. As something new is brought into focus, the context shifts. Foreground and background are dynamic, co-constituting, and part of the ecological structure of perception itself (Gibson 1979). Backgrounding the foreground-background relationship does not eliminate it. It does not matter whether a given gestalt began as a 'construction' templating the world, or as a moment when human knowing was penetrated and

reshaped partly in the other's image. Gestalts arise, they 'come to us', and whether in origin or in consequence, become part of co-constituting relation between organism and environment. To summon an earlier definition, knowing is a *concrete living process where the knower(s) and the known co-constitute each other and a shared context across time.* It is an ecology.

In aesthetic knowing, relationships arise as gestalts before individual components are discerned, like when I sense coherence in a painting before making out particular features, or when I recognise connections between seemingly separate ideas and then work out the details. Aesthetic knowing is not 'synthetic' in the sense of building a model from smaller parts (or even when it arrives from such building, it is not because of the building efforts alone. It comes as a unity). Aesthetic knowing arises as an echo resonating with the relational form of aspects of the world we are in and of, and therefore geared into intuiting. Contra Locke, this implies a relational empiricism, where human epistemologies intercourse dynamically with real world spatial and temporal structures.

3.2. Aesthetic knowing across the living world

Further, "*all* organisms –not just art lovers and philosophers– rely on aesthetics *all* the time" (Bateson and Bateson, 1987, 192, italics added). Picking up and responding to relationships is essential for all life and fundamental to how life co-constitutes ecologies. Life is *semiotic*, which means organisms interpret their worlds as valenced (ex Hoffmeyer 2007; Affifi 2014a; 2015; 2017b). Some things show up as mattering, pulling or repelling, while others recede as irrelevant (Uexkull 2010). Semiosis creates 'enabling constraints' (see Juarrero 2002)[12]. Living beings restrict and redirect physicochemical interaction by perceiving and responding to significance in encounters. This is why sugar-loving bacteria swim towards inedible artificial sweetener (Stjernfelt 2007). Even bacteria live and die in ebbs of meaning, a world of truth and error, far from the flow towards chemical equilibrium (Prigogine and Stengers, 1984). This is possible because all life stores and regulates the release of energy (Bateson, 1979), gaining autonomy in directing itself. Artificial sweetener shows up for the bacteria (tragically) *as* food because it structurally resonates with that referent. With this 'as' we see how metaphor is a fallible contact point, and "the logic upon which the biological world has been built" (Bateson and Bateson, 1987, p. 30). A metaphor depicts and gives insight into one thing by recognising its connection to something else. Like all meaning-making, it is aesthetic because "[m]eaning is not internal. Meaning is between parts" (Bateson, 1991, 304)[13]. Meaning involves foregrounding a semantic relationship between a signifier and what it signifies (Peirce 1992). One reason I prefer the term 'ecology' to new materialist lexicon such as 'machinic assemblage,' is because co-constituting relations arise through meaning-making. Relational possibilities diversify wildly when one living being interprets, and re-interprets another, across time. Unless inorganic process turns out to be semiotic, people should be wary when conceiving 'flat ontologies' (Bennett 2010). Epistemology and ecology intertwine. Epistemology is ecological because our ability to know arises from ecological relationship with the world, and knowledge engages with and influences other ecologies. Ecology is epistemological because all ecologies involve life interpreting and reinterpreting its surroundings. As epistemology is to varying extents aesthetic, so are ecologies.

3.3. Aesthetic and analytic knowing

One is tempted to contrast *aesthetic* with *analytic knowing*. Aesthetic knowing senses relationship, while analytic knowing dissects things into effective and essential subcomponents. This distinction is *partly* true, but itself develops from rather constrained analytic thinking. As suggested, relational aspects of ecologies arise from the texture of the aesthetic field. For example, although the concept "feedback loop" is refreshingly reciprocal compared to linear causality, any two actual

feedback loops differ vastly, in rhythm, regularity, smell and flavour. The same is true for the ecological concepts explored above, including crisis points, co-constituting relations, ecological levels, health and related concepts in my framework. In other words, aesthetic knowing is *partially* analytic. This is not only unavoidable, it is desirable. Even a bacterium meaning-making foregrounds certain relations; much is put outside its frame. Conversely, the apparently maximally relational gestalt "everything is interconnected" is itself abstract, backgrounding countless particular interconnections to emphasise a general principle. By extension, analytic knowing is itself partly relational. Consider even the linear explanation vilified by systems thinkers, "X causes Y." Within its tight spatiotemporal frame, this simple *relationship* is foregrounded.

One might imagine a spectrum of ways analytic and aesthetic knowing co-constitute perception and understanding, foregrounding through backgrounding different aspects of relationships around or within us, an aperture opening and closing in response to the relative interconnectedness of the world perceived. Like any healthy ecology, it would incorporate difference into its coherence. Relational empiricism sees relationships in the world, in the organism-environment, and in the form of gestalts, as sliding in and out of resonance. But contact is always re-achievable. Nevertheless, globalising culture values practices weighted heavily on the analytic side of the spectrum (McGilchrist 2009), and so with education systems complicit (Orr, 1992), it gears knowledge instead into dysecology. As this dysecology develops, people become increasingly acquainted with perceiving simpler gestalt relationships (such as identity, difference, and cause), and less with those requiring more comprehensive participation in the texture of living process (such as perceptions of wholeness, resilience, health, and decay). Such gestalts will foreground simpler relations, or simpler relation between foreground and background, or both. But it is just such textured relationships that we need to perceive, communicate with/in, evaluate and attend during ecological crises (Nielsen et al. 2020).

3.4. The role of feeling in aesthetic knowing

As perceived relationships become increasingly abstract, awareness that perception of relationship is a feeling in the body also grows dim. Phenomenologists describe empathy as a kind of embodied resonance. I feel another's suffering because my body and theirs are already in co-expressive relationship, not because I construct their state from various sensory clues as Lockeans might suggest[14]. Babies smile when smiled to, even if they do not yet have a 'theory of mind' to conceptualise 'that' there is another person smiling at them. In other words, 'the gestures of the other are recognizable to the infant in the terms of her own proprioceptive awareness' (Thompson 2002, p. 7-8). Resonance between the gestalt of the other and that in oneself extends beyond intersubjective human encounters (Abram 1996; Affifi 2014b). Seeing a clearcut forest, I feel constriction in my chest. Witnessing decoherence is not separate from that feeling. I do not first see neutral data that I then interpret with my cognising mind. It is because I feel a physiological disorder that I sense disorder in this mountainside. Any subsequent cognising interpretations happens within the felt 'pervasive quality' (Dewey 1934) of this aesthetic field. To pick up relations around us, we pick up relations *betwee*n those external relations and those internal. This is because the possibility of knowing anything already implies an ecology between knower and known, experienced and evolving through resonance between bodily feeling and worldly perception.

4. Beauty and ugliness in ecologies

If you "look at the world with a biological epistemology, you will come into contact with concepts which the biologists don't look at at all. You will meet with *beauty* and *ugliness*. These may be real components in the world that you as a living creature live in." (Bateson, 1991, 311).

Modern biases suggest beauty and ugliness are 'merely' subjective, a view also implied by the alienating and pixelated epistemologies described above. However, a recurring sense across many cultures and centuries, conceives *beauty* as the perception of "unity in diversity."[15] Said differently, relational integration is experienced as *beauty*, and disintegration as *ugliness*. From this perspective, beauty and ugliness are core to the perception of ecologies. This idea is not new. Long before Aldo Leopold (1987) listed integrity and beauty as two out of three criteria for his "land ethic," beauty played a key role in many Indigenous land practices (ex Kimmerer, 2015). Beauty is not separate from integrity; it is the felt experience of it.

Beauty and ugliness can arise when experiencing any ecology, starting with the relationship between my aesthetic field and what is foregrounding in it. Within this field, I may sense integrity or disintegrity in worldly relations, between my thoughts and feelings, or even between my thoughts and feelings *and* things in the world. And so on. Aesthetic knowing effortlessly crosses domains normally considered separate, not because it is anarchistic, but because we spontaneously experience relations and only after specify parts, kinds and domains. Aesthetically perceived relations can therefore be oblivious to 'levels' that concern the analytic mind, so we can experience *the integration of beauty and ugliness as itself beautiful*. This is why some disintegrations appear beautiful when considered in larger relational contexts, and other integrities can become ugly when scaled out (Affifi 2020a). With this, the reader will notice I have reached from the side of aesthetics, a similar dialectic to that discussed earlier concerning the relationship between stability and change, and also between health and dysecology. Living beings can respond to shared contexts created by relationships at different spatiotemporal scales (Bateson 1979). As Naess puts it, "What is real is more than the content of reality. There are abstract relations between gestalts, and these are on different levels of abstractness" (Naess and Drengson, 2005, p. 3301). As beauty, ugliness or some combination of them, we evaluate gestalts within and between ecologies.

When I say aesthetic knowing is evaluative, I mean perceived relations feel valenced, not neutral. For example, each note in a beautiful piece of music feels perfectly in place, as the music too fits my heart. The music 'connects' to the listener, and brings her into integration. Ugliness feels like a loss of balance, wound or fracture, or pain in the heart. But it can also appear as a tugging call to respond, suggesting ugliness can be transformed into beauty. Without the capacity to perceive quality of relations, we would not know whether a patient was sick, a child needed support, or a forest degraded. Nor would I have reason to care for these ecological disruptions. I would not know what my heart was called upon to do. Perhaps people need some distance from narrow instrumentality to perceive new aesthetic relations (Kant 2000). Or perhaps most aesthetic experiences of objects or events cannot be separated from their instrumental feature (Saito 2022). Regardless, once present, beauty and ugliness can drive people to tears, to loving devotion, and to mortal sacrifice. Sensing discoherence[16], I can begin imagining its transformation, and by orienting towards the promise of its re-integration, come to feel integrated into the world.

4.1. Fallibility and self-correction in aesthetic knowing

I have suggested aesthetic knowing is powerful and essential, but *fallible* (Zwicky 2019). We sometimes hold onto aesthetic perceptions that no longer resonate with the evolving context. Other times, we realise some cherished gestalt was crummy all along. Fallibility is a strength, evidence of aesthetic knowing's empirical contact with otherness. This openness is not continuous receptivity; it is lumpy because aesthetic knowing channels perception into its previous gestalts. For example, having seen several individual trees, a connecting pattern jumps out, and from this a category (say, "oak"), comes to partially template future perception. Insensitivity to difference may take over, but eventually the category provides the context for perceiving more

nuanced uniqueness (and further categories) than previously possible (Affifi 2020c; 2020d).[17] There is a tension in EE between valuing an immediate precognitive domain (often called for by phenomenologists, ex. Bonnett (2021), Abram (1996)), and understanding ecologies at different levels. A phenomenological world without aesthetic knowing's activity in foregrounding relations is as arid as submersion in a world of abstraction. The otherness of the other recharges only in dialectical interplay. A useful educational question is whether a given product of aesthetic knowing has become *anaesthetic*, and if so, what to do about it. Like an evocative turn of phrase becoming cliche, aesthetic knowing achieves knowledge often as sacrifice to its own depth of responsive feeling. However, a currently perceived relation need not be clung upon and rigidly constrain possibilities of relationship. Like Gadamer's concept of 'prejudice,' it can become the basis for its own reform, explicitly by seeking its limitations, or implicitly through how (in the Polanyian sense above) it informs the texture of the situations engaged. Generosity towards such prejudices is generative. Like other ecologies, there is a bootstrapping effect in how knowing tears and heals itself. Knowing is alive, not a mere machine.

However, because beauty is fallible, it can be *co-opted*. For example, the beauty industry backgrounds the ugliness it creates (such as body dysmorphia, classism, and animal testing) to create localised integrity mirages. When people realise these integrities are misguided, Lockean biases supercharge and fuel cynicism towards the perceptive power of beauty. Nevertheless, if we do not recognise aesthetic knowing's role "as an organ of ontological insight, if we derogate it, we cripple ourselves as ethical beings" (Zwicky, 2015, p. 282)[18]. We undercut our capacity to more intimately participate in human and more-than-human ecologies. We lose touch with otherness and kinship, and the dialectic between them. In doing so, dysecologies can arise. The experience of beauty is self-corrective when it expands our relational perceptions. By becoming aware of how aesthetic knowing feels and exploring its nuances, we can improve our ability to perceive the ecologies sustaining us.

4.2. Challenges to cultivating aesthetic knowing

Education systems channel or curtail aesthetic knowing for reasons that can be linked to assumptions about knowledge, the world, the purpose of education, and even the built environment. One reason aesthetic knowing is under-emphasised is that people seem increasingly underequipped to handle disorienting experiences. *Cultivating* aesthetic knowing means learning how to more sensitively catch and keep arising gestalts, rather than either relying on old ones or changing simply because one fetishes 'becoming'. This means ongoing connection, disconnection and reconnection through aesthetic knowing, and whatever calls to action arise along the way. Openness can be enlivening, but also unsettling and risky. The transition from disorientation to a feeling of certainty can be appreciated (like Dewey's vision of 'inquiry' courting 'doubt' into 'consummation' (1934)) or maligned (like when Nietzsche grieves his once 'colourful' thoughts, 'young, and malicious, full of thorns and secret spices,' now losing fragrance and becoming dull and immortal 'truths' (Nietzsche 1992, 426)). Dewey and Nietzsche describe different moments in the life cycle of knowing, but to experience either asks people to linger in what coming to know feels like, and in turn, becomes. Unfortunately, lingering is rarely evoked in schools, especially when it invites uncertainty and disorientation. The reader will have reasons at hand why this is so. In any case, consummation before romance becomes the norm. Uncertainty becomes fearful, and the aesthetic openness able to show the value of vulnerability rendered less probable.

5. Ecologies of courage

Cultivating an ongoing process of perceiving and participating in relationship can re-integrate humans into many diverse ecologies, not merely those of our seas and skies, but also the many

circulating within and across love and hate; humility, generosity, and gratitude; power and greed; war, peace, and purgatory; and of course, the classroom. And much else besides. This final section briefly focuses on courage for two reasons: courage is crucial for EE in this time of turmoil (Kool, 2010; Cutter-Mackenzie 2013), and my discussion has progressed to a point where developing aesthetic knowing is itself seen to require courage. What follows is not a definitive analysis or description of the ecology of courage, which is impossible and counter-productive given its dynamic complexity. Instead, I present several themes that arise in my attempt to ecologise courage through cultivating aesthetic knowing: fear as a crisis point, the anaesthetic nature of cowardice, attending to the body to awaken aesthetic sensitivity, and the role of beauty and ugliness in achieving creative reconciliation with what one fears.

5.1. Fear's ecological crisis

The threatening ecological crisis is a time of confusion and insecurity, perhaps affecting every aspect of our lives, from the personal to the planetary. Fear is likely to become increasingly prevalent with growing awareness of the relationships fraying across the living world, and also as the destruction itself amplifies. The gestalt perception *fear* is a felt quality that arises in sensing the threatened disintegration of valued relationships. Recalling that in ecologies meaning happens 'between the parts' (Bateson 1991), what fear *does* ecologically depends on the inter-actions it feeds into and co-constitutes. For example, fear of fear can lead to evading problems faced, and exacerbating them. Knowing this, I then might fear this 'fear of fear,' and worry that EE done wrongly could drive people into patterns of destructive denial despite its intentions (ex. Kool and Kelsey 2006, Affifi & Christie 2019; Pihkala 2020).[19] Fear is an ecological problem that needs to be handled ecologically. This means acknowledging that fear arises through and co-constitutes relationships, while attempting to perceive and respond to these relationships by cultivating aesthetic knowing. But for reasons just suggested, the problem seems self-detonating at the onset: if I fear fear and evade it, I restrict the process of cultivating aesthetic knowing, and thus the possibility of feeling my way into more responsive relationship. I will need to explore the opportunities and dangers in the experience of fear more closely to understand how education might respond to this difficult feedback loop.

Like any gestalt, fear can be foregrounded or backgrounded. When the fear gestalt is fore-grounded, it can corroborate in an *ecological crisis* point. For example, when I look at charts predicting species extinction rates in coming decades, I fear the loss of the diverse living world, for myself, for other species, and for a thousand generations to come. From past experience, I know such fear can pivot into patterns of concern or denial, which are sustained by many personal, social and cultural factors. Species extinction is ugly. It involves the disintegration of habitats and relationships amongst plants, animals and others, and also the disintegration of the vibrant world I experience as home. I feel that disintegration in me. Denial often takes the form of investing in activities providing an easy sense of integrity, some project that seems sufficiently 'ecological' to engage, and in doing so I may even create things of beauty. I may think myself part of the solution. However, as I background the ugliness I feel, I introduce another discoherence. Like the 'beauty industry,' I focus attention within a narrow frame and value its 'inner coherence' (Fox 2004) while the disjunct between it and the context I background lurks in view. What I fear does not disappear from my aesthetic field, and the decoherence only magnifies with my ongoing refusal to attend it. Beauty is again *co-opted*. By contrast, in a courageous ecology, I have resources to keep fear foregrounded; I face my fear. The present may be ugly and things may need to get much uglier, but I can sit in it. By facing fear, broader gestalts can come spontaneously into view, even perhaps one where appropriate response to what I face becomes clear. Put simply, cowardice absorbs me into the coherence of a local ecology to evade participating in larger ones, exacerbating a broader dysecology. On the other hand, courage accepts local dysecology and sets conditions for its transformation into a broader

healing ecology. Ecologies sustaining courage and cowardice attend to aesthetic perceptions at different ecological levels, and are open to the texture of the aesthetic field in different ways. On paper, aesthetic knowing seems exceedingly complicated, concerning itself with things like integrations and disintegrations *between* integrations and disintegrations across ecological levels. This is not the kind of thing increasingly precise modes of analytic thinking are suited to process. But recall that complexity means nothing to the aesthetically attuning body, which picks up tensions and integrations spontaneously, regardless of whether details are seen or relationships pinned down in consciousness.

The solution seems simple: feel it out. The problem is I may not want to. And yet, I cannot avoid fear by denying it. I cannot simply 'create a line of flight' and imagine myself out of the darkness. Given ecologies accomplish reconciliation and aesthetic knowing can tune into it, I must embrace fear as an experience and treat it as the condition for the possibility of new gestalts. But this asks for respect and receptivity, openly lingering in the space it provides without demanding –or stifling– movement. For a while, newly arising gestalts may induce new fear, perhaps even more terrifying. Or they may not. As the ecology weaves new relations, transformation may be slower than I think it 'should be.' And yet, *in its time* the ecology of fear is freed to tear itself open and heal itself. It should be obvious that embracing fear does not mean advocating a 'dark' aesthetic (ex Morton 2011), suspicious of harmony and favouring the unsettling. Ecologies re-integrate, and so should we.

5.2. Anaesthetised ecologies

Fear is not always an explicit gestalt. When backgrounded, it becomes the subsidiary context of some other gestalt, and its impact from the sidelines varies. Sometimes fear seems so distant, barely orienting me towards my concerns. The ecology of cowardness has a certain banality because of this. I may hardly feel the discord I deny, nor that to which I now contribute. Fear may persist as a vague disquietude as I pursue various projects in my beauty mirage. The ecology of cowardness may even offer a semblance of fearlessness. For example, I sometimes recall or share facts about the imminent 'mass extinction' without that sinking feeling I sometimes know of it.

In the aesthetic field, what I background feeds back into the relational context of what I attend (Polanyi 1962). So how is such anaesthetic possible? The aesthetic field provides a rich, concrete context for knowing, but is not transparent to explicit consciousness. Fear recedes into an interwoven matrix of relata. The ecology of cowardness reproduces conditions preventing openness to liminal flickers that might arise if I was paying attention. To find my way back into my heart (*mon coeur*), my courage, fear must foreground again.[20] To regain courage, I need at least enough of it to open my aesthetic field to whatever feelings might arise. Reminding myself of previous experiences where fear guided me towards integration can help. Even so, the texture of my ecology might complicate such attention. For example, a cluttered and fast-paced aesthetic field offers different opportunities for emotions to foreground. Constant distraction disrupts the feedback loops circulating between what I might foreground and its textured semiconscious context.

Opening to my aesthetic field means paying attention to my body, that vast, nuanced indicator of the quality of relations I am immersed in Shusterman, (1999). The same silent attention that opens me to relationships in meadows or streams, is the attention needed to wait for 'what happens' in my feeling body. I see or imagine something fearful and I feel tightening in my chest. I may then try to work out what is going on, exploring various reasons and consequences. Perceptual openness shifts the feeling body, and bodily openness shifts perception. In the ecology of aesthetic knowing, new gestalt perceptions and new felt qualities arise and resonate with one another. Cultivating an ongoing capacity to sense and discriminate bodily feelings is part of more attentively participating in relationships disposing me to courage or cowardice.

5.3. Ecologies keep moving

Avoiding immersions into tempting local coherences has what Keats (1899) called "negative capability," the ability to await patiently in the disquietude of unknowing. I remain uncertain. If integration arrives, it is not as supply to a demand. But even this is no 'solution.' I sometimes deny what calls me by foregrounding an analytically unfathomable situation *so as to* procrastinate. On the other hand, sometimes I need to ignore the darkness, put it on the backburner, watch sitcoms and chill. How to know if *this* evasion is healthy repose? Ecologically, these concerns are one-sided. Uncertainty might be *both* courageous and cowardly, or be nascent with the possibility of each. The ecology may not have resolved into one disposition or the other, and the meaning of the uncertainty will only arise in what happens next.

The ecology of courage and cowardice remain in dialectical interplay. The coherence of an ecology at one moment is not assured in the next. What integrates and guides me one moment can later lead astray. The contexts aesthetic knowing invests me in are themselves changing. New experiences adjust the meaning of my pursuits. Neither my end nor my means are necessarily stable (Dewey 1922), so a courageous steadfastness might soon become an unwillingness to face the ugly consequences of my determination. Courage requires an openness to revisiting my gestalts, which may have quietly transitioned into co-constituting their own beauty mirage. I previously observed that cultivating aesthetic knowing requires courage. Now I see that cultivating courage is also an ongoing process which itself requires such aesthetic openness. Perceptions of beauty introduce frames which exclude what threatens it, but what might also provide conditions for further beauty. The dream of a final resting place can shift me into the dysecology of cowardice, and utopian visions prevent attention to the work that calls me (Hodgson et al. 2018). However, on the other hand my cowardness, however entrenched, is the nascent basis for a beautiful potential resolution, and the more I am lost by my fear, the more powerfully I can re-integrate. Beauty needs ugliness. Disintegration is the medium to find or create new wholeness, and we need disintegration as well, to feel, and become again, meaningful parts of the world that brings us forth.

The ecological view presented here is not just an epistemological improvement over non-relational and non-dynamic ways of conceiving courage. I believe it is also a *kind* vision. When cowardness is seen to have the dialectical potential to transform into courage, human weakness is given a chance to show its stronger side. It is *beautiful* to understand that 'lilies blossom from muddy water,' as I hear Lao Buddhists say. Conceptions condemning humans or human traits contribute to ecologies of ugliness, even if it is ugliness one seeks to call out or repair. Many spiritual traditions are aware of this feedback loop, which is fundamental to aesthetic perception and response in developing relationships. Condemnation flees into a well-structured story, with perfect symmetry of good guys and bad, a world without shape-shifting and ambiguity. It creates a beauty frame not expansive towards discord outside its view. Courage needs cowardice as its continuous conspirator, the conversation of consciousness in a changing body in a changing world. It is what helps us maintain contact and conviviality with the ecology of our mind.

I hope to have shown that courage, fear and cowardice are dynamic contexts arising through relationships, and not static, unitary traits, and that aesthetic knowing plays a role in understanding and participating in how they arise and transform. To close, I step back from the ecology of courage, inviting the reader to pay attention to these and other ecologies.

6. Aesthetic knowing in environmental education

Aesthetic knowing perceives and responds to the quality of relationship, and this is true within any ecology, or ecology of ecologies. Any phenomenon that has form- or context- constituting relationships arising between its parts, whether spatially or temporally, or both, will have

concrete structure that can itself arise as felt gestalts. As suggested above, this process is partially abstractive, but it is hardly 'merely' constructed knowledge. The form of a gestalt can, and often does resonate with form in the phenomena. It can receive it, so to speak, and in turn set conditions for the possibility of further aesthetic knowing, pulling the knower into increased intimacy and intercourse with the concrete other. In curtailed form, aesthetic knowing is present in even its most abstract contexts, whether this be highly distilled analytic epistemic products, or very general attempts to experience interconnectedness with 'nature' or 'the universe.' Whether these extremes sometimes have a role is to be decided pragmatically, but I argue aesthetic knowing engages ecologies most responsively when it establishes and re-establishes contact with the form of concrete, developing processes. We have seen how systems theoretic concepts may refer to ecological dynamics, but lack the texture of actual ecological processes. Renewed contact might involve acquainting with the rhythm of such processes through how our bodies participate in perceiving them, as Todd (2020) suggests. Cultivating aesthetic knowing always means engaging the dialectic between what is in the frame and what is left out, or between foreground and background. In this way, the ecology between analytic and aesthetic knowing can lead to creative reconciliation between knowing and the world, when the form of the ecology articulates itself in the formation of the perceived, at least for a time. In a twofold sense, this is experienced as 'organic' integration, both between these modes of receiving the world, and between the arising perception and the world.

Because aesthetic knowing develops the capacity to perceive ecologies and respond ecologically, cultivating it should be central to education concerned with ecological sustainability. Helpful aspects of it are found in arts-based (ex. Inwood, 2013; van Boeckel 2017) and Goethean (ex. Gray, Colucci-Gray, and Robertson 2021) approaches to EE. Most generally, in EE the term 'aesthetic' is taken to refer to sensory experience and feeling (ex. in New Materialist (Mcphie and Clarke 2015, Roussell and Williams, 2019, or decolonial place-based education (ex Iared et al. 2016; Iared et al. 2017)). As important as such experiences may be, they do not engage in what I call 'aesthetic knowing,' a process that works dialectically with analytic knowing, to receive and respond to ecological form. This is partially because the meaning and scope aesthetic knowing is contested, but also because of how the distinction between art (as expression) and science (as knowing) is often unhelpfully drawn. "The separation of warm emotion and cool intelligence is the great moral tragedy," says Dewey (1922, p. 255). It is a moral tragedy in part because it is an epistemological blunder. Littledyke (2008) has recognised the need to integrate 'cognitive' and aesthetic knowing, and sees the latter as concerned with relationship. His concern, however, is primarily about the sense of relationship between self and what it knows, which is only one among many ecologies gathered under my framework. Because much of postmodern, critical and New Materialist EE theory is predominantly focused on critical analysis and/or concept creation, and suspicious of claims to know the world, the net result is reduced empirical attention to and participation in ecologies, more-than-human or otherwise.

The main purpose of this work is to outline an epistemology (aesthetic knowing) tied to an associated framework (relational empiricism) that insists on the possibility of perception and participation in ecologies writ large, and to reorient attention to these ecologies. This purpose is in the context of my broader aim, which is to develop a context for *ecologising* EE theory and practice (Affifi 2011; 2015; 2017b; 2023). Towards this purpose, I have developed a language that can begin to articulate the relationship between aesthetic knowing and ecologies, and have suggested some ecological concepts (*stability, dynamic equilibrium, ecological levels, ecological health, ecological crisis, dysecology,* and *creative reconciliation*) that can be used to understand general and recurrent ecological relationships, and which are 'picked up' aesthetically. I have also suggested aesthetic terms to help understand the epistemological process of engaging in these ecological relationships (such as *quality, context, foreground/background, aesthetic field, meaning, beauty/ugliness,* and *discoherence*). Finally, I have proposed that education should aim to cultivate the capacity to aesthetically know the relationships within, and between things,

and that this turns out to be rather complex because there are dysecologies driving anaesthetic flights from ever deepening perception and participation. I leave the further development of these concepts, their interrelationships, and specific implications for EE curriculum and pedagogy, for subsequent work.

Notes

1. I use the word 'gestalt' but prefer "aesthetic knowing" to Zwicky's "gestalt comprehension" or "gestalt perception." 'Aesthetic' foregrounds felt quality, which is crucial to my conception. I also want to position aesthetic knowing as complementary to, and ecologically connected with, analytic knowing.
2. Along pragmatic lines too: Dewey sometimes makes the same distinction (Dewey 1905)
3. Not all constructivisms, and notably not Piaget's 'genetic approach' (Piaget 1971) are anti-realist. But the word 'constructivism' tends to foreground the activity and role of the knower, and in many cases (ex the use of the words 'socially constructed') are employed to suggest an arbitrariness between knowledge and referent. In this paper, I use the word 'arising' instead of 'construct' to foreground how gestalts emerge through knowing ecologies and not because of the activity of a subject on an object.
4. Derby (2015, pp. 52-59) comes closest to my conception of aesthetic knowing because his work recognises and engages Zwicky's claim that good metaphors can resonate with ontological structure.
5. Deleuze and Guattari describe the interpenetration of tendencies towards coherence and decoherence, which they call 'reterritorialisation' and 'deterritorialisation.' For example, "[a] reterritorialization can be seen as a deterritorialization of a previous deterritorialization. Conversely, a deterritorialization can be seen as a reterritorialization in a new direction" (Deleuze and Guattari 1987, p. 21-22).
6. Bateson's use of 'logic' to describe levels in nature connects to his conception that all life is 'mental' process. Mind is a process that picks up and circulates information (defined as differences that make a difference) fed by energy stores. Contra Bonnett (2021), his notion of information is fundamentally aesthetic, opening a recursive domain of valenced interaction not occurring in the physicochemical world. See Bateson (1979).
7. This is tantamount to whether learning contributes to dynamic equilibrium or a trajectory change at the population level.
8. In environmental education, the rise of abstractionism has been linked to performative neoliberalism (Payne 2019). Performativity may be a factor, but what concerns me is its anthropocentric outcomes (Affifi 2020b).
9. Many diseases arise when microbial relationships shift into new patterns, not because any particular microbe is inherently 'bad' (Yong 2016)
10. Another strand of new materialism derives generic insight from subatomic particles to make apparently useful claims about human participation in ecologies (Barad 2007). Ontological generality needs to be replaced with concrete encounter, to develop responsive attention and participation within relationships. This is exemplified well in the work of other new materialists, such as Tsing (2015).
11. Morton (2011) is attracted to such effacement.
12. An example of enabling constraints: through *reducing* the sounds a person makes, a language's grammar and phonology expand the possibilities of meaning, interpretation and communication (Polanyi 1962).
13. Given the ubiquity of metaphor in scientific understanding (Hesse 1965; Brown 2008), the sciences are already proficient at this game. But metaphor as knowledge is treated more often as an embarrassing shortcut, perhaps an inconvenient didactic necessity, with the deeper implications about humans, the world, and their relationship, hidden from consideration.
14. Of course, sensory clues, as foregrounded aesthetic knowledge, can feed back into and affect this process.
15. In the West, versions of this idea circulate from Hellenic times to Hutcheson. It is also key to concepts such as *ubuntu* in African aesthetics (Sidogi and Ndou, 2021), Japanese *wabi-sabi*, among others.
16. I use 'discoherence' to refer to the experience of relations lacking coherence, and 'decoherence' for the actual dis-integrating of relationships. I may experience decoherence as discoherence when my gestalt resonates with the phenomenon.
17. Higher level aesthetic knowledge also feeds back into perception, such as perceiving today's temperature as an example of 'climate' not 'weather.'
18. also see Schultz 2022 on the unity of the aesthetic and the ethical in EE
19. Ex. Terror Management Theory observes that humans handle fear of death by seeking comfort in the security of their culture and what enhances self-esteem (ex Arndt et al, 2004). In capitalist culture, High Street and EE can co-constitute the ecology of cowardice (Affifi and Christie 2019).
20. Fear is not the only 'negative' emotions that can guide the heart. Macy (2007) notes when we feel compassion for others, we suffer with them, leading to a better understanding of one's calling. Of course, in the ecology of the mind, we may fear compassion.

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