Taking pause: The role of art and literature in reimagining human-nonhuman relations and transdisciplinary collaboration

Abstract

The academy's separation of the arts from the sciences constricts researchers' opportunities to engage with works of art and literature that pause our time-worn processes of data collection and analysis. From the works of Humboldt and Goethe, to more recent writers and artists, literature and art offer us moments to stop and think differently about the ways in which we interact with our environment and others, human and nonhuman. In moments of enchantment, awe or stillness, we might lose ourselves, and imagine other less anthropocentric ways of being in the world and new transdisciplinary forms of collaboration.

Key words: pausing; human-nonhuman relations; transdisciplinarity; literature and imagination; affective knowing

Introduction: the pause

> I woke at dawn, as I had every day for the last fortnight in search of mushrooms. The season had started, and a gentle stream of rain had fallen throughout the night, promising a flush of sprouting fungi. It was only a ten-minute walk to the edge of the escarpment, to the majestic old pine and eucalypt forests renowned for nurturing fruiting mycelia.
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> Every morning I had trudged the path through the bush searching expectantly by the base of tree trunks, at the edges of damp creek beds and beneath decaying logs. I had diligently researched mycology, visited local guides, podcasts and blog posts on the kinds of fungi to be found in my

> hometown. I had joined networks sharing pictures, and trodden many paths, yet not a single mushroom found.
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> This morning I stopped searching and walked off the muddy dirt track to sit amongst a lush canopy of tree ferns. A cacophony of morning bird song across scales and symphonies greeted me and while I'd heard them before, I was suddenly aware of the call and response between different bird species, of relationships between bird, tree, flora and fauna. Sitting on Indigenous Dharawa land, I saw, heard and felt the understorey, and the intertwining of all beings, animate and inanimate.
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> The soil smelt damp from century-old layers of decaying leaf litter. Running my fingers over black earthy humus, I gingerly lifted a skin of pine bark that sat patiently by my side to reveal a twin pair of fragile brown mushroom caps. I could hear the trees: "Look beneath the undergrowth and smell, feel and see what you always knew was there…" (Dena Fam, 2021)

Writers, artists and scholars have canvassed many ways of 'pausing' for thought or reflection: the pause produced by mindfulness and 'mindwandering' (Agnoli et al., 2018; Paul B. Paulus et al., 2021), by 'precognitive triggers' (Dewsbury, 2010a), including those generated by art (Thrift et al., 2010; Wood, 2016), in Saul Bellow's state of 'intransitive attention' induced by beautiful writing (2019 (1995), p. 180); by stepping away from 'the data' and immersing oneself in, and allowing one's perspective to be shifted by other thinkers (St. Pierre, 2019, 2020); by solitude and its capacity to stimulate imagination and creative thinking (Bowker et al., 2017; Knafo, 2012; Long & Averill, 2003; Paul B. Paulus et al., 2021); by post-representational and more-than-representational – sensory, affective, exploratory –

connections with the world (Anderson & Harrison, 2010; Barad, 2012; Dewsbury, 2010a, 2010b; Lorimer, 2005) which include walking as enabling a particular kind of attention (B. Banerjee & Blaise, 2013; Instone, 2015; Kagan, 2019; Murray & Järviluoma, 2020; Palmer, 2014; Wylie, 2005); by an affective intensity that suspends our normal 'action-reaction circuits and linear temporality' (Massumi, 1995, p. 89). What is sought is a kind of thinking that is more 'responsible and responsive to the world's patternings and murmurings' (Barad, 2012, p. 207).

In fields of research, the value of slowing our usual analytical, linear processes is seen as opening ourselves to something new or hitherto unthinkable. This is clear in Elizabeth St Pierre exhortation to avoid 'the "*rage to methodologize* anything and everything" (St. Pierre, 2020, p. 1, emphasis in original) so that we might 'create something new and different that might not be recognizable in existing structures of intelligibility' (2021, p. 6) and in Smith and Mentz' suggestion that '[i]n the lull that precedes interpretation, other voices will emerge, already speaking and already complete' (Smith & Mentz, 2020, p. 13). 'Slow scholarship' aims to evade the constant pressure to record 'less circumstantial detail or [to spend] less 'idle' time on the field', so that researchers can 'not only … answer questions better but also … ask better questions (Kuus, 2015, p. 839) and have time 'to listen and read what others have to say' (Mountz et al., 2015, p. 1247): 'slow is a movement toward thought and attention' (Rose, 2013a, p. 6); it suggests that a slower and more reflective approach might reach the new and 'unprecedented' in science (Lutz, 2012). Slowing or pausing has been described by psychologists as enabling incubation; while we 'mindwander' or deliberately distract ourselves, thought proceeds at an unconscious/subconscious level, leading to the 'aha' moment in which a solution or insight 'suddenly' appears (Unrau, 2019; Vul & Pashler, 2007; Wells, 1996). Maldonato et al (2016) describe awareness and non-

awareness as co-implicated in creative thought: '[t]he core of creativity is haunted by shadows, fantastic refractions, sudden illuminations that are inaccessible to our awareness' but which enable us to 'make sense of the complexity of the world, and to find new ways of approaching the problems' (pp. 320, 323).

We are interested particularly in the 'pause': not the distraction that enables subconscious incubation of thought, or the slowing down that enables better, and extended, listening and reflection, but rather the transformative experience in which there is a suspension of thought, so that subjectivity is temporarily altered through changed relations with the world. We argue that art and literature have been implicated in creating those apparent points of disjuncture; in particular, we focus on those shifts brought about by literature that change the relation of the subject with the nonhuman. Focusing on environmental sustainability, we take the nonhuman to include animals and plants, as well as the geology, water and air that sustain living ecologies, but not things built or manufactured by humans. Art and literature give us the opportunity to re-orient and re-situate ourselves in the human-nonhuman world, imaginatively and affectively, perhaps even to *lose* ourselves in the world, and potentially to change the nature of our relationships with each and every 'other', human and nonhuman. This has implications for the future of human and nonhuman others, and also for how we listen and collaborate with those others.

Literature, pausing, and re-imagining

Landscape paintings have been described as 'the poetics of experience, where 'a poetic means to imagine our place in the world'' (Griselda Pollock in Crouch, 2010, p. 11). The idea that poetics offer us an *experience* – the imaginative experience of being differently in the world – is another way of understanding the pause.

To re-imagine, or re-feel, our place in the human-nonhuman world requires at least a suspension of – a pause in – our anthropocentric frames and categories of observation and analysis. In this suspension, we might catch a glimpse of what Karen Barad describes as the agency and aliveness of the nonhuman in pursuing its/their own needs and agendas (Barad, 2012, pp. 208, 216) and how this aliveness and agency relates to our own. The experiences that intuitively seem the most likely to produce a change in our relations with the nonhuman world, are those created by immersive encounters with the nonhuman itself, as in our introductory story, or by powerful imaginative encounters with the nonhuman.

Our relationship with animals is perhaps the clearest example where we might come to understand this kind of suspension. Hayden Lorimer suggests that ethology, the study of animal behaviour, is a field of research that reveals 'the dimensions of the non-representational: learning how to be affected, the limits of verbal and non-verbal communication, and the primacy afforded to the event of encounter' (H. Lorimer, 2010, p. 74). 'In this mode of thought, we are all culture-creatures, we are intelligent, we act with purpose, we communicate and take notice, we participate in a world of multiple purposes' (Rose, 2013a, pp. 6-7). Hinchliffe et al's work with water voles and Merryl Parker's work with dingoes demonstrate the change in subjectivity that occurs when working closely with animals[1]:

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[1] We distinguish between 'learning to be affected' (J. Lorimer, 2010, p. 502) by animals, or trying to 'tune in' to an animal's habits and emotions (Bear, 2011, p. 302), and anthropomorphism, the attribution of human characteristics to nonhumans. A change in human subjectivity such that animals become more than 'background' or threat, servant or

> *Our eyes (and to a lesser extent our noses) were being trained to recognise distinctions that were formerly invisible to us. The pictures, field signs, and conversations were changing the way we sensed and ... the way water voles made sense (Hinchliffe et al., 2005, p. 648 (italics in original)).*

> Many writers have commented on the moment when an animal returns their gaze…The dingo, pushing her paws through the sand to locate the trap, wants to live…
> Without the barrier of a denigrating discourse, it would be hard to look a trapped dingo in the eye (Parker, 2007, pp. 75,76)

Relations between human and nonhuman have been the subject of various forms of literature, including nature writing, novels and memoir. These have been drawn upon and critiqued from within the field of ecocriticism, a form of inquiry succinctly described by Mita Banerjee (2016, p. 195):

> First, ecocriticism had to investigate the relationship between man and nature as it played out in a variety of cultural narratives, from literature to film and popular culture… Second, it exposed the anthropocentrism, the

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plaything of the (centred) human subject is an acknowledgement of 'the other's' subjectivity and its relationship with one's own. In 'mov[ing] animals from the shadows', we might learn more about 'what it means to be 'animal'' (Bear, 2011, p. 303), which might then extend to empathy or compassion (Carter & Palmer, 2017, pp. 223-224; Clark, 2011, pp. 53-54; Karlsson, 2011, p. 282)).

> human-centeredness of many of these depictions; and third, it went on to point out alternative ways of being in the world.

Dana Phillips (2003, pp. xi-xii) offers a caution however against the view that literature can change our relationship with the natural world:

> It assumes the ability of literature, in particular so-called nature writing, to go science one better by representing nature both with precision and with no sacrifice of literary quality, thereby heightening our perception of the natural world aesthetically while moving us to greater environmental awareness and involvement, perhaps even revolutionizing our culture in the process.

Suggesting that 'the perusal of environmental literature would seem to be a roundabout way for us to secure a bond with the earth (Phillips, 2003, p. 7), she argues both that it is only through disruption and the rise of science that the idea of 'the environment' has emerged, and that rather than an imagined pastoral paradise, 'the environment' includes also the reality of that which 'can be torn into with one's teeth' (Phillips, 2003, pp. 184, 247).

On the other hand, Moya Costello notes Clive Hamilton's concern that 'we have lost our ability … to be affected by nature …to be present; we have lost our imagination, and the imagery to inspire an appropriate responsiveness' (2013, p. 7, citing Hamilton 2005). Literature can help to repair this loss of imagination, by showing us what it would be like to be one part of, rather than the centre of, a world of vivid, 'intra-active' living and nonliving things (Rose, 2013b); Stephen Muecke quotes Deborah Bird Rose: 'ecological writing does in the text what life does in ecological connectivity' (Muecke, 2020, p. 275, citing Harrison and Rose 2013); writing can be a flow that connects us with 'others.' Rose recalls Native American writer Linda Hogan's comment that 'writing is an offering, a way of giving

something to the world' (2013a, p. 8), and says: 'Stories themselves have the potential to promote understandings of embodied, relational, contingent ethics. My slow writing is called forth by events within the living world, and it seeks to *pull readers into ethical proximity* with those events' (Rose, 2013a, p. 9, italics added). Like Bellow's claim that literature can 'bring unity and carry us into a state of intransitive attention' (Bellow, 2019 (1995), p. 180), Rose's conception of her writing as 'pulling readers into' a proximity with events in the world suggests a movement or shift in the reader that changes their place in, and hence their perspective on, the world. Nigel Thrift describes a 'jolt' – a sudden shift in perception – occasioned by watching a play (Thrift et al., 2010, p. 196); Dalia Nassar (2021), in discussing the literary writing of nineteenth century scientist and explorer Alexander von Humboldt, suggests that such writing invites the reader *to become the wanderer in the jungle* – we imagine ourselves in the landscape, experiencing it in an embodied and affective way.

Whether or not ecocriticism as a field of inquiry is constrained by a pastoral imaginary, we suggest that Hamilton's concern about a loss of imagery 'to inspire an appropriate responsiveness', particularly in the face of the climate crisis, is something that literature is well-placed to address. As Dalia Nasser (2021) has noted, scientific reports on climate change have failed to change us sufficiently; we need to find the kind of knowledge that moves people. The environmental crisis is, she says, a crisis of sense and imagination as well as knowledge; 'we know, but don't really know', a knowing that is passive and impotent. She argues that we need a knowledge that moves and motivates us, that is not only intellectual and ethical but mediated by affect and the senses, something that can come from deep collaboration between the sciences and the arts (Nassar, 2021). Works with which we enter into an imaginative and affective relationship offer this different kind of knowledge.

Writer Charlotte Wood refers to art as offering a candle flame to illuminate the darkness and 'breathing space' in which 'we can listen more than we talk' (Wood, 2016). The force of art and literature is implicit in the kind of work Laura Ellingson (2009, p. 10) proposes, where researchers use multiple layered forms of representation that include literary and artistic works, so that 'each partial account complements the others, providing pieces of the meaning puzzle but never completing it'. Dewsbury (2010a, p. 155) also calls for more artistic forms of representation that allow us 'to think the unthought, the singular, and allow different worlds to appear'.

In a tribute to historian Greg Dening, Tom Griffiths (2009, p. 74.08) discusses 'the creative imagination in the presentation of knowledge'. He notes that Dening 'urged his students to be "open to those other ethnographers of our living experience – our poets, our novelists, our comics, our cartoonists, our film-makers and photographers"' (Griffiths, 2009, p. 74.01, citing Dening 1998: 211):

> [Dening] was pleased to have been called "a magical realist". In his graduate workshops … students were inspired to perform, act, paint, tell, sing and even dance their theses (p. 74.03).

This creative work is a way for historians to 'cultivate wonder as a technical skill. Wonder is a mechanism by which they might make the familiar strange' (Griffiths, 2009, p. 74.12), and that strangeness might 'enter [our] dreams' (p. 74.13). This is one way in which literature differs from other works such as reports, journalism and academic papers.

Our aesthetic and affective responses to literature arise from an unveiling or revealing. Literature slashes through what DH Lawrence describes as the 'umbrella' we shelter under and upon which we 'draw a firmament':

> Then comes a poet, enemy of convention, and makes a slit in the umbrella;
> and lo! the glimpse of chaos is a vision, a window to the sun (Lawrence, 1956 (1929), p. 90 and cited in Deleuze and Guattari 1994).

Lawrence himself came to despair of poets ever penetrating an umbrella that has now become hardened in the fight against chaos (p. 91); poetry can show merely “the desire for chaos, and the fear of chaos” (p. 92). For Deleuze and Guattari on the other hand, artists can continue to struggle against “clichés” of opinion and “bring forth a vision that illuminates [chaos] for an instant, a Sensation”, a vision of something “neither foreseen nor preconceived” (Deleuze & Guattari, 1994, p. 204).

The jolt of the hitherto unseen – the vision of something beyond the umbrella – might also come in the form of enchantment, or re-enchantment (Wolch, 1998, p. 124); Humboldt’s and Goethe’s observations of the environment, the highly literary work of writers in the environmental humanities (Haraway, 2008; Rose, 2011; Tsing, 2014; Thomas van Dooren, 2014) and of “nature writing” (such as the trilogy of books about the sea by R. L. Carson, 1951, 1952, 1955) aim to not only inform but (re)enchant us with the nonhuman world, through descriptions that go beyond the scientific. Our opening story of searching for mushrooms is both a story *about* pausing and enchantment, and a story *to induce* readers to pause and become (re)enchanted.

Writing that pays attention in this way works with multiple senses, intuition, emotion and empathy as evidenced in Eileen Crist’s (2002) paper on Darwin’s earthworms, and Hinchliffe et al’s (2005) writing on water voles. Such enchantment, arising from deep attention or immersion, may also be melancholy: “a form of wonder that is also a feeling of alienation that attends a certain receptivity” (Pyyry & Aiava, 2020). This wonder or

enchantment arises in the space that Ursula Le Guin tells us the artist/writer must leave around her words: ‘that area of silence, that empty space, in which other and further truths and perceptions can form in other minds’ (2019 (2016), p. 50).

Art and literature are ways of *pausing* and shifting our familiar processes of thought, feeling and perception, sometimes suddenly; that which was invisible becomes visible and we see the world anew. Our affective responses to literature can challenge established “emotional regimes” – “official rituals, practices and expressions that underpin any political regime or community” or “feeling rules” (Zembylas, 2018, p. 201) about which emotions are appropriate in response to particular situations or experiences. The significance of affective responses in changing our thinking and acting is reflected in the work of Kathleen Stewart, Margaret Wetherell and others: affect is always ‘in relation,’ ‘indicating that something is happening which should be attended to’ (Yarker, 2017, p. 238, citing Kathleen Stewart); affects ‘literally hit us, or exert a pull on us’ (Stewart, 2007, p. 4). Wetherell et al (2018, pp. 1, 2) note that emotion ‘pushes people to do things’, a push that is ‘historically and culturally contingent, and bound up in power relations and politics’ so that our emotions amount to a form of commentary and judgement on ‘things that are important to us’. As Edward Taylor notes:

> Feelings are found to be the rudder for reason, without which it wanders aimlessly with little or no bearing in the process of making decisions (Taylor, 2001, p. 234).

Carson and Archer-Lean’s (2017, p. 427) experiment with a reading group focused on nature poems showed that the readings ‘facilitated an articulation and heightening of inner sense or memory of nature’ and ‘contributed to a broader discourse about care for the environment.’

Of particular interest is the comment by one participant that Wordsworth's odes to nature were less powerful that Les Murray's closely focused poem 'Broad Beans':

> It is almost like losing yourself in the poem and valuing it more than just where it sits in the big picture (S. Carson & Archer-Lean, 2017, p. 424)

The sense of 'wandering' with the poet, that is, losing oneself in an imagined place, reflects Nassar's (2021) comment on the writing of Humboldt. The pause engendered by such literature reveals the gap between a phenomenon documented and a phenomenon experienced. In wandering – becoming 'lost' – in the writer's world, in the suspension of time and the day-to-day events that mark it, in entering into a new proximity with human and nonhuman others, we are attentive without analysis, a state of 'intransitive attention' in which we briefly cease to be the principal actor but are carried, drawn or jolted into a different, less (self)centred place.

Below we examine the ways in which such a shift might enable our deeper engagement with others in transdisciplinary collaboration, and its potential to change human-nonhuman relations and hence our commitment to addressing issues of sustainability.

Pausing, re-imagining, and transdisciplinary collaboration

Klein notes that there are two major strands of transdisciplinarity today: 'an epistemological and theoretical orientation that transcends disciplinary boundaries, and a pragmatic and participative orientation to problem-solving' (Klein, 2017b, p. 7). Transdisciplinarity is often seen as an approach best suited to addressing the complex, wicked problems of humanity (Conklin et al., 2007; Sue L. T. McGregor, 2014a; Rittel & Webber, 1973), as issue- or problem-centred, integrating multiple disciplinary and other knowledges, and responsive to public needs (Volckmann, 2014, pp. 252-253). Theoretically, this reflects the 'new science

paradigm' that proposes multiple perspectives and the possibility of multiple solutions to complex problems (Capra, 2010; Lange, 2018; Wheatley, 2006). On the other hand, the idea that transdisciplinarity 'is at once *between* the disciplines, *across* the different disciplines, and *beyond* all discipline' (Nicolescu, 2014, p. 187) reflects the epistemological and ontological differences that can be challenging in transdisciplinary practice (Fam & O'Rourke, 2021). These challenges include, for example, trying to integrate potentially incommensurable ways of knowing, as well as ideas of what constitutes 'evidence' (Eigenbrode et al., 2007). Socially, working within and beyond the academy, with human and nonhuman, can raise questions about leadership and accountability (Morse et al., 2007) and privilege some participants over others (Raymond et al., 2010). Relationality has consequently become a key concept for theorists of transdisciplinarity (Sebastian & Jacobs, 2020). Spretnak (2011, p. 4) notes:

> [We]…are thoroughly relational beings of great complexity, who are both composed of and nested within contextual networks of dynamics and reciprocal relationships. We are made entirely of relationships, as is the whole of the natural world.

In transdisciplinary practice, relationality encompasses cooperation, communication, interaction, mutual engagement, and co-elaboration of knowledge (Klein, 2018). However, there are increasing financial, time and performance pressures on academics and consultants, including those wishing to work in the transdisciplinary space. Consequences include a tendency to use already understood data-gathering and data analysis tools, and the necessarily limited time available for diverse discipline-based team members to learn to understand each other. Our own backgrounds in transdisciplinary theory and practice (Fam & O'Rourke, 2021; Fam, Palmer, et al., 2017; Fam, Smith, et al., 2017; Palmer et al., 2017) have given us some

insight into the ways in which the ‘trans’ in transdisciplinary can easily become ‘multi’: the possibility of the truly new lost in a negotiated compromise of ‘passing the data’ through one model then another or combining different discipline-based data and analyses in an additive fashion where the parts do not really talk to each other or to the whole. The result in these cases is often useful but does not break new ground in the way originally intended by the early proponents of transdisciplinarity (Jantsch, 1972; Max-Neef, 2005; Nicolescu, 1998).

There are also challenges at a deeper level for individuals working in the transdisciplinary space. Transdisciplinary collaboration, suggests Nicolescu (2014, p. 192), requires its practitioners to enter a ‘zone of non-resistance’, or, in McGregor and Donnelly’s words (2014, p. 173), ‘*a new place* ... where they become open to others’ perspectives, ideologies, value premises, and belief systems, inherently letting go of aspects of how they currently *know* the world’. Nicolescu (2014, p. 195) describes it as the space of the ‘included middle’, where dualistic worldviews dissolve and *‘knowledge is forever open’*. It is, suggests, Moore (2018, p. 483) ‘the point where sorting, ordering, and linear co-consciousness is released for playful realization of inter-being’.

Ananta Giri (2002, pp. 112-113) and Tanya Augsburg (2014, pp. 240, 242) suggest transdisciplinary collaboration requires ‘cultivation of the art of abandonment’. As Pipere and Lorenzi (2021, p. 568) note: ‘Opening up in dialogue means choosing to make oneself vulnerable in such a way that could result in [losing] one’s self’. Alfonso Montuori writes of ‘the art of shifting our viewpoint, circulating among points of view, and the expansion of the context in which initial oppositions are located’ (2013, p. 223); this is the process of ‘unlearning’ needed by students to engage in creative inquiry rather than traditional forms of education (Montuori, 2012, p. 68). Here, we see that transdisciplinary work has both an affective and ethical aspect: courage to face the fear of ‘losing oneself’, and to feel the ‘pain

of abandonment' of epistemic and ontological certainties. Entering this new place or zone requires more than the pooling of knowledge or the mixing of methods; it requires '[r]igor in the language chosen and used, the value of silence, and the practice of listening to ourselves and others [which] dictates one's authentic position in relationship to other participants' (Núñez Madrazo et al., 2018, p. 249). Giri (2002, p. 113) proposes that the virtues of justice and generosity should underpin transdisciplinarity's relational aspects. The openness needed to suspend one's preconceived certainties needs 'radical listening': active listening, but with 'a different edge of criticality and an awareness of relations of identity and power' (Moore, 2018, p. 482). Vargas Madrazo, in proposing a transdisciplinarity that addresses the West's 'epistemicide' of traditional knowledges, emphasises the value of contemplative practices focused on awareness of the body:

> The participatory practice of proprioceptive thinking creates a possibility for the indispensable silent space, for the 'creative suspension' … of our identification with ideas and beliefs (unconsciously), that is at the very heart of the rationalist–positivist tradition. The free co-creative transdisciplinary thinking of the whole person can arise in this kind of learning space (Vargas Madrazo, 2018, p. 236, citing Peat 2008).

The 'silent space', or zone of non-resistance marks, in Sue McGregor's terms, a threshold: 'When moving toward the new state of transdisciplinarity, mental thresholds have to be crossed and threshold concepts must be mastered' (2014b, p. 219). Threshold concepts include 'emergence, embodiment, the included middle, the zone of non-resistance, and multiple levels of reality' (2014b, p. 219). The 'pause' is one such threshold concept, opening up the possibility of a decentring of the self and a shift in our subjectivity and changed relations with others, human and nonhuman. In our own research within the transdisciplinary

space, working with traditional and community knowledges as well as those from diverse academic disciplines, industry and government, such pauses are precious and essential. The diverse epistemologies and ontologies that form the foundation of our research partners' worldviews mean that the normal researcherly rush to data coding, analysis, modelling and production of outputs, can often be done in a state of partial obliviousness. Nor can we rely on each other to pierce the Lawrentian umbrellas we shelter beneath, and open us to the infinitely different affective and sensory and conceptual richness of another's life world. In art and literature however we can glimpse such experiences – what it is like to 'stay in the open' (Carter & Palmer, 2017, pp. 222-223), to understand that, while we may never fully live within another's life world, there are other, possibly incommensurate ways of 'knowing, being and doing' (Martin (Booran Mirraboopa), 2003).

Transdisciplinary scholars have identified the importance of drawing upon individual or team creativity when learning to work with others' knowledges (Fam, Smith, et al., 2017; Klein, 2017a; Montuori, 2013), including the use of artworks and stories to create 'boundary objects' for shared reflection by diverse participants (Matsumoto et al., 2022; Peukert & Vilsmaier, 2021; Star, 2010; Star & Griesemer, 1989); however there has been less insight gained on the value of engaging with art and literature outside these parameters. University silos that separate the arts and humanities from the sciences and social sciences constrict many researchers' opportunities to learn the value of the arts and literature in opening their own explorations of the world to very different ways of knowing, being and doing. Without exposure to other subversive and immersive imaginaries, researchers can more easily continue to install descriptions of the world into familiar pigeon-holes, and generate outputs that stretch neither our conceptual frameworks nor, indeed, the ways in which we express them (Dewsbury et al., 2002, p. 439). A discontent with these limitations has produced the

non-representational research described earlier, and St Pierre's post-qualitative research that 'clears some space' in which to engage with ways of thinking 'from the humanities, the natural sciences, history, and literature' (St. Pierre, 2020, p. 2).

The view that a convergence of poetry, art and science is needed to describe and understand the world is not new. It was at its height during the Romantic period in the cultural west (from the late 1700s to the mid-1800s). Erasmus Darwin for example was 'a botanist, medical doctor, and poet'; James Allard suggests that Darwin's work offers us today a critical understanding of inter- or transdisciplinarity by engaging with the space between disciplines, as he 'negotiated the diversity of knowledge and modes of knowing that made his work so popular and influential' (Allard, 2016, p. 598). Darwin, like Alexander von Humboldt, uses poetry to explain his struggle to know:

> Darwin is not simply writing a 'scientific poem' or using poetry to talk about science as his real concern but seeking for ways to, not merge, but work above the two into a fuller mode of knowing that is as much interested in the ways we know as in what we know (Allard, 2016, p. 599).

Goethe, who was both poet and scientist, recorded and theorised phenomena of the natural world including the nature of colour and the growth of plants (Goethe, 2008 (1840), 2009 (1790)). He noted that in any book "which treats of the appearances of nature … Nature herself must be present to the reader … by the help of a lively imagination (Goethe, 2008 (1840), p. xxviii).

Connectedness and a unity of all things was a founding principle of both Humboldt and Goethe's scientific explanations of the natural world; it is the basis of Goethe's invention of the concept of morphology: "the science of organic forms and formative forces aimed at

discovering underlying unity in the vast diversity of plants and animals" (Miller, 2009, p. xvi). It is the source of Humboldt's conception of assemblages of plants in nature, which have a "physiognomy" (today understood as an ecosystem) that is more than the sum of its scientifically identifiable parts (Humboldt, 2014 (1849)-b). Humboldt himself points out that representing this transcendent concept is something that may be captured better by the artist more than the scientist: "Despite all the richness and flexibility of our mother tongue, it is still a difficult undertaking to represent in words that which better befits the painter's imitative art of depiction" (Humboldt, 2014 (1849)-b, p. 163).

The importance for Humboldt of art and aesthetics in the presentation of knowledge can be seen throughout *Views of Nature* which is a multi-sensory, immersive product of creative imagination through which we step into the world he describes. He details not only the physical form of plants and geological formations, but the ephemeral qualities of light and noise, scent and heat within or around them, transmitting an experience rather than merely information:

> …a hazy, almost straw-coloured half-light is thrown by the seemingly low-hanging heavens upon the desolate plain… The smothering heat of the air is increased by the hot, dusty earth floating in the atmosphere, which is veiled as if by fog (Humboldt, 2014 (1849)-a, p. 37).

As historical fiction complements history in enabling understanding about the past, so too do art and literature complement scientific (and social scientific) observation:

> Goethe, Humboldt, and the romantics were aware, long before our present age of interdisciplinarity, that certain concepts could best be approached by

a perspective that drew from a variety of disciplines and methods, rather than just one… (Millán, 2011, p. 103).

The use of evocative, multi-genre representations of research has been termed 'crystallization' (Ellingson, 2009; Richardson, 2000, pp. 13-14). The use of poetry in research writing, for example, 'lets us hear, see, and feel the world in new dimensions' (Richardson, 2000, p. 12), just as a story can carry 'impact and meaning that integrates knowledge from diverse realms and disciplines into a fresh understanding' (Palmer, 2017, p. 195). The use of multiple genres '[builds] a rich and openly partial account of a phenomenon that problematizes its own construction, highlights researchers' vulnerabilities and positionality, makes claims about socially constructed meanings, and reveals the indeterminacy of knowledge claims even as it makes them' (Ellingson, 2009, p. 4). However before we seek such creative skills in art and writing within transdisciplinary researchers themselves, we suggest that through the vast world of art and literature, we have already available to us other worlds, other imaginaries and other, less self-centric, perspectives that can pause our usual modes of thinking.

We suggest that, in addition to the exercise of relational tolerance and generosity (Giri, 2002), or to techniques such as proprioceptive thinking (Vargas Madrazo, 2018), radical listening (Moore, 2018) and the use of boundary objects (Matsumoto et al., 2022; Star, 2010; Star & Griesemer, 1989), the change in subjectivity needed to open us to the possibility of other knowledges and life worlds – the suspension of self and certainties – can be brought about through our engagement with works of art and literature.

As we noted earlier, the kind of pause or suspension engendered by art and literature also has the potential to alter our relationship with the nonhuman world. The decentring of

the human has been seen by many scholars and activists as an essential shift in worldview towards sustainability (Haraway, 2003, 2008; Hodgetts & Lorimer, 2015; Jones, 2000; Rose, 2013b; Rose & Australian Dingo Conservation Association, 2011; Thomas van Dooren, 2014; Thom van Dooren & Rose, 2012; Whatmore, 2002; Wolch & Emel, 1998). In rethinking western epistemology and ontology, Vint (2008) suggests the need to move beyond the dualist gridlocks of 'realism versus social constructivism, agency versus structure, subject versus object, idealism versus materialism, individual versus social, nature versus culture, and human versus nonhuman', arguing that humans and nonhuman entities or phenomena are inseparable, and each have agency. All matter, human and inhuman, is an active participant; in Barad's (2007) view, the individualism of separate entities and the interactions between these discrete entities give way to 'ontological … inseparability' (Barad, 2007, p. 393).

Following those working in such fields as animal geographies, the environmental humanities and Indigenous studies, the art of suspending/abandoning conceptual certainties and of decentring the self is part of the (un)learning required to consider and care about more-than-human agents. It is, as Jamie Lorimer (2010, p. 502) notes, a matter of learning to be affected, and remaining open to uncertainty:

> As ethologists and ethnographers are coming to appreciate, attuning to animal cultures involves parallel processes of learning to be affected which develop differently in disciplines …. Interdisciplinary capacity and collaboration requires a respectful appreciation of the potential of these different modes of calibration. This stems from a commitment to the reality of the world, an uncertainty about what it will do and a humble willingness

> to put one's knowledge at risk in the process of learning to be affected by the phenomena under investigation.

An openness to a wider and potentially unknowable world can be seen in the 'turn to experimentation'. Coombes et al (2012, p. 692) for example argue that reconciliation between Indigenous and non-Indigenous peoples might entail a transcultural way of being in the world which 'requires a new way to see, trial and sponsor on-the-ground experiments'. For Karen Barad (2012, p. 207), theorising itself is a form of experimentation, which 'requires being open to the world's aliveness, allowing oneself to be lured by curiosity, surprise, and wonder.' For Dewsbury (2010a, p. 157), the point of non-representational theory is 'to experiment in thought with what constitutes the world: 'Try again. Fail again' without any expectation of 'fully knowing' or of there being an 'essential world' to know.

This openness to uncertainty, incompleteness, and surprise allows for 'futures yet unthought' (Grosz, 1999):

> .... life and duration, and thus history and politics, are never either a matter of unfolding an already worked out blueprint… Duration proceeds not through the accumulation of information and the growing acquisition of knowledge, but through the division, bifurcation, dissociation – by difference, through sudden and unpredictable change, which overtakes us with its surprise… (Grosz, 2005, pp. 110-111).

The responses of our imagination to art and literature make us aware of, or receptive to, the possibility that things could be other than they are, open not just to the specific possibility we find in the moment, but to the very possibility of other possibilities. Art and literature step between us and our accustomed processes; in moments of enchantment, awe or stillness, we

might see the agency and aliveness of the other, and be more able to engage in the 'border work' (Horlick-Jones & Sime, 2004; Sue L. T. McGregor, 2014b) necessary to developing more responsive, sustainable and socially just ways of being in the world.

Conclusion

Massumi's (1995) affective intensities that change our relations with our surroundings, St Pierre's (2019, 2020) intellectual provocations that make us think differently, Thrift's (2010) jolt brought about by performance art, allow us to see the world anew. They are a suspension of structures and frames that we lay upon the world – our 'disciplinary parochialism' (Montuori, 2013, p. 203) – without pausing sufficiently to perceive what lies beyond them. Art and literature most accessibly give us a way to 'lose ourselves' and so reimagine our relations with others, human and nonhuman.

Openness to the liveliness and the 'standpoints' (Wolch, 1998, p. 124) of the nonhuman, as well as knowledges from across academic disciplines and society, is critical in addressing the most complex challenges facing the human-nonhuman world, including for example acute crises such as the COVID-19 virus, planetary health (Prior et al., 2018), and the climate crisis (OECD, 2020). A 'resolute experimentalism' (Dewsbury, 2010a, p. 149), cultivating the arts of abandonment and perspective-shifting (Augsburg, 2014; Giri, 2002; Montuori, 2013), radical listening (Moore, 2018) and contemplative practice (Vargas Madrazo, 2018) are ways of enabling ourselves to stay in the 'zone of non-resistance' (Nicolescu, 2014) in which we might care for and collaborate with others. We suggest however that art and literature can act as a point of rupture – a suspension or pause in what has gone before, and become a threshold between the known and the new. Like sitting under a tree in a state of 'intransitive attention', the time spent reading literature or engaging with a

work of art, can be a moment of shift; on one side we continue as we were, and on the other side we might be able to reimagine our relations with the world, and thus new forms of empathy or acknowledgement, new questions and new forms of research, political engagement or advocacy, and changed everyday practices that support more sustainable and just futures for human and nonhuman.

Declaration of Interest

The authors report there are no competing interests to declare.

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