Children's encounters with urban woodlands, digital technologies and materialities

by

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ABSTRACT

This research considers children's encounters and learning with 'natures', places and digital technologies. It is situated within an urban woodland in Birmingham and is a collaborative project working with two primary schools participating in six-months of walking and filming events, website creation and creative workshops. Drawing on embodied, multi-sensory and socio-material approaches to children's geographies and interdisciplinary environmental education research, it works with the 'technique' of research-creation to explore children's learning with 'natures' and digital platforms such as YouTube. It also examines creative responses to the more-than-human, including water, weather, soils, trees, mud, bricks and minerals. Through inclusion of the GoPro wearable technology as part of the research assemblage, the project draws on notions of the entanglement of the digital and physical in techno-naturecultures (following Haraway's naturecultures and Latour's common worlds), arguing for the productive inclusion of the digital within environmental education practices.

Children walk with GoPros and water bodies, asking '*What do you see guys? Comment down below*'

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1 INTRODUCTION

This research is the work of six months of collaborative walking with two school groups of children aged between 8-11, walking and filming with GoPro wearable cameras. Through walking with a local urban park and woodland within Birmingham, a post-industrial city in the UK, together we[1] inquire with the digital, the material, the embodied and the more-than-human. In open-ended, messy and unfolding ways, the focus of this research is to open up possibilities for ways of thinking and doing outdoor learning and environmental education differently. It concerns processes of collaborative learning and responding to our research inquiry; by 'our' I refer to myself, the children and their teachers, in relation with place, materialities and the more-than-human. Twenty-three national governments, (by July 2022), including the UK Parliament, have declared a climate emergency (Climate Emergency Declaration, 2022). Given this attention to the climate emergency – entangled with the related contexts of mainstream neo-liberal educational systems (Sturrock, 2021; Pacini-Ketchabaw, Nxumalo and Rowan, 2014), extractivist systems of framing the earth as resource and concern with ongoing ecological, social, physical and mental health crises - other ways of thinking and doing education are vital (Common Worlds Research Collective, 2020):

> … education must play a pivotal role in radically reconfiguring the ways we think about our place and agency within this interdependent world, and therefore the ways we act (Common Worlds Research Collective, 2020: 3).

Calls for inclusive, non-ableist, anti-racist, non-performance-based and relational approaches to learning (and living) with the world acknowledge that human-centric paradigms need to

[1] Throughout this thesis, I use the terms 'we' and 'our' to discuss this research inquiry. This is because I consider the walking, filming, website editing, creating and development of much of the unfolding research to be a collective and collaborative work between myself, the children, the adults within the project and in various ways the technologies and more-than-human actants. As I explain in Chapter 3, this was a co-produced and collaborative research-creation project (following Springgay and Truman, 2019; Truman, 2022; Manning 2016). I conceptualise the children as being co-research-creators, particularly during the walking and filming part of the project. Therefore, when I say 'our research' or 'we inquired', for example, it is because much of the walking and filming inquiry emerged in process, together and as a relational and collaborative process. This thesis and the analysis is my own and I explain this further in Chapter 3.

change in order to live well in times of trouble (Haraway, 2016; Tsing, 2015). Within the interdisciplinary approaches to children's geographies, education and childhood studies, some academics are attending to co-produced, collaborative, non-hierarchical and non-outcomes focused research which propose more questions than answers, more provocations than conclusions (Springgay and Truman, 2019). These approaches acknowledge that existing ways of doing research (re)produce what we already know (St Pierre, 2016); and argue that what we already know does not serve us in creating other ways of responding and living with the complexities of the global crises we are faced with (Common Worlds Research Collective, 2020).

This research, therefore, contributes various processual, conceptual and practical experimental proposals for ways of learning with urban woodland ecologies, place, materialities, bodies, affect and more-than-humans. I choose the term 'more-than-human' rather than 'non-human', as with some other posthuman work, following Puig de la Bellacasa who argues that 'more-than-human' in one phrase encompasses 'things, objects, other animals, living beings, organisms, physical forces, spiritual entities and humans' (Puig de la Bellacasa, 2017: 1). Importantly, it includes the digital and the technological within these proposals, acknowledging how children's lives are always already entangled with other lively matter.

1.1 Context of this research

As mentioned above, this research takes place within a broader context of increased (academic and public) attention to the intersecting discourses of contemporary childhood, humans' relationship with 'nature(s)', climate breakdown and neo-liberal educational systems. Popular concern with technologically mediated, 'bubble-wrapped' (Malone, 2007), sedentary, indoor lifestyles within the UK and broadly across the Anglo-Western world, particularly regarding children and young people, is considered, by some discourses as 'resolved' through the 'nature connection' 'solution' (Richardson et al., 2018; Edwards and Larson, 2020). Richard Louv's (2008) book 'The Last Child in the Woods' has been hugely

influential within this debate; equally impactful is Sue Palmer's (2006) 'Toxic Childhood: How the Modern World is Damaging Our Children and What We Can Do About It'.

Arguing that the contemporary ills of childhood essentially revolve around a 'nature-deficit-disorder' (Louv, 2008) and increased technological use leading to 'screen saturation' (Palmer, 2006), these books were hugely influential in increasing (public, parental, educational and third sector) concern with and attention to 'fixing' these 'ills'. While the nuances of these arguments are not without merit (there are of course many reasons for outdoor learning and engagement with 'natures', as I will argue in this thesis), the overarching framing of this 'toxic' and 'deficit' mode of contemporary childhood has had significant impacts on the academic and public discourses regarding education, play, family life, leisure, urban planning, environmental management and health and wellbeing models. Within this thesis, I am specifically interested in the implications for children's learning with nature(s), technologies and place.

Impacts of these discourses can be seen in the exponential increase in the use of the term 'nature connection' across third-sector environmental education, outdoor learning, health and wellbeing organisations, through the increased prescriptions of nature as an antidote to medical conditions by public health bodies; the increased application of forest school programmes in mainstream schools (I provide a more in-depth context of the history and application of forest schools in Chapter 2); the proliferation of 'nature connection index' studies in academic research; and the inclusion of the term within UK Government policy (examples of which are discussed in the following paragraphs).

Rewilding Britain, a UK-based organisation, for example, considers 'nature-deficit disorder' a 'recognised condition in children, which has been identified as a contributor to obesity, depression, ADHD, behavioural problems and lowered cognitive ability' (Moses, 2022). It is problematic to consider 'lack' of nature connection as partially contributing to a range of physical, mental or neurological differences, particularly by employing a pseudo-medical term; 'nature-deficit disorder' was intended by Louv as metaphorical (Dickinson, 2013; Taylor,

2013) but has become employed as a 'recognised condition' (as Rewilding Britain does). Rewilding Britain go further in uncritically stating that: 'communities that are disconnected from nature show higher levels of conflict, violence, crime and racial tension' (ibid). 'Nature' is invoked here as an at-least-partial cure for societal and medical ills. This kind of discourse has also recently held increasing attention from the UK government.

The Department of Environment, Farming and Rural Affairs (DEFRA, 2018) released its '25 Year Environment Plan', promoting 'access to nature' to address mental health problems and issues such as childhood obesity, anxiety, stress, asthma and loneliness (ibid: 71, 74). The report proposes environmental therapies, promoting health and wellbeing through the natural environment, encouraging children to be 'close to nature' in and out of school, creating nature-friendly grounds, and more pupil contact with local natural spaces. In the report, DEFRA makes specific mention of the forest schools' approach as facilitating better relations between children and the outdoors. The document clearly positions nature as an at-least-partial 'antidote' for a range of conditions, disabilities and illnesses; again, we are encouraged to go to nature to be 'healed' and restored (Taylor, 2013).

A further framing of nature connection is articulated by the RSPB who argue that nature connection is a 'potential ecosystem service that could start a positive feedback loop between health, wellbeing and connection to nature that leads to benefits for biodiversity conversation' (Connection to Nature, 2022). While this is distinct from the above two examples in relating nature connection to biodiversity conservation, using these three above examples of the application of nature connection, it is possible to draw out some key arguments that situate the (different) position taken within this research. While of course there are many positive human benefits from encounters with nature(s), and I am not arguing against learning with 'nature', the framing of nature as, firstly, 'healer' and secondly as a 'resource' from which we will benefit through 'reconnection' does four significant things, which I will now introduce.

Firstly, the conceptualisation of 'nature' as a resource highlights the dominant mode of thinking concerning 'nature' and the environment. Framing 'nature' as an 'eco-systems service' stems from a human-centric conception of nature (Common Worlds Research Collective, 2020) which equates exchange relations with nature to other exchange relations. Ecosystem services are understood as the 'direct and indirect contributions ecosystems (known as natural capital) provide for human wellbeing and quality of life' (NatureScot, 2020). Positioning nature as 'capital' or a resource to extract from (even if for our wellbeing benefit and improvement) is commonplace within Anglo-Western neo-liberal, capitalist systems and has wide-reaching implications for how we live in times of climate emergency. This is related to the second and third points. The second being that the construction of nature as 'antidote' (Children and Nature Network, 2022a), within many contemporary environmental education programmes and discourses, oversimplifies and romanticises nature as pure, pristine, wholesome and clean (Taylor, 2013). Given the multiple, global, ongoing and devastating ecological, climate, hydrological, glacial and environmental systems emergencies and breakdowns that are rapidly increasing beyond the point of collapse, to frame nature in ways which connote ideas of it as pure, pristine and 'healer' is problematic. The third implication of the nature connection discourse is that it positions nature as a static entity, non-agential and further as 'out there', to be found in places like woodlands, fields, parks, for example, rather than as acknowledging that humans are also part of 'nature' and that 'nature' is, in fact, everywhere (Alaimo, 2016).

As I discuss in Chapter 2, this deeply entrenched dualism or split of nature / culture within Anglo-Western logic is inherited from Enlightenment philosophies which split the mind / body and human / nature (Haraway, 2016) and is mobilized within nature connection programmes. Finally, through operating to construct the *kinds* of 'natures' we are to 'reconnect' to, this discourse also constructs a specific *kind* of connection to nature, through these organisations, and thus also a specific *kind* of child or body within this discourse, that of a white, middle-class, able-bodied child, with access to these kinds of 'pure' natures (Nxumalo and Cedillo, 2017; Nxumalo, 2019). This works to construct a certain idealised and romanticised version of

what nature connection should look like and thus has predominantly been accessed by those with intersecting privileges (economic, social, racial, geographical).

The above implications of the nature connection discourse are articulated consistently by pedagogistas and educators working in relation to the Common Worlds Research Collective (including Taylor and Giugni, 2012; Blaise et al., 2013; Pacini-Ketchabaw and Blaise, 2021), whom I will discuss extensively throughout this thesis. Their work untangles the implications of nature connection discourses and dominant human-centric Anglo-Western approaches to 'natures', specifically in relation to environmental educations. A core concern for these approaches (that broadly situate under feminist new materialist and posthuman approaches to environmental education), is a reconsideration of the human from a hierarchical separation from nature to a horizontal relational entanglement in common worlds and naturecultures. Haraway's 'naturecultures' is a serious reminder that both sciences and humanities (and more broadly nature and culture) 'co-produces the other and are always/already in relation' (Merrick, 2017: 103). For Haraway, naturecultures therefore also indicate how both humanities and sciences are knowledge construction practices that are in some ways 'storytelling practices' (ibid). Latour's common worlds and Haraway's naturecultures highlight wide ranging implications in terms of how knowledge is situated, and nature is constructed in stories and thus how environmental educations position, conceptualise and practice pedagogies with children and 'natures', which form part of the central concerns of this research.

1.2 What this research does

Taking the above critiques of nature connection discourse as a starting point for this research and contextualising it (in Chapter 2) within the UK forest schools movement, as an example of a popular approach to outdoor learning, this research does three things. Attention within forest schools programmes (discussed in Chapter 2), for example, is focused on what the child is doing individually, developmentally and predominantly concerning their social and emotional development, using forest settings as a resource for this. A first consideration

within this research is, therefore, how to acknowledge and trouble this pervasiveness. This means, instead, paying attention to the affective, embodied, sensory, emotional and speculative ways in which diverse children are positioned within naturecultures (Haraway, 2016), not above or separate from the world, paying attention to learning in relation *with* materialities, weathering, the geologic, watery bodies, soils, trees, the digital and other more-than-human forces and actants.

Secondly, and relatedly, romanticising nature as clean, pure or healing evades our responsibilities towards paying attention to human-induced impacts on the environment (Taylor, 2013). In this research (as I outline further below), we come to learn with 'natures' as unknowable, polluted, murky (Horton and Kraftl, 2018) and therefore differently frame some of our encounters as distinct from romanticised and other than human saviourism of the environment. Thirdly, in framing technology as contributing to the toxicity of contemporary childhoods, as I discussed in opening this chapter, Palmer (2006) operates in a similar way to Louv (2008) in separating humans from technologies and natures. Technologies are frequently considered in opposition to nature and thus constructed as a negative influence and reason for disconnection. As I outline below, this is a common position taken by outdoor practitioners and is something I witnessed within my work as a forest schools practitioner and outdoor leader prior to this research. Therefore, in this research, technologies are understood as entangled with naturecultures, as interwoven with human lives, bodies and socio-material practices, so that any 'separation' of human from technology becomes impossible. Rather, the acknowledgement of the entanglement of technologies with children and natures becomes central to the work of this research. In this, when using the term 'technologies' throughout this thesis, I am both referring to the GoPros, selfie-sticks and digital online practices and platforms such as YouTube, the internet, websites, computers and gaming sites that participate in this research and also wider understandings of technologies including the neodymium magnets, nylon ropes, steel spades, rusting metal car parts, fridges, go-karts, guns, bombs and knives that come to figure prominently within this research. In this sense, children's everyday lives and learning processes are already entangled with these diverse communication, manufacturing, transportation and electrical technologies.

1.3 Why this research matters

Most outdoor learning and environmental education programmes I participated in, working as a forest schools practitioner and within the outdoor learning sector, before entering this research, generally followed developmental learning processes. Activities (and leader attention) focus on the social, physical, intellectual, cultural, emotional and spiritual development of individuals, through activities such as tree climbing, whittling, fire lighting, cooking, playing and den building. These, while evidently being less performance and out-comes-based than mainstream school systems in the global minority Anglo-Western world, broadly followed the development of the individual child through adult-led, structured sessions. Adults led sessions through making activity session plans, creating group time, 'leading' the group, providing learning and creative activities and 'scaffolding' learning for participants. 'Nature connection' was the dominant discourse that underpinned these programmes. This narrative is often articulated with little critical thought as to what 'nature connection' implies, what 'nature' *is* and what these discourses *do* to particular demographics of children and young people and to the more-than-human actants we share the world with. Technologies, specifically cameras, phones, GoPros, iPad but also children's digital knowledges and practices, were not incorporated in children's learning and often were considered as negatively implicated in children's 'disconnection' from nature. Furthermore, the wider technologies present and the residues, spills and rusting materiality of the world (including the dumped, disused, broken, dissolving, decomposing, discarded and degrading technologies that feature in this research) that exist alongside, underneath and amongst (and within, see Kraftl, 2020) the children and woodland places of these forest schools, do not feature in children's engagements with place.

I use the forest schools movement as a starting point from which my research has evolved because of my own engagement with the programme and further, because of its proliferation within UK in recent years. As I have mentioned, I am coming to this research as a trained forest school leader. I understand how the forest schools pedagogy, that is taught during the forest school leader training, can offer an alternative to mainstream, curriculum and outcomes

focused educations and yet, I agree with Taylor (2013), that it is still is situated within a developmental, human-centred, individualistic, adult-ist and increasingly neo-liberal approach to education. Furthermore, it is evident that as the movement grows and gains interest from wider demographics of teachers, educators, researchers, parents, third sector organisations and government bodies, there is a fracturing of the underlying or original ethos of the programme as an 'alternative education' (Kraftl, 2015) and an emerging mixing of informal learning programmes with formal education (Pimlott-Wilson and Coates, 2019). The two schools that I work with in this research are examples of this hybridity, delivering forest schools programmes from within a mainstream primary and a special school. I am interested in this tension and the contradictions of how the forest schools approach might be both alternative *and* mainstream. I am further interested in how it can be interpreted as pushing against outcomes-based learning yet still articulate the framing of the developmental child.

While experiences of the forest schools programmes likely differ depending on leader – and indeed as Maynard (2007) highlights, there are tensions between trained leaders and classroom staff in terms of control and interference from adults - the programme is 'scaffolded' by adults to attend to the child's individual 'development' (Cudworth and Lumber, 2021). Attention is given to child-led free-play and exploration, however, much of the activities within the programme require adult leadership, management and observation; tool skills, fire lighting skills, crafts, willow weaving, cooking, tree management and other activities demand a high level of (initial) adult leadership and structuring of the session (Blackwell, 2015). These are very focused activities which form much of the delivery and therefore, I would argue, do not provide openness for *other* knowledges and inclusive ways of relating with technologies, forests and woodland ecologies. This research aims to creatively suggest inclusive ways of learning with woodlands that do follow children's curiosities and inquiries but from a relational and assemblage approach.

As the forest school example demonstrates, it is important that we critically examine the underlying framings and ethos that structure ways of learning with children and natures. Programmes that focus on the developmental child through which progress, outcomes and

'impact' is measured are the dominant models within UK educational systems. It is important, as the Common Worlds Research Collective (2020) outline, to question these models and propose other ways of thinking. Not only in relation to the climate crisis, but to create more inclusive, anti-ableist, anti-racist, progressive and ecologically and socially just ways of learning and living (ibid; see also Springgay and Truman, 2019). While my research remains concerned with the child *in relation with* the more-than-human, I attempt to offer a different articulation of the child from the developmental child. I am not concerned with the child as a bound and individual entity and I shift away from the developmentalist attention on evidencing, for example, the social, emotional development of the child during our walking research, or analysing the changes in confidence, resilience and sociability, for example, which is dominant in forest schools research (Blackwell, 2015; O'Brien and Murray, 2006; Maynard, 2007; McCree et al., 2018).

Instead, this research is an effort to inquire with other ways of learning with children and 'natures', digital technologies and the more-than-human. By 'other', I mean multiple possibilities – other than adult-led; other than outcomes-based; other than dominantly neuro-typically focused; other than dominantly white and middle-class; other than (solely) child or human-centred; other than extractivist in its thinking (Nxumalo, 2017; 2019) towards materialities; other than against technologies; other than science-based teaching; other than curriculum-based teaching; and other than simply learning *about* nature or learning *in* nature but instead learning *with* nature(s) as agential, vibrant and alive (Bennett, 2010). I also came to this research, therefore, thinking about alternative educations (Kraftl, 2015) and forms of collaborative, creative, pedagogical approaches (Land et al. 2020, Land et al., 2020a; Kind et al., 2014; Mereweather, 2019) with desires to consider how children might learn *differently* in order to refuse outcomes-based educational systems (Springgay and Truman, 2019). And secondly (and simultaneously) to examine ways in which children might learn *within* a world full of lively others, to acknowledge the less romanticised, pure or 'clean' relations with materials and the more-than-human in order to live well in precarious times (following Tsing, 2015 and Haraway, 2016). As Pacini-Ketchabaw (2013) argues '(T)he forest cannot be an

innocent space that we and the children, visit to purify ourselves and show care for the environment' (p. 363).

1.4 Framing my approach to this research

As I have touched upon above, academic research concerned with children and nature(s) can take a number of different approaches, frequently falling into the following three 'types': either firstly focusing on the child *in* nature, often related to measuring improved 'nature connection', health and wellbeing and individual child development (Adams et al., 2016; Cudworth and Lumber, 2021; Knight, 2013; Harris, 2017; Sheldrake et al., 2019)); secondly the child learning *about* nature, often framed in terms of environmental education *for* sustainability and future stewardship of the environment (Street Hoover, 2021; Hughes et al., 2018); or thirdly, as discussed, a smaller body of research is instead beginning to consider the child learning *with* nature, considering nature(s) as alive, agential and existing in relation with the child and humans (Taylor, 2013; Land et al. 2020; Pacini-Ketchabaw and Blaise, 2021). This is not to say that these three types of research do not intersect or share commonalities, children often can have improved health and wellbeing from learning with natures and also are likely to learn more about different concerns of environmental education while relating with natures. However, as discussed, the different approaches also entail impactful differences in terms of how we, as researchers, educators and humans situate ourselves in relation to both children's learning and the more-than-human world.

In this thesis, I am concerned with adopting the third approach – acknowledging children's learning through relations *with* 'natures', understanding 'natures' as vibrant, lively and affective. As Blaise and Ryan (2020) argue, these different logics of learning, teaching and pedagogy are concerned with 'emergence, potentiality and connectivity' (p. 87). This broadly positions this research within a posthuman approach to learning with natures, thus considering the 'mixed-up, non-innocent, multispecies, common worlds that children cohabit with various human and more-than-human others' (Blaise et al., 2013: 350).

By referring to 'non-innocent' within this research, I am following Blaise et al. (ibid) and Pacini-Ketchabaw (2013) who highlights that 'non-innocent' 'frictions' within (for her, specifically forest) pedagogies 'interrupt the innocent simplicity of the narratives encountered in contemporary forest pedagogies' and 'produce movement, action and effect that might complexify both children's presence in the forest and the presence of more-than-human actors' (p. 362). This shifts away from the 'innocent child in nature' narrative and attends to the mutual, messy (ibid), emerging encounters of children with natures. For Pacini-Ketchabaw, this friction is specifically in relation to the contexts of settler-colonialism within situated forests in British Columbia. However, these non-innocent 'co-shapings' (ibid), within this research, will refer to the extractivist logics and practices in relation to magnet fishing, tree planting and performing Minecraft (which I discuss in Chapter 6). Thus, it is understood within this research that non-innocent relations acknowledges the consequences of encounters for both the child and the more-than-human. Researchers who take a posthuman perspective acknowledge that the 'more-than-human is a generative tool that helps us rethink human exceptionalism' (ibid) and therefore move to 'decentre Humanism' (Truman, 2019) in order to open relations and ethical response-abilities towards others. To this, I further include, as *techno-naturecultures,* the entangling of (digital) technologies with the more-than-human.

While acknowledging the relational entanglement of techno-naturecultures, in this thesis I work not to fully decentre the child but to include the more-than-human in relation *with* the child, with the child coming into and out of focus (Kraftl, 2020). I argue that attention to the relational concerns of children, technologies, matter and the more-than-human can work to better include the relational socio-material experiences of children. Horton and Kraftl (2018) consider this as 'extra-sectionality[2]' which 'might retain intersectionality's critical and political purchase, whilst simultaneously folding socio-material complexities and vitalities into its theorization' (ibid: 928). This includes, for this research, differently articulating children's relations to matter and materiality and how this relates to acknowledging the entanglement

[2] Horton and Kraftl acknowledge that their term 'extra-sectionality' is inspired by and refers back to Kimberlé Crenshaw's term 'intersectionality' (Crenshaw, 1991).

of digital technologies (Land et al, 2020) as well as situated place relations (following Nxumalo, 2019). As Luke Bennett argues:

> a posthumanism that embraces 'the world with us' can – by decentring but not abandoning the human entirely – sensitize our attention towards the entanglement of us, our ideas and the material world in which we are enmeshed (Bennett, 2016: 70).

Throughout this research, children, natures and digital technologies are, therefore, considered as 'non-innocent', complex and productively troublesome concepts to interrogate (Taylor, 2013). I am not framing children, nature or technologies in binary ideas of good/bad, positioning them as either innocent, pure or inherently damaging, polluting or dangerous. Children's relations with natures are always impure, curious, caring, messy, uncertain, destructive and damaging. Natures are messy, contaminated, unknown and life-sustaining. They are ongoing, multi-scalar and multi-temporal. Digital technologies are also entangled in our learning with natures in complicated ways, that both highlight underlying and persistent, dominant discourses of Anglo-Western constructions of environmental educations, as well as extend opportunities to come to know place, materialities and natures differently as more than resources for human extraction and as more than a backdrop for human activity (Blaise and Ryan, 2020; Alaimo, 2016a).

As well as being informed by both a posthuman approach to learning and doing research, this research is also informed by a post-qualitative approach (St Pierre, 2016) and the conceptual tools of research-creation, which brings a 'thinking-making-doing' approach to knowledge creation (following Manning, 2016; Springgay and Truman, 2019b; Pahl and Pool, 2021). This encourages research that is not produced in the reducing of fieldwork into pre-defined methods and thematic, coded and written data analysis (Weaver and Snaza, 2017; St Pierre and Jackson, 2014) but instead acknowledges that research knowledge is produced in the *processes* of thinking-making-doing. This approach has meant thinking with events as they unfold, responding to the relations and the material-discursive encounters as research assemblages. David Shannon (2021) highlights the concept of 'proposition' as a key device for

speculative and creative work within research-creation projects, as a means of 'bringing forth 'something new'' (p. 54) and thinking about how things may be - a proposal, or possibility. This proposal works to frame the relations of an inquiry but isn't a statement of intention; rather, it is responsive and generative, emergent within the encounter and in relation with the more-than-human.

As we began our walks, various propositions emerged within our research assemblage. Participants offered that we are '*going behind the scenes'* of the park, as *'woodland explorers*' to tell stories about how the park '*comes to life'*. Others described wanting to tell stories with these woods '*full of wonder',* to explore a '*whole new world'*. These propositions affected our research processes and demanded that we remained attentive and open to curiosities, surprises and unanticipated directions this research might take (Koro-Ljungberg, 2017; MacLure, 2013). I return to these propositions in section 3.4.1.1. where I discuss walking with wonder and curiosity and how these propositions for inquiry thread through the research. Children's 'work' of research-creation is, therefore, considered in ongoing processes of walking, filming, editing, interrogating and creating. It was through these processes that the research shifted and took form. I choose to write these encounters within this thesis through a kind of 'bag-lady approach', following Haraway (2004) whereby 'unexpected partners' are put together with 'irreducible details' in a 'frayed, porous carrier bag' (ibid: 127). Therefore, this project is made up of numerous narratives and moments of events (Kind, 2013) that took place during our walking process and come together in their articulation of encounters and learning with naturecultures.

Furthermore, within this thesis, our research assemblage is considered as collective and collaborative and children are positioned as researchers and research-creators (Pahl and Pool 2021). Therefore, I will often refer to 'us', 'we' and 'our' inquiries. This will generally refer to the research assemblage of myself, the child researchers and also the other adults who are part of these walking events (forest school leaders, teachers, volunteer parents). It will also include the technologies and the multiple other more-than-human actants that become the focus of this research, such as the stream, the ponds, the trees, the mud, soils, bricks, stones,

minerals and deadwood. Of course, there were multiple other more-than-human actants within our assemblage but, following Hennessy and Rooney (2021), I attend to those that came to matter. In Chapter 3, I outline my individual approach to the video editing and analysis, as well as my writing of narrative stories which accompany the analysis chapters, but throughout I make it clear when I am referring to 'me' as a researcher in this assemblage, rather than 'we'. It is worth noting that project ended abruptly due to Covid-19, six-months into our yearlong walking and filming sessions, therefore this extended research assemblage could no longer participate in the further analysis and writing up of this research. Hence, the work within this written thesis itself is mine alone.

1.5 Affirming positionalities within this research

Feminist new materialists argue that research should pay attention to who and what is (and therefore isn't) being affirmed through research collaborations (Truman, 2019), considering also the intersectional and situated concerns of human participants as well as the attention to matter and a 'decentering of Humanism' (ibid: 10). Truman further argues that feminist (new) materialist[3] research should align with anti-racist, decolonial and feminist politics and ensure that the citational and practical research process articulates these positions. Through addressing and paying attention to these concerns, researchers must take responsibility for the 'networks, relations and worlds created' through the process (ibid).

In this collaborative research, while based within in global minority North, I work to affirm the encounters with natures and children whose intersectional identities are marginalised or minoritised in particular ways. Research concerning environmental educations, children and natures – and particularly research which situates participants as collaborators and co-researchers - is still limited involving children from minoritised backgrounds and those who are disabled and with special educational, learning and support needs. Children participants

[3] Truman (2022) discusses the exclusion of the 'new' in what is commonly known as feminist 'new materialisms', arguing that feminist materialisms are not 'new' (pg.1) but also that the 'new' is used as a marker to separate feminist materialisms from Marxist materialisms. In my research, I will continue to use the term 'feminist new materialisms' as this is how I have found it most referred to in the literatures I am referencing.

in this research include children with diverse heritages, with most participants identifying as other than white British and more than half of participants identified (by parents/carers) as disabled. I did not record socio-economic backgrounds as part of this research but do include some detail of the school catchments in the Chapter 3. Some participants did not speak English as their mother tongue, one spoke no English, some were pre-dominantly non-verbal autists while others were bilingual; some were in care, adopted out of care or had recently arrived in the UK with their family claiming asylum.

Providing research opportunities that include diverse means of engaging with embodied, sensory, digital and creative processes opens up means to collaborate with children *as researchers* (Shannon, 2020; 2021), with research that is not focused on discursive, representational data, such as interview transcripts, as is much qualitative work (St Pierre, 2016; 2013). Enabling open-ended collaborative research with children in situated encounters opens opportunities for articulations of other ways of knowing and becoming and takes all relations and bodies seriously. This matters in many ways related to mainstream education and learning with natures. Therefore, I do not engage these children as a means to research their encounters in comparisons or relation to any notion of binaries of (dis)ability but rather acknowledge all bodies as becoming (Braidotti, 2006) and in relation to affirming the 'possabilities' of disability (Goodley and Runswick-Cole, 2013). Including diverse participants in research affirms their inclusion in research and debates concerning children's relations with place and natures and takes situated experiences seriously (Truman, 2019).

In my research collaborations I am also affirming the (predominantly) cis adult women collaborative participants committed to alternative frameworks of education – the classroom teachers, assistants and forest school leaders, who have chosen to do something differently in being open to this research and who bring their extensive knowledge and experience with learning outdoors to this project. In working with these practitioners, I am at once opening possibilities for us to collectively think differently about learning outdoors whilst acknowledging their commitment to enabling young people different learning encounters.

Following Haraway's argument for partial and situated knowledges (1988), I take a feminist positionality that recognises that the researcher cannot operate at a distance, separated from the research as if maintaining some objective and rational distance from that which is being observed. Instead, understanding that knowledge is always partial and situated, places the researcher *within* the world and emergent with rest of the research assemblage (Fox and Aldred, 2015; Hickey-Moody et al., 2016; Taylor and Ivinson, 2013). I therefore acknowledge that my own positionality matters in relation to this research. I come to this research as a queer, white, middle-class, able-bodied, cis gendered woman who grew up in rural woodlands of the south-west of England. Having worked within community and environmental engagement, outdoor learning and specifically forest schools practices, along with various creative arts-based and academic higher education training, I bring specific situated knowledges and privileges with me into this research.

This means that this research is situated within the specific positionalities, places and assemblages of the actants that become the process of this research (Truman, 2022). I will return to this approach in my methodology but here I wish to state that this research is not offered as research to be generalised or with the intention of being necessarily applicable to other places and contexts. The events and encounters that are narrated in this research are unique to this research assemblage and how it unfolded; specifically, that is, in relation with the processes, practices, knowledges and positionalities that each actant (including the more-than-human actants and forces) entangle together (Barad, 2007; Fox and Aldred, 2015).

1.6 Structure of this thesis

This thesis will begin with a literature review (Chapter 2) which will address key debates within interdisciplinary studies of childhood, children's geographies and educational disciplines, concerning how children have been positioned in relation to nature(s) and place. This will highlight particularly the dominant discourse of children's 'connection to nature' that I have introduced in this chapter and ways in which this plays out within the forest schools programme. I will then discuss more-than-representational approaches, specifically work

from feminist new materialist and common worlds theorists, highlighting how relational approaches to research consider children and the more-than-human always already entangled, rather than disconnected from natures. I introduce work on affect, the embodied and the sensory, the geologic and the digital. In this, I pay attention to the limited research that includes digital technologies such as cameras and GoPros.

Chapter 3 will discuss my methodological approach. In this chapter, I describe how this research emerged, from the curiosities I came to this project with to the collaborative relationships I developed. I situate this research in Highbury Park, Birmingham, discussing the ecological, historical and socio-material context. I then introduce the research assemblage, describe the school contexts and highlight some of the practicalities of the project development. I finally move to introduce research-creation as the modality of this research. I conceptualise research-creation in three ways – through walking as research-creation (following Springgay and Truman, 2019), including walking with GoPros and with wonder and curiosity, through collaborative website creation and video editing as research-creation and by considering myself and the children as research-creators.

In Chapter 4, I focus on the multiple ways in which (digital) technologies entangle with our research-creation inquiry. In this chapter, I extend existing literatures related to the entanglement of digital technologies with/in childhoods and natures. I consider the GoPro, first, as an extension of the child. I secondly consider the embodied and performative narrations with imagined YouTube audiences as children becoming YouTube. I then, thirdly, discuss how the GoPro and the more-than-human, as agential and lively (following Bennett, 2010) disrupt our inquiries. I finally offer our website editing and co-analysis sessions as diffractive re-turns (following Barad, 2014) to footage, creating new relations between embodied performances and watery bodies on digital screens. I argue that these processes of research-creation enable new directions in our research methods.

In Chapter 5, I develop some of these emergent directions of research through considering how our ‘going behind the scenes’ of the park (as detailed above) opens up relations with

different weather (mainly water/rain-related) wanderings (Blaise, Rooney and Pollitt, 2019) and figurations of watery bodies (following Neimanis, 2013; Berry et al., 2020; Horton and Kraftl, 2018). We become weathered and learn *with* weather (Rooney, Blaise and Royds, 2021). We learn with water as unknowable, contaminated, transformational and as archive (Neimanis, 2013). I will discuss the entanglement of technologies and bring in speculative stories that emerged from our walks concerning rusting car parts, go-karts and magnet fishing.

Chapter 6 will turn to the matter of minerals, tree roots and bricks. I return to stories of magnet fishing to discuss the complexities of learning with materialities and some of the ongoing tensions of extractivist logics that run through this research. I further work to consider the multiple and entangled temporalities and tempos (Pacini-Ketchabaw and Kummen, 2016; Hennessey and Rooney, 2021) that encompass tree-times, forest-time and human-time through the event of tree planting and exposed tree roots. I pay attention to the different relations between child and brick, considering how anthropomorphising bricks might be our 'species specific' way of communicating with (following Rautio, 2013) and making 'odd-kin' with the world (following Haraway, 2016). I then turn to bricks and Minecraft to consider the geologic and children and geological agents (following Clark and Yusoff, 2017; Hadfield-Hill and Zara, 2019), again considering the tensions inherent in these events.

I will then conclude the thesis in Chapter 7, by way of addressing some of the contributions and proposals from the project to environmental education research and the geographies of children and young people, as well as the practices of outdoor learning.

2 LITERATURE REVIEW

As I have introduced in Chapter 1, there is an increasing amount of attention being paid within academic research (within human geography, educational studies and broader interdisciplinary childhood studies) to children and young people and concepts of nature, place and environments. This academic work ranges from environmental psychology (Chawla and Heft, 2002; Chawla, 2020) and attention to children's 'nature connection' (Cheng and Monroe, 2012), to the posthuman work of the Common Worlds Research Collective, which decentres the child and looks towards relations between humans and more-than-humans (Taylor, 2013). Evidently, these approaches encompass vastly differing theoretical framings of both the child and of nature. In this literature review, I will first aim to briefly outline research concerning children, place and natures, including research informed by and critical of the 'nature connection' discourse before focusing on more-than-representational[4] research that considers both the 'child' and perceptions of 'natures' differently.

The first section (2.1) of this literature review, therefore, **maps out the academic literatures and related dominant discourses of children and natures**. Firstly, I will provide a brief overview of how constructs of the biological and the social 'child' have been articulated within interdisciplinary childhood studies. Secondly, I will discuss the 'nature connection' discourse, highlighting the academic work of evaluating nature connectedness. I argue that much of this discourse is at risk of being romanticising and reductive in its understanding of children and nature. Using examples from the forest schools programme, while remembering the examples introduced in Chapter 1, I will, thirdly, situate how ideas of nature connection influence the

[4] [4] The term 'non-representational' has been challenged as being limited in disregarding the 'representational' elements of social research and therefore various alternatives have been proposed including 'more-than-representational' (Lorimer 2005) and 'hybrid geographies' (Whatmore, 2006), to acknowledge an expansiveness of approaches. There has been debate with social sciences as to whether the terms non-representational or more-than-representational better articulates the shift away from representation and social constructivist research. Thrift's conceptualization of non-representational work (Thrift, 2004) was fundamental is developing non-representational approaches towards the embodied, affective and material. However, scholars such as Sarah Whatmore (2006) and Hayden Lorimer (2005) have argued instead that the phrase 'more-than-representational' is better suited to encompass an expansive openness to encounters that matter (Lorimer, ibid). I am going to use the term more-than-representational because I think it enables more relation between the representational and more-than, rather than a severing.

ways in which environmental education is delivered. I do this to set up the context from which I then will diverge in my research. The final part of this section outlines critiques of more conventional approaches to research concerning 'nature connection' and developmental framings of children and natures. I will return to these critiques in more detail in section 2.2.2. This discussion of the critiques of the nature connection discourse will introduce the remaining section of this literature review - which goes into more detail with more-than-representational and posthuman approaches to children and natures.

Section 2.2 of this literature review will then further examine research emerging from posthuman and new materialist **approaches to children, learning and natures, with particular attention on the concepts of naturecultures and common worlds**. This encompasses both feminist new materialist work and the overlapping, yet distinct, work of more-than-representational theories, which attend more to affect, bodies and emotions and are generally less concerned with materialities. Much of my contribution focuses on the entanglement of digital technologies within naturecultures and learning, as well as affective and embodied encounters. I **will therefore discuss research that specifically expands the ways in which children, 'natures', affect, bodies, emotions, materialities, digital knowledges and technologies relate**. I introduce a variety of research that is relevant to the specific encounters within our research, including the geologic, the hydrologic, place and the digital. In situating this research within theoretical frameworks that take seriously speculative, experimental and creative approaches to knowledge making and education, I aim to contribute innovative ways to extend thinking relating to digital technologies, learning, children, place and 'natures'.

There is much to be explored in resituating educations of children and 'natures' within the pedagogies of 'common worlding' (as Affrica Taylor argues, 2013; see also Taylor and Giugni, 2012). While I take much from their challenges to the modernist, individualistic, child-centred and developmental approach to education (Taylor, 2013; Blaise et al., 2013) and their critiques of the connection to nature discourse (ibid), their posthuman stance, for me, sometimes removes the child too much from the research and further presents various ethical issues around writing about the agency of the more-than-human (Kraftl, 2018). I am interested in

bringing the child and more-than-human into relation and the child into and out of focus in this research (Kraftl, 2020), understanding, from a socio-material assemblage perspective, that different relations of actants and actors create different forces within research events (Barad, 2007; Bennett, 2010; Taylor and Giugni, 2012; Hennessy and Rooney, 2021).

2.1 Dominant discourses of children and nature

Within the geographies of children and young people as well as interdisciplinary childhood studies, particularly educational studies, much attention has been paid to the relationship between the child, 'natures' and the environment. There are diverging paradigms conceptualising the child as either 'biological', 'social' and, significantly for this research, as 'biosocial'. These broad conceptions of the 'child' frame relationships between children, young people and nature very differently, having direct impact on the everyday lives, educations, policies and framings of children and the more-than-human world. In this section, I will first briefly outline the dominant discourses of children and nature that have been constructed within Anglo-Western academic literature and then draw on examples of how 'nature connection' is related to forest schools and public policy literatures, before addressing some of the arguments against the discourse of nature connection (Taylor, 2013) which I will then develop in section 2.2.

2.1.1 Dominant constructions of the child within interdisciplinary childhood studies

Two key constructions of childhood have dominated the interdisciplinary studies of childhood over the last thirty years – that of the biological, developmental child and that of the child as a social actor with individual agency**.** Both these constructions centre the child within a developmentalist, universalised, individualist, humanist and neoliberal discourse related to education and environment. A third construction is that of the biosocial child as becoming *with;* this construction is emergent within more-than-representational and posthuman approaches - as well as sociologies of childhood (Prout, 2004). The hybrid (Kraftl, 2013;

Woodyer, 2008) biosocial approach considers the child as relational with the more-than-human. Here, I will outline the biological and social framings in order to demonstrate how the (physical) environment, 'natures' and technologies are treated within these discourses and then to highlight how this relates to the depiction of the child as 'disconnected from nature'. My research challenges and problematises this discourse and therefore my extended argument will take this discourse as its key counterpoint.

Broadly considered within a developmentalist framework, the biological child is depicted in a universal state of 'becoming-adult', not a fully formed human but an 'adult in waiting' (Cele, 2015; Aitken, 2018). Such deterministic, biological and developmental categorisations of age (Evans, 2008) emphasise the progressive stages of a universal child developing into a full adult through aging and socialisation processes, such as school and the family (Holloway and Valentine, 2000: 765). As Murris and Borcherds (2019) argue, this assumes 'they are (still) developing, innocent, fragile, immature, irrational and so forth' (p. 197). Much of the theoretical underpinning of this developmental child is founded on early educational psychologists such as Jean Piaget who considered the child as cognitively and spatially developing through universal, identified, linear stages (Aitken, 2018). The developmental child, and particularly Piaget's theories, have had a huge impact on educational pedagogy and teaching as well as environmental functionalist psychology in research in which the human individual is the 'sentient agent who purposively engages with his or her surroundings' (Chawla and Heft, 2002: 206). Regarding mainstream educational frameworks within Anglo-Western models, and particularly in recent decades, the developmental child is centred and supported to develop towards a fully developed neo-liberal subject (Land et al. 2022). This includes educational policies that focus on achievement, attainment, performance, progress, school and workplace readiness and individual performance (ibid).

A 'geographical turn' within sociological studies and an increased politicisation of research concerning human (and children's) agency during the early 1990s, influenced increased attention from human geographers and interdisciplinary childhood researchers towards understanding the political, cultural and everyday lives of children and young people

(Holloway et al., 2019). The child was considered as 'being' - as a fully whole social actor, with childhood understood as socially constructed (Prout and James, 1990, in Holloway et al., 2019). As Holloway and Valentine state, this 'new' social studies project moved towards organising around a social constructivist approach, considering the child as a bound subject with individual agency and rights of the child as situated within specific local and global structures and spatialities (Holloway and Valentine, 2000; Holloway et al., 2019; Aitken, 2018). Valentine declares childhood an 'invention' (Valentine, 1996: 583); a social construction.

Holloway and Valentine (2000) emphasise the importance of spatiality in the construction of identity through three key areas: the spatial and temporal construction of childhood in place; the use of everyday space in young people's lives; and spatial discourses surrounding the constructions of childhood (Evans, 2008). These spatial discourses of childhood, recognised as differentially experienced, through social, cultural and political structures, were thus considered as both related to and constructed by global and local processes, politics, everyday practices and individual life worlds (ibid). As such, social constructivists consider childhood types related broadly to social and cultural differences, rather than universalising childhood or understanding it within distinctly developmental terms (Prout and James in Holloway and Valentine, 2000). This extends to understanding of children's use, experience and understanding of environments and place as being socially and culturally constructed, through issues to do with identity, gender, age, ethnicity, socio-economic difference, rights and agency, access to public spaces, institutional systems, play, family, technology use, social structures and other differing socio-cultural signifiers (Valentine, 1996; Valentine and McKendrick, 1997; Matthews et al., 1999; Skår and Krogh, 2009; and Griffin, 2015; Cele, 2015; Holloway and Pimlott-Wilson, 2015).

Significantly, within social constructions of childhoods, the discursive and the social remain central to the ways in which childhoods are researched and understood; representational qualitative work focused on ideas of human agency, voice, politics, rights and structural relations of power. Furthermore, as Prout argues (2005), the reductivist, binary thinking of either the biological or socio-cultural framings of childhood has further entrenched the

nature/culture divide and 'expell(ed) biology, the body and even materiality as such from [its] accounts of childhood' (Prout, 2005: 84). Prout argues for an 'interdisciplinary childhood studies' that entangles the body with social life but also acknowledges that 'human life also takes place through artefacts, technologies and machines of all kinds' (ibid: 107). More-than-representational approaches which attend to the affective, the material, the embodied in relation to the child in socio-material or material-discursive (see Woodyer, 2008) ways will be addressed below. I will now move to discuss in more detail how the social constructivist and developmental framings of the child have interacted with the nature connection discourse.

2.1.2 Research concerning the nature connection discourse

Related to the above constructions of the contemporary child is the discussion of the child in nature. As Dickinson (2013) argues, and as I articulated in Chapter 1, a result of increasing attention on the 'state' of contemporary childhood, in relation to technology, urbanisation, stranger danger, educational reform, child development and over-protectionism ('bubble-wrap' or helicopter parenting (Malone, 2007)) has been to attribute 'alienation' from nature as a partial cause of these issues (Dickinson, 2013). Thus, the increasing focus on the socio-cultural constructions of childhood and on the child as an individual actor, has led, in part, to increased attention on the child in nature to explain the changing nature of (Anglo-Western) childhoods. Employing research and anecdotal evidence to support an often-polemic argument within public discourse, the nature connection argument draws on adult-ist concerns of technology (Palmer, 2006), urban environments, outdoor places and approaches to education in order to construct a dichotomous narrative of human-nature relation.

As I outlined in Chapter 1, the conception of the child as disconnected from nature emerged particularly from Richard Louv's 'Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder' (2008). This polemic, yet popular, book concerning the child as 'disconnected' from nature - and as suffering from a pseudo-medical 'nature-deficit disorder' or 'NDD' as a result – has dramatically impacted both practice and discourse. While Louv himself states that this term is a metaphorical concept (Dickinson, 2013), and thus used rhetorically, the ramifications of this book and this term cannot be underestimated. Concerns have

proliferated about relative nature connection and the wellbeing of contemporary children and young people, particularly in Anglo-Western societies, and more specifically from the middle class and white demographics. This narrative, as I have described, is increasingly articulated (often uncritically) as a given by environmental educators, the third sector and UK Government departments, as well as being paid increasing attention by research agendas. Much of this research begins from this baseline position of assumed 'nature disconnection' in then moving to address how to establish a 'reconnection'.

Dickinson (2013) argues that this 'nature-deficit disorder' is a 'popular alienation discourse' (ibid; 3), evoking a 'nature' which is 'an anthropocentric human construction, driven by and entrenched in a human-nature binary, a fall-recovery myth, and distancing through science and naming' (Dickinson, 2013: 15). By 'fall-recovery' she refers to the use of tropes by adults generalising and romanticising their childhood connection to nature by using phrases such as 'when I was younger', which arguably denies the historical, political, environmental and cultural contexts of environmental degradation intersecting with race, class and gender. Dickinson goes on to state that Louv's application of the NDD term is 'contextualised by ADD/ADHD' and that Louv considers 'nature therapy – "nature's Ritalin" – (to) reduce ADD/ADHD symptoms' (Dickinson, 2013: 3). As I mentioned in Chapter 1, this is highly problematic considering how commonplace use of the term 'nature deficit disorder' has become within environmental education programmes and third-sector organisations, detached from its metaphorical and literary conception and becoming employed, as I shall further describe, by educational programmes in the UK and globally[5].

Specific research 'testing' for nature connection often employs a 'Connection to Nature Index', developed by Cheng and Monroe (2012), (with various indexes being developed more recently (Richardson et al., 2019)). This index includes surveys and questionnaires to test and measure children's 'affective attitude towards the natural environment' (Cheng and Monroe, 2012: 31), quantitively attempting to measure for 'enjoyment of nature', 'empathy for creatures', 'sense

[5] Louv co-founded the Children and Nature Network (Children and Nature Network, 2022) in the US which employs the concept of nature connection. Other organisations working to incorporate the concept include the RSPB, Rewilding Britain, The National Trust, for example.

of oneness' and 'sense of responsibility' (ibid). Research which employs connection to nature indexes, examines, for example: reasons for nature disconnection (Hand et al., 2018); the optimum age for environmental education in strengthening nature connection (Liefländer et al., 2013); age related differences in nature connection (Hughes et al., 2019); the educational, social and experiential influences on connection to nature (Prévot et al., 2018); the health benefits of being in nature for reducing stress and improving mental wellbeing and happiness (Wells, 2003; Adams et al., 2016; Tillmann et al., 2018); the overall relation between nature contact as prevention and treatment for addressing human health challenges (Frumkin et al., 2017); nature as a nurturing space (Hordyk et al., 2015); nature connection for 'improving' creativity (Arbuthnott and Sutter, 2019); being in nature as improving physical activity (Trapasso et al, 2018); nature connection for fostering pro-environmental attitudes and conservation behaviours (Smith et al., 2018; Linzmayer and Halpenny, 2014; Chawla, 2018; Rios and Menezes, 2017; Sheldrake et al., 2019; Street Hoover, 2021); pathways to nature connectedness (Lumber et al., 2017); and how to encourage engagement and experiences with nature (Skår et al., 2016; Skår, 2010).

Further research argues that nature experiences at any age promote nature connection (Cleary et al., 2020), while others argue that specific residential environmental education programmes increase nature connection (Talebpour et al., 2020; Mullenbach et al., 2019). Furthermore, nature connection discourses predominantly consider the impact of digital technologies, such as smartphones, on connection to nature as bad (Louv, 2008; Malone, 2007; Richardson et al., 2018; Helms et al., 2019) with some research claiming a (generationally worsening) shift from 'biophilia' (as love of nature) to 'videophilia' (love of videos) for 'Westernized' children and young people (Edwards and Larson, 2020; Pergams and Zaradic, 2006). The Children and Nature Network website (which Louv co-founded) homepage shows an image of a child picking up a stone with the phrase 'There's no app for this: We believe that nature makes kids healthier, happier and smarter' and asks people to take the 'Vitamin N Challenge'. (Children and Nature Network, 2022).

As academic research measuring 'connection to nature' (Chawla, 2020) increases, so too does application of the term, as well as the 'nature-deficit-disorder' term. As I have introduced in Chapter 1, the language of nature connection is increasingly employed within government policy; national charities both in the UK (and in the US, Australia and Canada) are developing programmes of nature connection and employing the term 'nature-deficit-disorder'; schools are incorporating the language of forest schools into their curriculum and their school grounds; and the forest schools and outdoor learning industry is booming. I will now discuss the specific example of forest schools in relation to nature connection.

2.1.3 UK forest schools and nature connection

As I have highlighted, forest schools movement is one such programme that is often positioned as an 'antidote' or healer of this contemporary 'nature-deficit disorder' by 'prescribing' nature (Cree and McCree, 2012). I will outline the central tenets of the forest schools movement and associated academic literatures (including Ridgers, et al., 2012; Harris, 2017; 2021; McCree et al., 2018) highlighting how the forest schools programme can again be critiqued as too-often reductive in its understanding of the relation between the child, technologies and the more-than-human. Furthermore, I introduce this forest schools context in order to situate later discussions concerning the schools I work with. It is important to outline the prominence and the wider narrative of forest schools within UK educational and third sector settings, to understand the tensions and complexities of how organisations are approaching outdoor learning. I will now turn to outline the forest schools pedagogy.

The forest schools movement developed, in the 1990s, from a specific Scandinavian-inspired approach to learning *in* nature and was intended for use within early years pedagogy as a UK version of outdoor kindergartens (Cree and McCree, 2012). It has evolved as a movement which supports, implicitly, within its pedagogical approach, the idea of nature reconnection as well as drawing on connotations of the innocence of the child and nature relationship. The key pedagogical influences are constructivist learning; holistic development; play; positive learning and development of self-esteem; and experiential learning outdoors (Blackwell,

2015). Key pedagogical theorists include Dewey, Piaget, Montessori and Vygotsky, with Dewey's argument for the *use* of natural objects for learning and Piaget's emphasis on the child's sensory experience of the material world to support cognitive development (Blackwell, 2015; Taylor, 2013). Incorporating these, alongside an appreciation of Rousseau's ideal 'state of nature', the Forest School Association states that it focuses on six guiding principles (*What is Forest School?,* no date; O'Brien and Murray, 2006). The central principles are that forest schools provide a long-term engagement of a small group of young people within a woodland environment, and that they encourage a holistic approach to non-academic-focused development, including emphasis on independence, confidence, resilience and creativity. It further encourages risk taking with facilitators 'scaffolding' intrinsically motivated learning in a non-hierarchical dynamic (ibid).

Forest schools are, thus, examples of the social constructivist approach to understanding the developmental child in nature (Waite et al., 2016). This has led to much focus of forest schools' related research attempting to measure 'improved bonding and social skills', 'increased motivation', 'increased concentration', developing 'imagination and creativity' (Murray and O'Brien, 2005); emotional resilience, emotional self-regulation and wellbeing (McCree et al., 2018; Blackwell, 2015); social and emotional development (Harris, 2017a); or 'grown-up-ness' (Kemp and Pagden, 2018), although Maynard (2007) raised a potential over-emphasis on the impact on children's self-esteem. In practice, these developmental principles are often combined with more scientific, biology-based learning about tree and plant naming, identification and processes, as well as mastery over the environment through fire lighting, wood whittling and den building, often depending on the skillset and interests of the forest school leader (Ridgers et al., 2012; Blackwell, 2015; see also Dickinson, 2013 for similar argument of other environmental education practices employing nature connection discourses). This is considered within the movement as part of a 'holistic' approach to learning, nurturing the interrelated aspects of a participants' social, personal, intellectual, communicative, emotional and spiritual development through individually 'scaffolded' pathways (*Full principles and criteria for good practice,* no date). While this notion of 'holism' might seemingly relate to later discussions about entanglement and multispecies collectivities

(Taylor, 2013) and learning *with* place (Duhn, 2012; Springgay and Truman, 2017), here it only applies to the *child's* scaffolded learning and development.

While learning *about* nature has also been incorporated within aspects of forest schools (such as learning to identify plants for foraging and understanding tree identification for skills such as whittling), much of the forest schools programme remains focused on the child *in* nature narrative (Taylor, 2013). Within this distinction is a final critique worth noting – the difference between learning *in*, *for, about* and *with* nature and the environment. Nature 'connectedness' in this paradigm is considered as something the individual child gains from being *in* nature and learning *about* nature (ibid). As noted above, the focus on the individual, social and emotional development of the participating child supports this concept of the outdoor space as being utilised as a *tool* for the focus of the child (Harris, 2017; Cudworth and Lumber, 2021), rather than considering the woodland as agential, or as a site for learning *with* more-than-human others (this will be developed within section 2.2).

Forest schools is part of a wider movement of 'alternative education' (Kraftl, 2015) - others being Steiner schools, Montessori schools and home education (ibid). Much attention is being paid to the forest schools movement as an alternative to the mainstream neoliberal classroom setting (Cudworth, 2020; Pimlott-Wilson and Coates, 2019; Kraftl, 2015; 2016). Despite these 'alternative education' programmes generally intending to counter the formal, neoliberal curriculum and attainment-based approaches to education (Kraftl, 2014; Cudworth, 2020), forest schools are now increasingly bridging the informal and formal educational approach as an 'alternative' education *within* mainstream educations (Pimlott-Wilson and Coates, 2019), included within mainstream schooling at both primary and secondary levels in large parts of the UK. Kraftl (2014) considers this 'dis/connection' whereby alternative educators are often critical of mainstream schooling yet empathetic and often working in relation with mainstream schools. This inclusion within mainstream and neoliberal educational systems has meant that in fact, often, the forest schools programmes prop these systems up (ibid). Cudworth (2020) argues that the growth of forest schools has meant this 'alternative way of 'delivering' the curriculum is becoming seen as an example of best practice' (p. 517), with

schools using their outdoor spaces to embed 'the use of this environment within their curriculum' (ibid). However, this denies the delivery of forest schools programmes the opportunity to actually *be* an alternative education or pedagogy, as it was perhaps conceived; instead, it often becomes an alternative space to deliver the national curriculum. This ensures that, in fact, alternative methods of learning, such as opportunities for relational pedagogies, for example, are omitted through the school's desire to use forest schools spaces to teach the curriculum outdoors. There are, of course, benefits for taking any learning outdoors but the entanglement of forest schools within this curriculum-based system is a contradiction in intentions. While posthuman theory is focused on 'staying with the trouble' of tensions and contradictions (Haraway, 2016), this sense of contradiction results in a confusion of pedagogical approaches, which undermines the strength of the 'alternative' education to push against the dominant mainstream system. This is not to say that all forest schools settings are based within schools, indeed the movement has expanded to include private businesses operating across the UK. The Forestry Commission, for example, delivers programmes in their publicly owned woods (O'Brien and Murray, 2006) and various third sector charities operate forest schools programmes in community-based and informal settings.

Cudworth further argues that the forest schools approach might 'present the potential for a posthuman discourse within the spaces of schools' (ibid: 507). However, again, in this the understanding of the posthuman is contradictory. As Taylor (2013) strongly argues, the approach of forest schools, as developmental and child-centred, does not correlate with a posthuman epistemology. As is evident in her positioning of the common worlds posthuman approach (detailed below), the human is considered as relationally entangled with the more-than-human. Intrinsic in this is the understanding of naturecultures. Cudworth's argument that forest schools 'can go some way in reconnecting children to nature and develop their posthuman sensitivities towards the wider environment and non-human animals' (Cudworth, 2020: 508) confuses the notion of the posthuman as something still held within a child, as a bounded entity that through reconnecting with nature can somehow 'find' its posthumanness. The posthuman is not a sensibility found through nature (re)-connection, but a relational understanding of the human as already always entangled with nature, as a

nomadic subject that is porous, unbound and agential in the emerging relations between bodies (Braidotti, 2013).

The UK forest schools movement, to summarize, while a potential alternative to mainstream neoliberal education systems within the UK context (albeit increasingly usurped by these systems and paradoxically increasingly delivered from *within* those institutions (Pimlott-Wilson and Coates, 2019; see also Kraftl, 2014 on 'alternative educations')) remains adult-led or 'scaffolded', structured and human-centric and with emphasis on the progress of the individual, developmental child (see Taylor, 2013). It further conceptualises nature as a space and resource for human development, benefit and wellbeing. Focus on the developmental child discourses, result in reductive and often extractivist practices (Nxumalo, 2020) within environmental education. I will now expand out from the forest schools example to discuss broader implications of the nature connection discourse.

2.1.4 Critiques of the nature connection discourse

In this section I will outline critiques aimed at the nature connection discourse. As I have highlighted, the nature connection discourse is found particularly within white, middleclass and Anglo-Western, neoliberal research and policy contexts. This middleclass concern of 'pure' childhoods being disconnected from nature through technology and urbanity denies the complexity of childhoods that do not exist in this milieu (Hadfield-Hill and Zara, 2019, 2019a, 2019b; Nxumalo and Cedillo, 2017; Dickinson, 2013). This therefore highlights the omission of the global majority of children and young people. It highlights the disparity between those children, living *within* Anglo-Western societies, who are contemporarily considered to be *naturally* or *ideally* connected with nature (white, able-bodied, middle-class, heterosexual, neurotypical) (Malone, 2016; McLean, 2013) and those children (those of minoritised backgrounds, disabled children and those of lower socio-economic status) who have been excluded from this imagination and in fact, are often seen as a threat or as 'out of place' when out in nature (Springgay and Truman, 2018; Nxumalo and Cedillo, 2017; Taylor, 2013). There is an increasing attention within wider posthuman research to the decolonisation

of environmental education (Nxumalo, 2019) and with it the attention to other bodies and walking with otherness (Springgay and Truman, 2017; 2019). As I have previously mentioned, Horton and Kraftl's (2018) inclusion of the extra-sectionality of the socio-material everydayness of children and natures pays attention to the intersecting socio-cultural identities and differences of children as well as the *extra* sectional attention towards the material processes and flows that children also live with. In this research, participants are from diverse socio-economic and ethnic backgrounds and have a range of different social and emotional needs and disabilities. Working inclusively and paying attention to our intersecting and extra-sectional differences was an explicit consideration within this research.

Secondly, I have highlighted how the argument at the core of this discourse, that contemporary children are disconnected from nature, emerges from a distinctly rational, scientific and human-centric epistemology. Affrica Taylor traces the development of the 'child in nature' discourse through the construction of the individual, developmental child from Enlightenment thinkers to the present day (Taylor, 2013). Nature is thus, within this discourse, constructed as pure and 'good' and positioned to be the child's 'natural' teacher. The separation of nature and culture, emerging from Enlightenment philosophers, such as Descartes and Rousseau, and its related binary logics of mind/body, pure/unpure, good/bad has become a dominant paradigm of Western thought. This brings with it several assumptions towards the types of educational practices that are undertaken concerning the relation between humans and nature, as well as assumptions regarding the measurement and study of such relations.

The implication of considering nature as the 'antidote' for contemporary societal 'ills', as Taylor highlights (2013; see also Dickinson, 2013), is that science is now incorporated to explain, examine and assert this 'natural' but broken nature-child relation. As we have seen with the forest schools research and ethos, much of this academic explanation of the health and wellbeing benefits of being *in* nature are put to use in arguing for the programmes' benefits for the individual (developmental, agential) child. To argue for the health benefits of being *in* nature, as evidenced through scientific research, is to go 'full circle', as Taylor states,

to Rousseau's conception of a pure nature as teacher and healer: 'it is now science's job to validate Nature's impeccable credentials to do its own thing' (Taylor, 2013; 57). Therefore 'rational' science, in the form of, for example, quantitative nature connection indexes, is applied to explain and examine the *internal,* psychological 'nature' of human development to support the benefits of connection of child and nature, as *external* nature (Taylor, 2013: 61). Louv's 'nature-deficit-disorder', Taylor argues, is the cumulation of this 'science fact' discourse and rhetoric used to explain the benefits of nature. I am not arguing against a greater emphasis within environmental educational pedagogy towards outdoor learning and encounters with the more-than-human, materialities and places. I am, however, concerned with how the attention and focus on 'fixing a deficit' or evidencing nature connection is distracting from the possibilities that can emerge through becoming *with* the environment in unknown, open-ended relational entanglements. As this thesis will argue, there are multiple lines of flight, flows, movements, rhizomatic routes (Prout, 2004), that becoming with the more-than-human and the digital can articulate children's relation with natures.

Thirdly and relatedly, 'testing' and measuring for 'nature connection' applies a scientific, rational approach of analysis of 'data' and quantitative surveys to affective, emotional, and embodied states of social beings. As Latour (2005) argues, from a post-structural position, there is no possibility for social sciences to treat the social with the same hard science approach of data, brute fact or objective truth. I do not agree with those employing nature connection indexes and quantitative 'scientific' approaches to 'nature connection' that it is possible to measure such affective, embodied, abstract, emotional, sensory, and relational relationships through quantitative surveying of feelings, senses, and awareness. I disagree that nature connection indexes can (or, further, should attempt to) evidence and articulate the sense of wonderment, surprise, relations, tensions, and entanglement with the more-than-human, that other forms of research, that I will discuss below, do. Instead, I think there are more appropriate, nuanced, inclusive and enabling approaches to studying the embodied, sensorial, unquantifiable, affective, relational and emotional relationships between humans and nature(s). These forms of research and pedagogical approaches propose that environmental educators, teachers, practitioners, third sector partners and government

policy makers shift frameworks and practices to better pay attention to what is already ongoing, within the complex relations that already exist beyond measure and beyond reductive evaluation (Common Worlds Research Collective, 2020).

There is, accordingly, an increasing body of work within environmental education pedagogy research (Mereweather, 2018; Harwood and Collier, 2017; Crinall and Somerville, 2020; Blaise, Rooney and Pollitt, 2019) and within the geographies of children and young people (some of which I discuss below) which employs (distinct yet related) posthuman, new-materialist and more-than-representational theories as a significant challenge to the narratives of the 'nature connection' argument. This body of work, which I now move to discuss, takes a radically different approach to thinking about humans and natures. These ways of situating and thinking about the child in relation to 'nature' is, Taylor argues, (in tune with others such as Latour, Haraway, Tsing, Stengers), of great importance in order to find ways to live on the damaged planet, as we do/must (Tsing, 2015).

2.2 Posthuman approaches to children, learning and natures

Posthumanist scholars argue against the positivist, reductive, data-focused, quantitative, objective 'hard' science, particularly within social sciences and educational research (St Pierre, 2016). Posthuman work, but more significantly broader more-than-representational work further argues for both the affective, embodied, sensorial and emotional relations (discussed in 2.2.2), as well as the relational entangling of lively, vibrant, material and more-than-human common worlds I discuss below (following Haraway, 1997; Latour, 2014; Prout, 2004; Puig de la Bellacasa, 2017; Barad, 2007; Snaza et al., 2016). In posthuman work, there is no such separation of humans from natures within naturecultures and no such bound, individualist subject as is perceived in the treatment of the rational human in the above nature connection studies. As such, the child is not considered as an individual 'being', but rather, 'relationality between human and nonhuman bodies ('entanglements') brings the individual into existence' Murris and Borcherds (2019: 198). Thus, 'human *and nonhuman entanglements* have

performativity, which is a radical shift from thinking in terms of *individual agency'* (ibid, emphasis in original).

Posthuman theories such as Haraway's technocultures and naturecultures (2003) or Braidotti's nomadic subject (2013) radically shift theory away from the Cartesian mind/body split; while new materialist theorists such as Karen Barad's agential realism (2007) and Jane Bennett's thing power (2010) bring vibrancy into the more-than-human, thus recognising socio-material processes (including naturecultures) as emergent, unbounded, living and lively. Within new materialist thought, as Stacey Alaimo articulates 'the substance of what was once called "nature," acts, interacts, and even intra-acts within, through, and around human bodies and practices' (Alaimo, 2016: 1). I will now outline some related posthuman approaches to environmental educations before moving to include more-than-representational approaches that I employ in my research.

2.2.1 Naturecultures and common worlds

While I differ in some aspects of their approach, I am influenced and motivated by the work of scholars working through common worlds environmental education pedagogies. The collective of common worlds researchers specifically employ feminist posthuman pedagogical frameworks for environmental education and broader educational posthumanisms (Lloro-Bidart, 2017; Taylor and Giugni, 2012; Blaise et al, 2013). As a growing collective of diverse and international early years educators, researchers, pedagogical mentors and scholars interested in childhood studies and education, they come together around an interest in challenging the positioning of the agential child as dominant over and separate from the more-than-human world (Common Worlds Research Collective, 2020). I have begun to outline their critique of the nature connection discourse above; this section will extend their theoretical arguments and empirical research, which is situated within pedagogical approaches. I will then discuss related, albeit distinct more-than-representational theories, that are also employed within this research before moving to consider specific work within these areas.

It is important to recognise that much of the posthuman and the new materialist theories that have emerged from within the Anglo-Western science paradigm conceptualise human nature relations through application of quantum physics (following Barad, 2007) or feminist science-technology studies (following Haraway, 1991; 2004; 2008; and Braidotti, 2013), rather than applying Indigenous knowledges. Acknowledging the liveliness of the non-human has a rich history outside of the modernist legacies of colonial, Enlightenment thought (Nxumalo and Cedillo, 2017). Large bodies of Indigenous knowledges and scholarship, as well as Black feminisms, exist outside of this Western paradigm of science with cosmologies, teachings, worldviews, and knowledges that understanding the human in relation to the more-than-human, the reciprocal, the spiritual and natures (Wall Kimmerer, 2020; Nxumalo and Rubin, 2018; Tuck and McKenzie, 2014). That said, some common worlds researchers do incorporate Indigenous knowledges within their work, particularly as it is frequently situated on unceded territories within Australia or Canada and working within the tensions of settler colonialism and Indigenous communities (Pacini-Ketchabaw and Taylor, 2015; Pacini-Ketchabaw, Nxumalo and Rowan, 2011; Nxumalo and Cedillo, 2017; Nxumalo 2019). I will be focusing on the more-than-representational, posthuman and new materialist scholarship in this research, recognising myself as a white, Anglo-Western scholar without claims to Indigenous thought or practices.

Drawing on posthuman and feminist new materialist theorists (such as Barad, 2007; Haraway, 2016; Braidotti, 2013; and Bennett, 2010) common worlds researchers argue that early years (and specifically environmental) education needs to take a more-than-human or posthuman perspective to address the complex overlapping ecological, societal, and planetary issues of the Anthropocene (Taylor and Giugni, 2012; Blaise et al., 2013; Common Worlds Research Collective, 2020), related to climate change, neoliberalist educations and the legacies and ongoing settler colonialism. Accordingly, research aligned with the common worlds research collective, is concerned with how to develop pedagogies that pay attention to the relations between children and nonhuman others foregrounding 'the enmeshment of children and more-than-human others in mutual ecological vulnerabilities' (Nxumalo and Rubin, 2018: 202). This, Taylor notes (2013), requires active engagement with the 'other', in messy and

diverse worlds, shifting focus away from the individual child and transforming the understanding of what 'nature' is and does.

This work expands from much of the work developed by Donna Haraway and Bruno Latour in their rethinking of the nature/culture binaries dominant within Anglo-Western rational, positivist science and social constructivist approaches to social science (Prout, 2004). Haraway's 'naturecultures' and Latour's' 'common worlds' are both terms which emphasise the entanglement of nature and culture, arguing that everything is always already meshed, entangled, or otherwise interdependently related together (Kind et al., 2014; Common Worlds Research Collective, 2020; Land et al. 2020). This situates the human as a porous, unbound and fluid force *within* the agential world, not as above or separate from it and thus implicates the human in the worlding, the ongoing doing of the world (Taylor and Ivinson, 2013). Agency shifts from being a possession to a 'doing distributed across multiple inter-relations actors' (Nxumalo and Rubin, 2018: 203). This further implicates the researcher as entangled and affective *within* the research (St Pierre, 2016; Hultin, 2019). Blaise et al. (2013) acknowledge how 'naturecultures' include the multispecies common worlds that children are *already always* cohabiting. I am interested in research that attends to this worlding, experimenting and working with children and more-than-human actants as a 'learning to become with the world' rather than an abstract learning about the world (ibid: 3).

Children and more-than-humans occupy entangled, mutual, and non-innocent, often destructive relations (Hohti and Tammi, 2019; Pacini-Ketchabaw, 2013). This acknowledges the mutual 'co-shaping' (ibid: 361) potentials of these relations and recognises that children live in extractivist, consumerist and colonial worlds and thus are complicit in the damage being enacted by humans. I address some of these tensions within this research. The call to other ways of learning with the world invites recognition of the multispecies vulnerability that is shared between human and nonhuman (Taylor and Pacini-Ketchabaw, 2015). Reframing the more-than-human world as vibrant and lively with agential potential is central to shifting educational pedagogical approaches in ways that matter and that have ethical and political implications (Lloro-Bidart, 2017; Blaise et al., 2013). Affrica Taylor presents the key tactics in

doing this, in a keynote address on hosted YouTube (Taylor, 2019). These include following research with high levels of affect; complexifying relations; following speculative and unfolding events; attempting to write in a way that distributes agency; and conducting research that enables thinking relationally with others. It challenges educators to think relationally and to consider a multispecies ethics of care through paying attention to the interrelated, non-hierarchical and non-anthropocentric relations in ways that can be response-able to living together in times of climate emergency (Tsing, 2015; Puig de la Bellacasa, 2017).

As Lloro-Bidart (2017) highlights, a key difference between feminist new materialisms and critical posthumanist theories (such as common worlds research) is that new materialist research might decentre the human but rarely centres the animal – this is what much of the common worlds work does or has done to date. Accordingly, much of the early work of the common worlds approach is concerned with research on child-animal multispecies relations (Hohti and Tammi, 2019) - including child-dog relations (Malone, 2016); child-insect-educator relations (Nxumalo and Pacini-Ketchabaw, 2017); encounters between children, worms and ants (Taylor and Pacini-Ketchabaw, 2015); the relations between children, spirituality and animals as companion species (Hadfield-Hill and Zara, 2019b); and children, racoons and kangaroos (Taylor and Pacini-Ketchabaw, 2017). As Horton and Kraftl (2018) argue, these might 'prioritise those materialities characterized by a singular, plainly-visible, divisible, neatly-bounded presence or haecceity' and thus 'overlook many ongoing, everyday, moment-by-moment, autotelic, intra-active, seemingly pointless or meaning-less' encounters with materialities (p.929). I am not interested in the animal particularly in my research, instead I am concerned with relations between children and technologies, watery-bodies, tree roots and crumbling, decomposing materials such as bricks, soils and minerals; more recent work within this approach has shifted to address these multi-scalar and multi-temporal socio-material relations (Pacini-Ketchabaw 2013; Pacini-Ketchabaw and Kummen, 2016; Land et al., 2014; Rautio, 2013a; Rooney, 2019; Hennessey and Rooney; 2020).

As I have highlighted through the above section, there is a growing body of post-human research attending to relational pedagogies of environmental education. I return (in sections 2.2.5 – 2.2.9) to discuss work concerning the different materialities that will be specifically addressed through the analysis chapters of this research. I now turn to other more-than-representational concepts that are also important to my research. While both post-human and feminist new materialist work overlaps in many aspects with the below more-than-representational approaches, there are distinct differences in these approaches; significantly, more-than-representational theories are less concerned with materialities but also attend to affect, emotion, the body and the multisensory. These concepts and theories are interwoven within the above research but demand more focused attention.

2.2.2 Employing more-than-representational approaches

Scholarship considered as part of more-than-representational (otherwise called non-representational) approaches also considers the ongoing, everyday, affective, sensory, and the embodied processes and intensities of *doing* of bodies in practice and performance (Horton and Kraftl, 2006; Whatmore, 2006; Boyd, 2017; Sheller, 2015; Hackett and Rautio, 2019), in relation with assemblages of lively materialities, affective atmospheres, forces and nonhumans (Vannini, 2015: 318). Within the sub-discipline of geographies of children and young people and interdisciplinary childhood studies, this means moving towards the 'extra-sectional' (Horton and Kraftl, 2018a), the 'more-than-useful' (Horton and Kraftl, 2006), and the mundane and the 'hyper-diverse' (Kraftl, Bolt and Van Kempen, 2019) ways in which children and childhoods intersect with materials, places, bodies and the sensory: 'we live *through* what is happening' Boyd, 2017: 29). Recognising that the social and the material are complexly entangled, concepts emphasise the entanglement rather than a dualistic separation of bound entities.

More-than-representational approaches instead use concepts such as agential realism (Barad, 2007), assemblages (Deleuze and Guattari, 1987), meshworks and dwelling (Ingold, 2000), actor-network theory (Latour, 1996), hybrids (Thrift, 2004) and, as discussed, naturecultures

(Haraway, 2008) and common worlds (Taylor, 2013, following Latour 2014) to reconsider the affects, forces, and relations between human and more-than--human bodies and materialities. This shift recognises worldly relations that are more-than-human, more-than-textual and multi-sensual (Vannini, 2015). More-than-representational approaches understand research as part of going on in the world rather than reporting back from the world (ibid). Researchers are thus not collecting 'data' to represent an objective reality but instead seeking to disturb, intensify, explore the present through embodiment, spatiality, and sociality – to blur hybrid spaces like the bodily and the virtual (ibid: 134). Snaza et al., (2016) specifically highlight new materialist work concerning the ways in which the material is entangled with curriculum, pedagogy, educational spaces and research practices. These theories propose other possible ways to research children's learning with natures (and digital technologies) that can perhaps offer more nuanced, complex, unfolding and rich expressions of children as always already connected with the world. In the remaining sub-sections of this literature review, I will draw out some of the key theories that are influential in more-than-representational approaches.

2.2.3 Affective and emotional relations

The 'affective turn' in emotional and affective geographies has been influential in new materialist and more-than-representational research concerning children and young people, given its focus on the forces *between bodies.* Affect theory, following Thrift (2004), Massumi (2015) and Manning (2016) considers the pre-conscious and pre-subjective forces and intensities that affects bodies to act and be acted upon. Its effects can be qualified as emotions and feelings; it is felt on the body, can be transmitted through the body and is thus social (MacLure, 2010: 284). Affect is understood as a relational force working and circulating between bodies (Truman, 2019) to produce connections and relations (Mulcahy, 2012), rather than emotion or action as a conscious and individual *effect* of an affective force (Thrift, 2007). This shifts understandings of affect from 'an inner psychological state of human *being,* to affect as embodied practices of assembly, human and otherwise' (Mulcahy, 2012: 11, emphasis in original). This brings into relation material-discursive performances and practices (Barad, 2003) understood as human and nonhuman matter and materiality as affective in

relation to each other through assemblages of bodies, intensities, and forces. Thus, affect is *in-between* bodies; it is not an individual feeling but a dynamic intensity between bodies affecting atmospheres (Buser, 2014; Whatmore, 2006; Ingold, 2012; Boyd, 2017). Hickey-Moody (in Mulcahy, 2012) argues that affect is a 'material exchange' an enmeshment between bodies, human and nonhuman through which some kind of knowledge is produced. This affective capacity might 'stick' to bodies (Ahmed, 2014) creating differences that matter thus highlighting the intersectional 'subjectivities' that concern feminist, queer and critical race and disability researchers. Thus, attending to how affect is differently felt by different assemblages of bodies and therefore the implications of how bodies *become* (Truman, 2019) through various affective forces is important for ethical and politically engaged research.

For my research, I am interested in how affective atmospheres might shift our learning and walking together with the materialities and natures of the park. Through our assemblage of bodies within this research, affective moments shift how we respond to each other and thus have impact on pedagogical contexts. Mulcahy's research (2012) into what geography teachers *do*, explores moments of affect and the material arrangements or assemblages that make up pedagogical moments. Mulcahy argues that by thinking about pedagogy as an assemblage 'affords a sense of collective responsibility' (2012: 21). That the pedagogical relations affecting teaching encounters are assemblages of social and material entities 'embedded in distributed, heterogeneous and specific practices' (ibid), brings in opportunity for material outside of a textbook curriculum, such as news stories, materiality of the classroom, jokes and conversations between pupils and teachers to all become part of the affective pedagogical practice. Affective encounters within pedagogical practices, for Mulcahy, open opportunities for connection, for shared atmospheres, stories and responses that are not set within fixed, bound roles of individual teacher versus learner, instead allow for moving, relational and unknown 'pedagogy *as* friendship' (Albrecht-Crane, 2005 in Mulcahy, 2012: 22, emphasis in original; see also Kraftl, 2014 for discussion of love and care in alternative education spaces). I am interested in how moments of affect, connection and shared doings between our research assemblage might develop this idea of pedagogy as friendship, as an atmosphere of care and comfort that extends beyond the human relations

and also towards the more-than-human. The sharing of stories and responses between children but also non-human responses and atmospheres opens up pedagogical opportunities for learning with materialities such as minerals, watery bodies and bricks. Furthermore, through the research-creation process that I outline in the methodology chapter, I extend this concept of pedagogy as assemblage to consider pedagogy as an assemblage of *thinking-making-doing processes* (Manning, 2016) of learning with children, technologies and materialities.

2.2.4 Haptic, embodied, multi-sensory and sounding relations

As well as the concept of affective atmospheres and emotional relations within research with children and learning, more-than-representational approaches also study the multi-sensory of the everyday, including through haptic and sonic senses as well as visual and embodied. Paterson (2009) considers haptic geographies as 'responding to bodily sensations and responses that arise through the embodied researcher' (p. 766). He suggests that the 'somatic senses', such as tactile, kinaesthetic tensions, balancing, touching, feeling, and sensing, must be included in research, as predominantly qualitative research has been attentive to the visual sense. This is echoed by Kraftl (2013) in relation to children's emotional geographies and their (predominant at the time) focus on voice and agency. Woodyer (2008) suggests that to overcome both the biological determinism and the social constructivism that has dominated children's geographies, attention to 'hybrid' childhoods and particularly to 'embodied practice and haptic knowledges' (p. 350) is essential. For Woodyer, the haptic is the relational interface of 'subject and object, the human and non-human' (ibid). While Boyd (2016) acknowledges the multiplicities of this sensuous turn in geographies, which include the haptic, the sonic and the scented, she argues that they perpetuate the ideas of senses as being experienced in separation. Instead, she considers Massumi's argument for 'proprioception', which might be understood as 'the profound sense of being in the world' (ibid: 53) or being alive. Kind (2013) considers a 'haptic perspective' as how one 'perceives the world through movement, touch, and one's feet in contact with the ground', (p. 436) rather than a solely visual perception of the world, this includes Sarah Pink's concept of 'walking with' the camera (ibid). This relates back to the earlier section on affect and highlights the shared concern with the in-between,

the relational and the embodied. It further echoes the research-creation approach that I discuss in Chapter 3, through the idea of emergence. Land and Danis (2016) discuss their pedagogical research on movement in early years settings by drawing on Manning's work, which highlights that bodies and movement (or equally bodies and senses) are not separate but are ongoing and emergent: 'movement happens *with* bodies; bodies matter *with* movement' (p. 31, emphasis in original).

Research concerned with emplaced, embodied and the multi-sensory has developed practices with video (Pink, 2014; Paterson and Glass, 2020), sound and intra-active, multimodal sounding and listening practices (Gallagher, 2016; Gallagher et al., 2017; 2017a; Wargo, 2017), sound related to education (Gershon, 2011; Gershon and Appelbaum, 2018; Goodman, 2017; Verstraete, 2017; Gallagher et al., 2017a) and sounding research-creation practices (Shannon and Truman, 2020; Shannon, 2021). Other more-than-representational research related to the embodied and the multi-sensory include performance-based methodologies, such as walking (Horton et al., 2014; Brown, 2017; Wylie, 2005) and moving (Land and Danis, 2016). This includes attention to the body and the material through embodied relations to place (Nxumalo and Rubin, 2018). In my research, I am interested in the multi-sensory, or perhaps the idea of proprioception, through both the embodied practices of walking, tapping, sounding, rolling, running, wading, paddling, and lying down during our walking research but also through the embodied and multi-sensory responses during the creative workshops and the website and video sessions. However, I am more inspired by the work of researchers influenced by research-creation modalities or techniques (Loveless, 2015; Manning, 2016) and the post-qualitative, relational, and intra-active approaches to the embodied, the affective and the multi-sensory (Caton, 2019; Springgay and Truman, 2017; Land et al., 2019; 2020; Hackett and Somerville, 2017).

Much of this work pays attention to the intra-active and relational differences of the socio-material, entangling materialities, place, technologies, and human bodies in practices of becoming. I am further interested in these in relation to the more-than-human (Springgay and Truman, 2017a), including weather, water, soils, muds and the digital. Springgay and Truman

acknowledge the multi-sensory in relation to the transmaterial and consider how embodiment needs to move beyond the idea of 'an individual and sensuous account of the body in space' (ibid: 30) towards accounts that include the more-than-human and displace human mastery (see also Alaimo, 2016). In my analysis of the affective, sensorial, and embodied relations within this research, I will also discuss the sensing of the GoPro and the affectual performances of weathering and watery bodies, in relation with the child participants.

I shall now move to focus on how posthuman, feminist new materialist and more-than-representational research, with concern for environmental educational pedagogies, address relations between children and the geologic (Nxumalo, 2017; Springgay and Truman, 2017; Hadfield-Hill and Zara, 2019); children, water and weather (Rooney, 2019; Blaise, Rooney and Pollitt, 2019; Hadfield-Hill and Zara, 2019a); child-nature relations (Rautio, 2013); and child-technology-environment relations (Land et al, 2019). In this sense, all the following examples explore the ideas of relational ethics with more-than-human relationships and how this relates to either children's educational pedagogies or children's everyday lives.

2.2.5 Children and the geologic

Thinking differently about human relations with the earth involves shifting towards a more temporally distributed and materially mixed mode of subjectivity, queering it as the geologic subject (Yusoff, 2015). Interdisciplinary posthuman researchers have, following Yusoff and others (Clark and Yusoff, 2017; Grotz et al., 2017; Puig de la Bellacasa, 2017; Springgay and Truman, 2017), offered concepts such as 'geo-theorizing' (Nxumalo, 2017) and the idea of the child as 'geological agent' (Hadfield-Hill and Zara, 2019: 2) as ways to reconsider the relations between child and Earth, recognising that humans are made of earth forces (Somerville, in Springgay and Truman, 2019). The 'geologic' understands the human body as transcorporeal and transmaterial, co-composed with forces and elements that make up the earth, (ibid) assembling with rocks, stones, and minerals. In 'stone walks' Springgay and Truman (2017) consider encounters with stones in Canada, Wales, and Australia, to challenge the idea of rocks as one of three assumptions - lifeless, a resource or a threat (ibid: 851) and instead consider rocks as 'animate, affective, quivering, and reproductive' (ibid, 852). To this end, they

articulate rocks and archives as 'interfactual, transcorporeal, and transmaterial co-compositions' (ibid); I return to the archive in Chapter 5 and to rocks in Chapter 6.

This destabilizing of ideas of rocks and stones as solid 'things', through terms such as transcorporeal, transmaterial and co-composed (ibid) opens possibilities for relations with materialities beyond their human use as resource, inert matter or cultural artefact (Ingold, 2012). Ingold argues, following Delueze and Guattari, for materials as becoming, in flows of continual variation and argues that to know materials we must follow them and 'co-respond with them' (ibid: 435). Rautio (2013a) considers the agency and vitality of stones through the autotelic practices of children carrying stones. Through this she highlights the intra-action between the stone and the child, acknowledging the stone's agential potential in shaping human behaviours and relations to geologic. Understanding stones as vibrant and animate is productive in events that took place during our research. Firstly, through experimenting with carrying, corresponding with (and deconstructing) bricks; and secondly with magnet fishing[6]. These events sparked inquiry into the animate mineral and magnetic compositions of rocks, which during our inquiry led to learning with transcorporeal entanglements of minerals with multiple other bodies.

Recognising children as geological agents (Hadfield-Hill and Zara, 2019) positions children as active in shaping and affecting the materiality of the earth. Hadfield-Hill and Zara (2019) offer children as geologic agents in three main ways - through the working with clay, water, mud and leaves, children are shifting and moulding Earth to make pots and medicines; through their carrying and moving of water and encounters with landslides, they understand geological movements at different temporalities; through their living on land in the process of urban transformation, they are entangled in the building of new infrastructure. This relation to the earth and the materiality of the world necessitates thinking about different ethical and political response-abilities of humans to the more-than-human common worlds we inhabit

[6] Magnet fishing is an activity which involves using a powerful neodymium magnet attached to the end of a long nylon rope in order to pull out metal and magnetically attracted material from locations. It is often used to reach underwater and has become a phenomenon documented by various interest groups on YouTube and other social media sites.

(following Alaimo, 2010; Alaimo 2013 and Hekman, 2016). Hadfield-Hill and Zara (2019) also consider how, as geological agents, children are entangled in the material changes and movements of the earth, affecting geological processes and transformations at different scales and temporalities. As 'tiny earth movers' (ibid), children as geological agents are composed of and entangled with geology and geological forces and thus in this sense we can no longer talk of a detached human relation to 'nature' as 'out there' (Alaimo, 2016) but instead need to tell emplaced stories which reconsider children's material relations with the forces of the earth (Kraftl, 2020).

The term 'geological agent' is useful in my research when considering some of events that took place, such as tree planting, whereby children were affecting and affected by working with the ground and materiality of the earth, digging, and moving earth and worms and grubs and stones in order to plant new trees in the soil. Turning the ground as earth (Ingold, 2012) - agential, lively and as life itself, including holding nutrients to sustain new tree roots - shifts the understanding of the earth from layered surface, towards earth as deep, as full of complex organisms and living processes. This relational framing of tree planting challenges the dominant human-centred 'saviour' conceptualisation of tree planting and instead foregrounds the material and geological relations between human, tree whips and earth.

Relating to forest schools research and applying a new materialist framing of agential realism, material entanglements and assemblages, Mycock (2018) discusses the mud in forest schools settings. She considers mud-child bodies as becoming 'messy hybrids' (ibid: 9) and highlights the gendered and classed concerns that emerged through socio-material relations of mud and 'dirt' or becoming 'dirty'. This she then relates to the agential cuts made by waterproof clothing which became part of a hybrid body facilitating child-mud relations and intra-actions. This relates to Hadfield-Hill and Zara's notion of the child as 'geological agent' through shaping and affecting the matter of mud through child-waterproof-mud assemblages, but also highlights the extra-sectionality of socio-material processes within diverse children's intra-actions with natures. This relates to events which took place during our walking research, whereby the child-waterproof-soil-water assemblage enabled us to get stuck in the mud, to

walk with watery-bodies and to become geological agents in a variety of ways. To this assemblage, I add the digital technologies that further formed 'messy hybrids' with geologic and human bodies.

For Nxumalo, understanding children's subjectivities through the geologic and 'geotheorizing' challenges the 'settler colonialist' (Nxumalo, 2017: 558) approach of human dominance, extraction, accumulation, and commodification of nature that is dominant in early educational curriculum. She argues that 'extractivist' thinking influences even early years education and presents a continuation of colonial approaches to nature – through mineral extraction, 'scientific' categorization, labelling, display of the 'thing', the object, the specimen, the rock as non-agential and for child-centred utilisation. Nxumalo disrupts this through geontological pedagogies which recognise the lively materiality of mountains and their relations with children's knowledge-making, moving towards indigenous storying and recognising rocks, stones, mountains, moss, and the earth in order to decolonize education and reshape the ways in which children relate with the Earth (ibid). While being aware of the appropriative problematics of applying indigenous approaches of knowledge-making to situated contexts of place that do not share these indigenous histories, as in my research site, I find Nxumalo's work useful and important in challenging dominant discourses of environmental education. In highlighting what kinds of knowledges are being constructed through an extractivist and neo-colonial approach – that of destructive and consumptive taking from the land - some of the actions and events within this research, specifically magnet fishing and performing Minecraft, can and will be troubled.

2.2.6 Children and place, land and geos

Further to thinking with the geologic, much of the feminist new materialist and posthuman research has considered relations to place, land and geos. Duhn (2012) argues for a pedagogy of place that understands place as a 'lively assemblage' of forces and matter. This assemblage of place moves attention to the entanglements between child and matter and therefore requires a different kind of political and ethical relation to 'place'. Such an ethics of place as lively assemblage becomes one that acknowledges the non-innocent relations and unequal

response-abilities (Hadfield-Hill and Zara, 2019) humans have in relation with place. I work with this consideration of place as a lively assemblage of relations within this research and further draw on how Taylor and Giugni (2012) utilize Doreen Massey's characterisation of place as 'a heterogeneous 'event', involving geological, human and more-than-human 'throwntogetherness' (Massey, 2005: 138, in Taylor and Giugni, 2012: 114).

Land et al (2020) consider 'lively digital place stories' as an intentional approach of staying with the trouble of 'thinking together with children about how we can care with the park and forest right now' (p. 138), arguing that Facetiming with iPhone technologies tells stories with specific places, that help develop pedagogical methods for attuning to the specific relations of the places they are in. Land et al. develop their term 'lively digital place stories' through thinking with Nxumalo and Cedillo's (2017) concept of 'place stories' as 'storytelling that foregrounds the complex politics of place in children's everyday encounters' (Land et al. 2019: 30) together with van Dooren's (2014) 'lively stories' as a 'methodology for attuning to more-than-human others' (Land et al., 2019: 30). Nxumalo and Rubin (2018) further develop 'waste stories' as other embodied and more-than-human stories of place. This highlights the importance for situated and ethico-political practices of researching with place and the more-than-human.

For Goodenough et al., (2021), understanding the intra-active flows of activity within forested places, and specifically between trees, children and other nonhuman actants, positions 'cultureplaces' as partners in children's play, rather than static non-agential places. Goodenough et al. recognise that through new materialist understanding of trees and plants as agential partners and responsive to their encounters with children demonstrates a more-than-human ethical responsibility and care to place relations. This notion of care (following Puig de la Bellacasa, 2017) is also recognised in Drew and MacAlpine's (2020) storying of place, through forest encounters, as acknowledging the displacement of more-than-humans through human ecological destruction. As with Goodenough et al.'s research, in our research, place equally isn't understood through human familiarity, attachment or romantic innocence but instead is entangled with destructive and damaging actions and responsibilities of care.

Springgay and Truman (2019) consider how methodologies in postqualitative and more-than-human research should expand to include 'land and geos' in attempts to disrupt dominant human-centred place-based research. Arguing that understandings of place-based learning are 'entrenched in ongoing settler colonialization' (Tuck and McKenzie (2015) in Springgay and Truman, 2017: 17) attention to land and geos includes the nonhuman and forces beyond the human. Through various walking and research-creation interventions, they query what it is to walk *with* the land through embodied learning, rather than abstracted and detached learning *about* the land. I take much from their conceptualisation of walking as research-creation and expand on this in Chapter 3. For Riley (2020) turning from place-based to land-based experiential education is a posthumanist and postcolonial move which shifts away from student-centred education. This land-based education, Riley argues, must, again, involve a social and material turn towards learning *with* the land through worldly intra-actions, rather than a discursive learning *about* the land. Styres et al (2013) make clear the difference between a pedagogy of place and a pedagogy of Land - taking Land as the 'the spiritual, emotional and intellectual aspects of Land. Land as sentient' (p. 37) in the context of (Aboriginal) Indigenous knowledges (Styres, et al. 2013). The significance of Land (which is capitalised in their research) within Indigenous knowledges as always having been alive and living is important to differentiate from new materialist and posthuman theories that begin to consider vital assemblages of place.

Nxumalo and Cedillo address the decolonizing of place in early childhood education, focusing on unsettling dominant Anglo-Western knowledges of place through other knowledge-making practices and argue that despite the tensions between posthuman geographies, Indigenous onto-epistemologies and Black feminisms, they might work productively together to 'unsettle place' and challenge colonial and modernist ideas of children and nature as disconnected (Nxumalo and Cedillo, 2017: 100). Thus, while it is important to acknowledge the different trajectories and epistemologies that relate to place and land pedagogies, for some this coming together in tension of posthumanisms and Indigenous knowledges is productive in unsettling developmental environmental pedagogies (ibid: 107).

In our research, I work mostly with the concept of place as lively (following Duhn, 2012), rather than addressing the concept of land. This is mainly because as a research group we did not collectively address the specific ethical and political tensions and histories tied up with this land. I do discuss this in part in Chapter 3, presenting some of the complex colonial legacies and histories associated with the land and former ownership, however we had not begun to discuss or address these collectively before our research ended. I acknowledge this as an ongoing tension within this thesis. I do however, in considering place as a lively assemblage discuss some of the tensions and ethical complexities of some of our inquiry, not seeking to 'fix' these but to stay with the trouble of persistent extractivist and human-centric logics (following Haraway, 2016).

2.2.7 Children and water

As with new materialist and posthuman research that takes the 'geologic' and ideas of 'geontology' to trouble or 'queer' (Yusoff, 2015) material, temporal and scalar relations between the human, the nonhuman and the geological materiality of the earth, so too does a 'hydrologics' (following Neimanis, 2013) aim to think with watery bodies to trouble becoming worldly with water (Pacini-Ketchabaw and Clark, 2016). Through the need to think differently about how humans relate to water in expansive and alternative ways from the colonialist and extractivist approaches of the Anglo-Western world, posthuman and feminist new materialists have developed speculative figurations to think differently with water (Crinall and Somerville, 2020; Pacini-Ketchabaw and Clarke, 2016; Taylor et al. 2020; Hadfield-Hill and Zara, 2019a; Horton and Kraftl, 2018).

Astrid Neimanis has extended Haraway's idea of the 'figuration', enabling a mapping out or 'figuring' of bodies of water to better enable us to pay attention to watery relations (Neimanis, 2013). Neimanis also builds on Stacey Alaimo's concept of 'transcorporeality' to consider how different bodies become attuned to each other through 'contact zones' where bodies meet and differences are produced, thus encouraging us to think how human bodies might relate to watery bodies. Her watery body figurations include water as gestational, water as

dissolving, water as a means of communication, water as difference, water as archive, water as unknowable, water as returning and repeating and always different (ibid). These speculative figures of water enable us to recognise that water can be a multitude of bodies, it can destroy and can contaminate, flood and dry up.

Applying Neimanis' 'hydro logics' to a common worlds environmental educational pedagogy, Pacini-Ketchabaw and Clark (2016: 100) ask how hydrologics enables us to differently 'get close to water' and 'becoming worldly with water'. They recognise how mainstream Anglo-Western early education restricts children to learning about water in a developmental and extractivist framings. Instead, they propose 'responding to water's unknown qualities rather than attempting to master water' (Pacini-Ketchabaw and Clark, 2016: 100). Berry et al. (2020) argue for the river as a pedagogical contact zone to disrupt discourses of 'purity', instead acknowledging the materiality of the contamination and pollution inherent with watery bodies. Horton and Kraftl (2018) extend Neimanis' hydro-logics to consider how water as archive, unknowable, communicative and a source of differentiation brings 'smearing-swarming-percolating' (p. 928) more-than-human socio-materialities into relation with the extra-sectionalities of age, class, race, religion and everyday lives of young people. Postila (2019) proposes 'water as method' and following water as a 'science led by curiosity' (p. 227) to consider how encounters with water produces knowledge about drought, flooding, pollution and other environmental issues. Focusing on everyday encounters, rather than pedagogical approaches, Hadfield-Hill and Zara (2019a) consider how posthuman research understands water as unstable, liminal and affective (ibid: 4). They demonstrate how water becomes more than a pedagogical resource, more than a playful resource and more than a measurable, drinkable and containable body. Instead, watery relations and entanglements affect children's everyday lives, bodies, places and relations with the more-than-human world.

Differently from the above posthuman research, other more-than-representational research considers water as affective in care and caring 'landscapes'. For Djohari et al., (2018), for example, young people feel the affective atmospheres of waterscapes as safe and comforting, through the affective 'flow' state of the material and embodied practices of fishing. Buser et

al. (2020) also consider 'blue space' as caring space and how the enactment of 'waterscapes of care' include the agency of water in this co-production of care (p.1040).

In order to move beyond just thinking of water as fluid, Neimanis' hydrologics requires us to respond to the different relations between the water and bodies and thus to better address the ethical and political issues of water as '*part of a global hydrocommons'*. Do Nascimento (2019) argues that

> (W)ater is political – its notions and engagements are drowned by social meanings, contaminated by colonial histories, and bound by geography – water is lost at sea (p 47).

Paying attention to how water is political is important in shifting possible ways of being in the world (ibid). In relation to the political figuration of water, Horton and Kraftl (2018) include watery bodies as part of the 'percolating', 'smearing', 'swarming' socio-materialities of children's everyday outdoor play, including the 'flows of water, toxins and racialised affects' (p.926). Through acknowledging how the percolating watery bodies and materialities relate to the socio-material affects of racism and socio-economic differences.

This responding to water extends relations between children and water into wider material and intersectional concerns and encourages thinking beyond child-centred, developmental and rational 'scientific' use of water towards recognition of the complex and uneven relations to watery bodies. In our research, much of our walking involves being with water, thinking with water and human bodies encountering watery bodies of duckweed-filled ponds, rivers full of rubbish, fast flowing storm water, oily watery spills and smelly duck ponds. We come to think with water in some of the different figurations offered by Neimanis, as well as Pacini-Ketchabaw and Clark, and extend our relations with water beyond that of the knowable, rational, containable, and measurable 'fluid' water that is often constructed in classrooms. In this way, for our research assemblage, thinking and learning with watery bodies, pollutions, water inequalities, issues of flooding, drought, chemical pollutants and other watery issues become part of a more-than-human relational pedagogy.

2.2.8 Children and weather / weathering

As Hadfield-Hill and Zara (2019a) discuss in their work on Indian monsoon watery relations, water is more than just fluid, it is part of the weathering world, in rain, erosion, shifting of earth and transforming of the geologic through wearing away. Their work brings together the everyday, affectual and embodied relations between children and young people and the monsoon. It highlights water as unstable, liminal and affectual within the fluid inequalities of children's everyday lives. This relation of water, weathering and the everyday relates to Vannini et al. (2012) who consider the human relation to the weathering world through the embodied practices of weathering-place, much like dwelling relates the body to place (following Ingold, 2000), a body is shaped 'by the weather-places is has come to know' (Vannin et al., 2012: 373). Weathering bodies and weather worlds are another focus of posthuman theorists, extended to the more-than-human in thinking with how children's encounters with weather and how attending to different weathering times and scales can enable rethinking about climate change pedagogies and more-than-human relations (Rooney, 2018; Rooney, 2019; Blaise, Rooney and Pollitt, 2019). Blaise, Rooney and Pollitt propose 'weather wanderings' as a walking intervention that challenges developmentalist approaches to children's walking and learning as being focused on their discovery, control and mastery of 'nature' and the world (p. 166). In their weather wanderings, instead of discovery and conquest of the land and environment, walking with weather is a generative, immersive and more-than-human practice. As Weldemariam (2020) points out, in Rooney's weather wandering, weather is not a concept but a vital materiality; a lively force that comes together with children in weather-child assemblages affecting bodies and enmeshing children with weather materialities. Blaise, Rooney and Pollitt work with the figuration of 'weather bodies', following Neimanis and Walker (2014), in Blaise, Rooney and Pollitt, (2019), acknowledging that our human bodies are also weather bodies, along with other more-than-human bodies. They state:

> weather wanderings are an invitation to wonder-with weather; atmospheres and elements move through children's bodies while they move with more-than-human others in worlds that are being shaped by care and carelessness (ibid; 167).

In both wandering and wondering with weather, children respond to the agential world as they intra-act in non-linear temporalities and spatialities. Time, for Neimanis and Walker (2014) *is* weather and weather *is* time. Weldemariam argues that there is an opportunity within new materialist approaches to weather assemblages for teachers to 'turn around' the dominant weather pedagogies, such as the weather calendar in which humans 'predict' the weather, to recognise the agential potential of weather as vibrant, lively, changeable and temporal (Weldemariam, 2020).

Furthermore, when weather wandering, the weathering effects of wind and sun and rain are witnessed both in the more-than-human materiality as well as felt through the body, further acknowledging the vitality of weathering forces. This might be in the event of noticing weathered bones and decaying dead animals altered in state by wind, the sun or cold (Blaise, Rooney and Pollitt, 2019), thus acknowledging how weathering affects child-animal relations. Or in the weathering of trees, fallen and thus both dead and living, the ongoing weathering of more-than-human agencies complicating linear time narratives (Rooney, 2019). In encountering a pumpkin's decay, Hennessy and Rooney (2021) consider the tempos of decay as again disruptive of any human-centric views of time, place, growth and decay (p.1). These tempos of decay highlight how children and matter, such as the pumpkin, become weather, 'weathering the on-goingness of life, matter, weather and decay' (ibid: 6). For Rooney, weather wanderings also enable acknowledgement of the complexities of the everyday, ongoingness of climate change and how children are entangled in these multi-scalar challenges (2019: 179). Rooney encourages a slowing down and taking time, stillness and persistence with weather wanderings, following feminist new materialists and posthuman theorists Isabelle Stengers' and Anna Tsing's desires for slowness and the art of paying attention (ibid: 180).

2.2.9 Children and digital technologies

This research involves digital technologies, including waterproof GoPros, websites and YouTube channels. I am interested in the merging, overlapping, flows and spilling over of digital practices and knowledges into both the informal learning and the embodied encounters of this research – considering this entangling as 'techno-naturecultures', following Haraway (2003) and Latour's 'common worlds' (2014). Digital knowledges become part of our walks in unexpected ways. Paying attention to participants' informal knowledges from digital platforms such as YouTube became a productive and exciting part of our research-creation and inquiry. Recognising technology not as a distinct or separate aspect of formal education, nor as a tool to be mastered or learnt (such as through digital literacy) (see Land et al. 2020) but as entangled as techno-naturecultures and as ubiquitous within children's everyday lives and learning environments (Prout, 2004), enables a playful experimentation with children's embodied performances, languages and knowledges that include the digital (Kullman, 2012; Kind, 2013). I am interested in how GoPros, YouTube, websites, nature programmes or Minecraft gaming, for example, entangle with the ways children learn *with* environments, natures and materialities. It is therefore important to examine literatures related to children, digital technologies and natures.

Media and technologies literature within childhood research has been broadly focused on the *utilisation* of technologies for human and childhood practices (Gallagher, 2020). In this research, I do begin to broaden out conceptualisation of technologies, in include the digital technologies we collaborate with but also to include broader technologies such as the rusting mechanical technologies of the car parts, fridges, neodymium magnets, nylon ropes and man-made materialities that become part of this research. However, generally within literatures focusing on technologies, areas include digital methods and approaches within children's geographies (Ergler et al., 2016); application of digital technologies for formal and informal learning (Dubovi and Tabak, 2020; Greenhow and Lewin, 2016); the digital and 'mobile' parenting practices related to YouTube (Burroughs, 2017); digital and social media related to everyday lives (Dezuanni et al., 2015; Mavoa et al., 2018; Plowman, 2016); and digital

technology in relation to children's mobilities (Jarvis et al. 2017; Nansen et al., 2015). Prout (2004) offers a relevant early insight into relational approaches to children, technologies and natures by employing Deleuze and Guattari's theory of assemblages along with Haraway's notion of the cyborg to consider child-computer assemblages as 'emergent entities' (Prout, 2004: 120). He notes how children working with ICT and computer technologies 'have led the way in accepting the hybrid, heterogeneous character of things, able to 'cycle' through a range of possibilities and ambivalences at high speed' (ibid: 126), these include blurring the boundaries of the living and non-living and the conscious and non-conscious (ibid). Wargo (2018) considers the 'withness' of wearable technologies (such as GoPros) as 'materially performative of the posthuman subject' yet rather than considering the 'literal cyborg', attends instead to the 'relational practices and assemblages the child becomes enmeshed in' (p. 506). It is this kind of relational assemblage that I am interested in when considering our experimentation and learning *with* GoPros. Sylvia Kind's (2013) work on creating and improvising with photography cameras and children pushes this assemblage approach to seeing photography 'as a process of collaborating and moving *with* the world, an in-between space, rather than a view from either the outside or inside' (Kind, 2013: 429, emphasis in original) in order to refuse the gaze of photography as being to objectify a truth, actual event or static representation. I will now discuss some of the central ways in which digital technologies have been framed that relate to my research; firstly in education, secondly in relation to place and natures and thirdly in relation to digital online practices.

2.2.9.1 Digital technologies, informal learning and digital literacies

Digital technologies are becoming increasingly included into educational spaces and curriculum, with tablets, interactive whiteboards, iPads, YouTube and computers incorporated into educational practices within mainstream schooling. Much of the research concerning educational relations to digital technologies considers how to understand and situate the role of technology within learning environments; whether schools should be engaging with social media (Greenhow and Lewin, 2016); how to recognise and incorporate children's at home practices related to digital technologies within school teaching (Gillen and Kucirkova, 2018); how digital literacy informs pedagogy (Sefton-Green et al., 2009); what we

understand as digital literacies (McDougall et al, 2018; Meyers et al, 2013); and how should the unequal access to digital technologies at home and outside of school be addressed (Sefton-Green et al, 2009). Greenhow and Lewin (2016) discuss the informal/formal boundaries of learning, concluding that the binary approach to learning related to social media technologies is too simplistic and doesn't allow for the reality of complex learning contexts.

Gillen and Kucirkova (2018) argue that a posthuman perspective on 'classroomness' can be helpful to acknowledge how multimedia technologies can 'percolate' between home and school spaces, creating learning and connecting opportunities for families and children and challenging binaries of home/school and informal/formal learning. This idea of a dynamic relation of technologies between children's home and school lives, and recognition of how children's 'moment-by-moment activities in the classroom' are 'inflected' (ibid: 843) with their knowledges of technologies flowing from other spaces, is useful in my research. This intermingling and dynamic relation demonstrates the multifaceted and complex entanglement with technologies that children experience and how these entanglements do not stop once children 'enter' a school environment. White et al. (2021) consider the 'intermingling' of technology, biology and the social whereby the digital becomes part of an 'active human-technology interface' (ibid: 8). For White et al., analysis of a school's use of digital documentation platforms, highlights this intermingling through teachers' use of photos, video, text and audio files to share children's learning journeys with families (who log in from home) and other educators. But, as White et al. question, what kind of 'seeing' of learning is being communicated and how does that affect what is considered 'learning' by educators. They argue that learning became identifiable by educators as being 'tag-able, trackable, complete and co-constituted' (ibid: 11) and that this attention to the production of artefacts of 'seeing' learning is not neutral. As my research shall articulate, children's knowledges and relations with digital technologies were constantly emerging, through embodied performances and storytelling, however the agential potential of the digital technology (no longer considered 'neutral') affects how these learning events emerge and also how I contextualise or value them as learning opportunities.

I am interested in research which proposes alternatives to the binaries related to formal/informal learning, digital/physical worlds, good/bad technologies and nature/cultures. As I have discussed, I have encountered this good/bad binary understanding of digital technologies (such as mobile phones, iPads, GoPros) within forest schools practices and have demonstrated how digital technologies have been framed as bad, dangerous and damaging to children, particularly regarding their relation and 'connection' to nature. As Chapters 4, 5 and 6 will articulate, digital technologies, knowledges from online platforms and broader technologies, including car parts, guns, fridges and bombs were complexly related with our walks and encounters. I am interested, therefore, in how McDougall et al. (2018) argue against technological determinism and a binary view of digital technology as either good or bad within education, instead recognising that the *uses* of digital literacy are central to examining how the digital is incorporated into learning. While the idea of 'uses' doesn't fit within the posthuman conception of technologies as agential companions (Land et al. 2020), which I will explore later in this review, McDougall et al.'s term 'dynamic literacies' highlights how digital technologies can be employed for collaborative meaning making, storytelling, learning and digital curation, which can facilitate an expansive digital literacy extending outside of schools, into home life and community 'third spaces' of learning (ibid). I am not interested in the use of technology *for* digital literacy, however, this dynamism, hybridity and collaborative storytelling with technologies is relevant to this research.

Rather than a separation of formal and informal learning environments that distinguish between school and home, a dynamic approach is more hybrid. Mayers et al. (2013) consider 'knowledge ecosystems' to include the informal environments outside of formal education systems, including museums, home, libraries and online communities, such as YouTube. Rosenthal (2018) highlights how YouTube is used for self-directed 'free-choice' informal science learning. While Tan (2013), develops arguments towards self-directed, independent and informal learning using YouTube, acknowledging the peer learning and community formation that evolves through this process. Tan's research focuses on higher education students; however I am interested in research that focuses on the relation between YouTube and informal learning amongst younger children. In their editorial, Arnott et al. (2018) argue

that research should move away from considering the extent of influence of digital media on children's lives, instead towards acknowledgement of children's digital landscapes and focus on the kinds of interactions children are having (ibid). There is little work which addresses the agential potential of technologies in affecting learning practices. Neumann and Herodotou (2020) highlight the range of purposes children report using YouTube for, including 'researching, creating, curating, sharing (and) showcasing' (p. 75). Marsh (2016) highlights the peer-to-peer sharing of multimodal 'texts' on YouTube such as unboxing videos between young children across the globe, arguing that these new transmedia play worlds (p. 377) have socio-material significance for how children engage with YouTube. I will further extend this curating, creating, sharing approach to the socio-material engagement with YouTube within this research, as well as the agential potential of the GoPro in affecting learning practices. Parry and Taylor (2021) consider the digital literacies of children through the 'playful tinkering' of children's 'digital authoring' creating multi-modal, digital media texts, as authors of vlogs and digital diaries. I return to the ideas of engaging viewers in 'imaginary communities' (p. 154) in Chapter 4, when I discuss children *becoming* YouTube.

2.2.9.2 Assemblages of technologies, children, place and natures

Limited research has begun to consider the methodological approaches to including digital technologies in research concerning specifically children's walking, entanglements with nature and being outside in the environment (Green, 2016; McGlynn-Stewart et al., 2020). Work incorporating an assemblage approach to children, technologies and place includes Aneurin Smith and Dunkley (2018) who consider the technology-nonhuman-child assemblage as 'roaming pathways' of children's outdoor roaming, with GPS software and digital cameras in a national park; and Clement (2019) who works with the 'GoProing-research-assemblage' of families with young children walking with GoPros. For Aneurin Smith and Dunkley understanding the assemblage of technology, child and environment as a roaming assemblage, encourages them to ask how these pathways might extend to other 'contexts where children roam, including urban, digital and virtual spaces' (ibid; 316). This relates to Clement's (2019) work with the GoPro in that the GoPro, for the families in her research, 'played a part in cocreating' (ibid: 154) everyday research encounters and that therefore

walking with a GoPro is always more than walking. She recognises that the GoPro was not a neutral or 'invisible observer', in a similar way to White et al. (2021) discussed above, the technology became central to the affective and emotional atmospheres of walks as 'GoProing', a specific and 'less mundane' way of walking (ibid: 150). In relation to my research participants working with the GoPro, aspects of Clement's research resonate, particularly when the effects of the GoPro's presence include uncomfortable feelings of wearing the GoPro but also unsettling the flows (ibid: 153) of regular walks. Clement cautions that GoPros bring with them complications into the assemblage and that they might not be appropriate for all walking research. I will discuss how the GoPro affects our research assemblage in Chapter 4.

Equally informative for my research in terms of intra-actions and unfolding events with digital technologies are the works of Änggård (2015), Kind (2013), Kullman (2012) and Land et al. (2019). Working (respectively) with digital photo cameras, video cameras and iPhones, these authors highlight the entangled, intra-active relations between children, place and digital technologies. Änggård's material-discursive approach highlighted how digital cameras intra-acted with children, inviting them to respond in ways which sometimes 'deviate' from the research 'agenda'. While this is not something that concerned me, as the research was emergent, the idea of intra-action, divergence and ongoing, overlapping attentions between the camera and participants is relevant. Sylvia Kind's (2013) work with photography cameras in experimental intra-active moments with children also resonates with this thesis, shifts away from the static (and colonial) gaze of the camera towards articulating the 'thing-power' (Bennett, 2010) of cameras in collaboration with the haptic movements, senses and, again, relational, 'lively entanglements' (ibid) with the child. Her work encourages improvisation, experimentation and inquiry with materialities, photography and the child. I will draw on her work throughout this thesis.

Similarly, Kullman, (2012) highlights how the hand-held digital video cameras become extensions to participants' bodies, entangling in a 'multi-sensuous practice where one participates in the unfolding of events, rather than simply observing' (Kullman, 2012: 7) (see also Prout, 2004 for reference to 'cyborgs' and socio-technical assemblages in relation to

children and ICT). This is something I draw out and discuss in Chapter 4, considering the GoPro in relational assemblage and as extension of the body, working with (and against) the children in multi-sensory ways during our walks. Kullman further highlights how the camera and picture-making processes encouraged children to become 'surprised and 'enchanted' by the 'marvellous specificity of things' in their surroundings' (ibid: 8); again, this sense of wonderment is echoed and extended upon in my research, with the GoPro performing a 'behind the scenes' approach to what the children describe as 'the woods of wonder'. Kullman's consideration of how digital video technologies can augment these mundane events and shift ways in which children relate to walking and the details of places is relevant for our walking research with GoPros, for example zooming into trees, shrubs and extending the camera underwater and underground.

Land et al. (2019) walk, as Kullman did, with digital video technologies but with different propositions. They employ a common worlds approach to walking with an iPhone camera and the facetiming apps to learn with places. Their research is not concerned with how the 'use' of technology might hinder or affect otherwise everyday encounters, such as Clement's research on walking; or with the footage as 'representational' of the children's agency or experiences, as is much work with static images, photography and filming, at the expense of the vitality of the encounter (Kind, 2013). Instead, they work with the iPhone camera as a companion, facetiming with children and iPhones in two different parks and forests in Canada and Australia. They consider these experiments of video calls, sound recordings, boomerang looping videos and digital map making as exchanges of 'digital place stories' that 'craft pedagogical contact zones' with place and technologies; the contact zones are messy spaces of 'human and more-than-human relations' (p. 31) and as such, these stories are complicated, political and situated.

I have mentioned Clement's work on GoProing and walking above and will here expand on other research specifically related to GoPros. Research with children and GoPros is limited within the more-than-representational approaches with children and natures I am interested in. Work with GoPros more broadly includes Burbank et al.'s work on children's experiences with photography in museums (Burbank, et al. 2018), including the sensory affects of the

GoPro camera in tracing children's movement and sensations with they take a photography camera around a museum. Specifically, Burbank et al. highlight how pervasive parents, carers or adults' involvement and interruption of children's digital photography was and how wearing a GoPro offered another approach to noticing children's first-person engagement. Green (2016) engages children (aged 3-6 years) as 'active researchers' wearing mounted cameras while playing and exploring (named as 'sensory tours') in a northern Alaskan birch-tree forest. Green's phenomenological research also further included classroom visits to analyse the data with 'video-stimulated recall discussions' (p. 281). Myrvang Brown et al. (2008) consider the method of a head-mounted camera in examining affective and 'pre-textual dimensions of social worlds' (p. 2), specifically with walkers and mountain bikers in Scottish mountains. Of particular interest is the rich detail of sensory and embodied feelings, affects and movements of physical activities that the head-cam can articulate.

All four of these GoPro related research projects (Clement, 2019; Burbank et al, 2018; Myrvang Brown et al. 2008; and Green, 2016) work with the GoPro mounted either on the head or the chest, referencing this in ways which relate to Myrvang Brown et al.'s ''hands-free' audio-visualities of mobility and movement through landscape' (p. 5). However, with our research, participants were mainly working with a selfie-stick and sometimes with the camera and a wrist strap. This, I found, makes a difference in how the camera intra-acts and specifically how participants communicate with the camera. As Green argues, the head-mounted camera enables viewing of what children are doing with their bodies and how they are moving with place. Yet wearing a GoPro on your head is very different from working with one on a selfie-stick. Despite the differing technologies, I found more relation with my research and the digital video camera research of Änggård (2015) and Kind (2013) where children perform and act with the camera, as a participant within the event. In terms of the intra-active 'withness' of learning with GoPro technologies, Wargo's (2018) work on writing with 'wearables' highlights how 'material technologies do indeed matter in early literacy' (p. 503). This withness or relation between the material and the discursive is constructive in thinking with how in my research the 'withness' of the digital and the material entangle to produce new ways of learning with natures.

2.3 Conclusion

In this literature review I have, firstly addressed the broad framings of children and young people that have predominantly structured research within geographies of children and young people as well as interdisciplinary studies of childhood. I have then, secondly, highlighted how these constructions of children, as bound individuals and within developmental and neo-liberal educational frameworks, relate to the 'nature connection' discourse. In highlighting the prominence of this discourse, I have included the example of the forest schools movement arguing how the underlying principles of this movement reiterate this development child *in* nature construct (Taylor, 2013). I have further highlighted how this discourse reinforces the separation of nature from culture, and by implication creates binaries between nature and technology; digital and physical.

From this detailed framing of the forest schools movement within the context of 'nature connection', I have then, thirdly, discussed the alternative approaches to research concerning children, learning, place, technologies and natures which I intend to develop with this thesis. Focusing specifically on feminist new materialist and common worlds approaches, as well as broader more-than-representational approaches concerning the affective, embodied, haptic and multi-sensory within research, I have highlighted the arguments for bringing the more-than-human into relation *with* the human. In this, I pay particular attention to the socio-material assemblages of children and the geologic, children and place, children and water, children and weather and children and (digital) technologies.

This attention to work approaching children's learning and relations *with* natures is intended to provide the basis from which this research contributes various provocations, proposals and tensions. In the chapters that follow, I will specifically address the limited research attending to the entanglement of technologies with children's learning *with* natures. As I have argued, there is little research which takes a broader understanding of digital technologies as companions, as lively and agential and as messily held in tension with children's learning processes. I will further extend research concerning expanded figurations of water bodies and

the geologic, by including technologies and digital archives within these socio-material processes. I do this in order to resituate children's learning as always already entangled with the complexities and tensions of techno-naturecultures.

I choose to work within these more-than-representational and posthuman approaches because I consider representational and human-centric, developmental approaches to learning to be reductive and inattentive to the socio-material and extra-sectional (Horton and Kraftl, 2018) generative differences between both humans and the more-than-human. Understanding children, place, materialities, technologies and the more-than-human as *becoming* in performed, emergent, affective, ongoing, messy and lively relations, rather than conceptualising humans as with predetermined agency and the world as inert, opens up possibilities for rich, diverse, inclusive and expansive matters of concern to become the work of the inquiry of research.

3 METHODOLOGICAL APPROACHES AND MODALITIES

This chapter discusses the methodological concepts, approaches and practicalities which I have employed in this research. As I have outlined in the introduction, this research will undertake a more-than-representational research-creation approach into children's encounters with urban woodlands and digital technologies. My conceptualisation of research-creation, which I outline below, is inspired by work from feminist (new) materialist scholarship and as well as other transdisciplinary researchers working in creative, collaborative and relational processes with children and the more-than-human (for example Manning, 2016; Springgay and Truman, 2019; 2019a; Land et al, 2020; Pahl and Pool, 2021; Truman, 2022). During this research, I became increasingly informed by the productive complexities to thinking and doing research and how post-qualitative theorists (particularly those within interdisciplinary education and childhood studies, such as St Pierre, 2016; Ulmer, 2017; 2017a; Rautio, 2013; Taylor et al., 2012; Kind, 2013; Koro-Ljungberg 2017; Nordstrom, 2015; Snaza et al., 2016; Mazzei and Jackson, 2017; Sweet Nurminen and Koro-Ljungberg, 2020; Crinall and Somerville, 2020; Kullman, 2012) experiment with research processes differently, away from proceduralism and essentialist methods of data extraction (Truman, 2022: 25).

In this research I pay attention to what is emerging while walking, filming and researching. As such I did not enter this research with 'predetermined directions' or a 'pre-set agenda' (Blaise and Ryan, 2019: 90) in terms of learning 'outcomes' to 'achieve' within this research. Rather, I am concerned with this research as a 'rhizomatic process' whereby learning 'can begin anywhere and go anyplace' (ibid). As Hultin (2019) argues, socio-material inquiries are not interested in a specific end or specific outcome, instead they attend to the flows of practices and the temporal unfolding of relations and conditions of becoming (p. 101). This does not mean that, as Truman (2022) states 'anything goes' but instead that I came to this research with some propositional curiosities and some containing proposals (Shannon, 2021), such as walking and filming with GoPros but the processes of the walking and filming were open-ended and experimental. Blaise and Ryan (2019) argue that:

> (E)xperimentation is an open-ended practice that does not have an end goal, nor does it try to interpret what something means. Instead, it is concerned with "how" something functions (p. 91).

As such, much of this chapter, as well as the analysis chapters that follow will include considerations regarding the *how* of the project: how we walked, how we filmed, how we responded and how emergent ways of learning came to shift the research process. Rather than aiming for answers within this research, instead I am concerned with the unfolding processes of learning through encounters with place, bodies and digital technologies. I choose to write these encounters as a series of non-linear 'events' (Nordstrom, 2015) and through a kind of 'bag-lady approach', following Haraway (2004) whereby 'unexpected partners' are put together with 'irreducible details' in a 'frayed, porous carrier bag' (ibid: 127). By telling stories of everyday encounters, often momentary, fleeting or banal (following Taylor et al. 2013; Horton and Kraftl, 2018) these partners can be considered in relation with each other in ways that matter to 'rethink childhood and learning' (Taylor et al.2013).

In this chapter, I will outline the beginnings of this project (section 3.1), including how I came to situate this project in Highbury Park in Birmingham (section 3.2). Given that this research is situated and place-based, I will, as agreed with the schools, go into some detail concerning the place, land and the history and ecology of the park, because it is of relevance to the research inquiry. I will outline the research assemblage (section 3.3), specifically detailing the human participant researchers and their various intersecting identities. In this, I will discuss the development of the inquiry with both schools and some of the procedures of consent and ethical considerations. In section 3.4 I conceptualise my approach to research-creation (Manning, 2016; Springgay and Truman, 2019; Loveless, 2015; Truman, 2022). This will outline how the events that occurred are conceptualised as a multimodal *thinking-making-doing* collaborative process where knowledge production and learning can occur in the entangled and embodied movements and doing of research (Springgay, in Truman, 2020: 226). I do this in three ways: firstly, conceptualising walking as research-creation (3.4.1.), including walking with wonder and with GoPros (3.4.1.1 and 3.4.1.2); secondly, through conceptualising the processes of editing footage and multi-modal creative workshops as research-creation (3.4.2),

including the collaborative editing sessions (3.4.2.1.) and collaborative creative workshops (3.4.2.2), as well as my own video editing and narrative writing processes (3.5); and finally I consider our research assemblage (of myself and the children) as research-creators (3.6). Through this approach, research is acknowledged as situated and partial; researchers are considered as being *in* the world and *with* the research assemblage, rather than rather than an impartial and separate researcher reporting *on* the world (Springgay and Truman, 2019: 87).

3.1 Beginning this project: emergent curiosities

I begin this chapter by providing some initial context to how this project emerged and, by way of introduction, some of the modes of thinking that I hoped to work with through the project (which will be extended in the following sections). I moved to Birmingham at the start of my PhD, to be close to the university research community. I initially considered conducting my 'fieldwork' year back where I had been living in Scotland. However, upon moving, I quickly became involved in volunteering and working as a sessional outdoor play staff with an orchard/woodland group based in my local park, Highbury Park. Through this, I met outdoor practitioners, many of whom had backgrounds in alternative therapeutic care, Montessori education and forest schools leadership and were also local residents, working with the park community. I attended many of the group meetings and learnt a lot from walking in the park, having conversations about history, ecology and local communities. Their knowledge sharing and my regular presence with them in the park, became very productive. I was curious to learn with these people and this place, to witness and discuss many of the tensions that were held here. These tensions included between different demographics of park users (for example between dog walkers and young people), some of the varying activities that take place in this park (including recent 'arson' fires on the orchard group's tool shed and other small fires), the decisions concerning the ecological maintenance and restoration of the park (which has many overgrown, ruinous and derelict areas) and, for some, how to grapple with the colonial histories and legacies related to the land's former ownership (which I discuss below).

My intentions or 'aims' for this project were broadly concerned with inquiring with how children encounter and learn with urban woodlands, including their socio-material, technological, affective and embodied relations. While I intentionally did not develop a set of research questions (I will explain below how these emerged through the process of research), I came to the project with a series of curiosities and approaches to inquire with. I was curious with thinking differently about learning with wooded places, learning with children, moving beyond the developmental child approach I have outlined in Chapter 2 and instead paying attention to place, to materialities and to relations between humans and the more-than-human. I came to recognise this park as a potential place for research-creation. Alongside the existing outdoor learning projects that were taking place in this park, there were multiple other entangling forces and tensions that made this park an interesting place to inquire with, disrupting some of the dominant narratives from environmental education. Thus, as I mentioned in Chapter 1, this research is both situated in this place and in relation to my (and the other research participants') experiences, learning, processes and identities; it responds specifically to this assemblage. I aim to undertake research that is open to affirming both what happens and what is refused (Truman, 2022), rather than rigidly following a methodological procedure as if it were a fixed and pre-given certainty of actions with the aim of coming to answers.

A significant relationship that developed during this time was between myself and Holly, one of the local forest school leaders, who was often with children from her school at the early community sessions I was participating in during my first year in Birmingham. Holly and I knew each other through this network; Holly also joined me on educational visits to the university's research woodland and met with regional outdoor practitioners. As we are both trained forest schools practitioners, I described to her my professional experiences of working within the outdoor learning sector, including with primary after-school groups and secondary groups for those with additional social and emotional needs and disabilities, but also working within organisations focused on taking curriculum learning outside. I described my thoughts regarding the lack of attention paid ways of learning that were not adult-led, structured or focused on the social and emotional development of the individual child. I related this to my

masters research focusing on children and young people's embodied practices and mobilities within local urban greenspaces as well as previous undergraduate research concerning how, in the rural (specifically forested) community where I grew up, woodlands become entangled in storytelling and embodied understandings of place. I described my curiosity about children's informal encounters with natures and digital technologies. We imagined possibly incorporating a range of digital and analogue technologies that I could borrow from the university's forest research institute and how playing with these technologies alongside the more-than-human, the embodied, the material and the affective could relate to children's learning. I further suggested experimenting with creative workshops and highlighted my own arts practice working with materialities. Holly understood my reasoning for open-ended, experimental and non-outcomes-based research (Blaise and Ryan, 2019) and that the inquiry would emerge through the process of the research and through our research assemblage enabling children to become co-research-creators (Pahl and Pool, 2021). I will discuss in Section 3.6 how this non-outcomes-based approach created some tensions and queries throughout the project.

3.2 Situating place, park and woodlands

In this section, I provide an overview of the research related to its situated geographical place, including the city and the park, it's history, ecology and social and political community.

3.2.1 Birmingham and King's Heath: the local context

This research took place in Birmingham, a large post-industrial city in the West Midlands region of England. The city has a population of over 1.1 million (Population of Birmingham 2021/2022), with higher than UK average representative of minoritised ethic groups according to the 2011 Census (ibid). It is, according to the 2019 Index of Multiple Deprivation survey, the 7th most deprived local authority across the UK, with 43% of the total population of the city living within the 10% most deprived areas and 51% of all children under 16 living in the 10% most deprived areas (Birmingham City Council, 2019). As I have mentioned, our walks took

place in Highbury Park, in the south of the city. Kings Heath, the ward in which this park is situated, has the 10th highest average income of the city and is therefore more affluent than the rest of the city but is still ranked in the 30% most deprived UK areas, according to the 2019 Index of Multiple Deprivation National Decile (ibid). It also has a lower-than-average percentage of minoritised[7] ethnic groups within its demographic compared to the city as a whole (ibid) and 23.9% of its population is under 18. Given that the Beech school (described below) bussed-in the majority of pupils from across the city, these statistics aren't necessarily reflective of the demographics of the schools or the children. This ward has the 16th highest income levels of the city's 69 wards and again, roughly the same percentage of under 18s and a lower-than-average percentage of minoritised ethnic groups compared to the city as a whole.

Birmingham has over 600 'blue and green spaces', covering over 4,700 hectares (Birmingham City Council, 2022: 12). In February 2022, the City Council launched the 'Our Future Nature City Plan' report for the next 25 years, with the aims to create a greener city with more access to parks and greenspaces (ibid: 3). This new attention to greenspaces within the city and the relation to inequalities concerning access, health and wellbeing to these places focuses attention on the city and its future thinking and actions related to place, educations and 'natures'. While our research took place prior to this plan, it does make this project, including its alternative proposals for learning with techno-naturecultures, timely in the context of Birmingham's future relations to greenspace.

3.2.2 Highbury Park, a short socio-material history

Highbury Park is a public park of 30 hectares (Historic England, 2022). It is the ongoing forming of multiple processes of geological and ecological change as well as the socio-material, human-centred shifting land uses and ownership and significantly, the merging of three adjacent historic estates held by three wealthy landowners over the 17-19th centuries (Pisolkar, 2018).

[7] I am using the term 'minoritised' rather than minority to reflect the understanding that people are actively minoritised by systems, structures and individuals, rather than actually existing as a minority (Milner and Jumbe, 2020).

Highbury Park, Birmingham (Ordinance Survey, 2020)

Much of the farmland had been owned by the former Henbury Estate, to the south of the present park, during the 1700s, before being purchased by Joseph Chamberlain, a prominent British politician, in 1879 and extended upon over the following 40 years through his development of his Highbury Estate and Hall (Slater, 2018). Uffculme Estate, the third estate to the east of the present park was owned by Richard Cadbury, the chocolate manufacturer and wealthy landowner. The wealth of these estates, through the political and economic interest and positions held specifically by Cadbury and Chamberlain, is related to the colonial expansions and imperialist actions of the UK, including the politicians and industrialists of this era. Parts of all three estates' land were merged in both 1921 and extended in 1933 to become Highbury Park, the public park as it remains today (Pisolkar, 2018).

Ballard (1986) describes Chamberlain's 1880s Highbury estate as a 'rus in urbe' or a 'country estate within an urban setting' (p. 61). Much of the land during the late 1880s within Highbury Estate was both maintained as parkland and 'meadow' with field boundaries, small woodlands and mature trees. The wealth gained from Chamberlain's family steel manufacturing business enabled him to retire and enter politics (Ballard, 1986) and through his political position, to expand his wealth and his estate. This is evidenced through Chamberlain commissioning a significantly landscaped 'pleasure garden', closer to the hall, with a large variety of tree and shrub species (Historic England, 2022). The collecting of plants such as orchids and other species native to British colonized lands display the ecological histories of empire. Much of Chamberlain's political work was undertaken from Highbury Hall and it is noted (Ballard, 1986) that his 'pleasure gardens' were designed for hosting guests and delivering speeches. The pleasure garden included a stone platform above a pond, as well as ornamental rose gardens, Dutch and Italian gardens, a rock garden, a kitchen garden, hothouses for orchids, rhododendron avenues and extensive tree planting (Pittaway, 2019; Ballard, 1986). Fishponds and a boating lake and house were also developed during the late 1880s and the estate had a productive dairy and farm, with brick stable floors (Pittaway, 2019). I focus on this history because of the impact this period of ownership had on the socio-material and ecological context of the park.

Bronze Age burnt mounds remain in the earth and the ridge and furrow of medieval field systems continue to undulate the ground in the south corner of the park (Chamberlain Highbury Trust, 2021). The physical indentations, mounds and lines in the earth remain from former boundaries of the hedged and farmed fields of the 1700s. The oldest oak tree, a 'veteran' aged over 300 years old, that would have stood amongst those earlier farming fields, split, cracked and crashed to the ground during our first walking session in October 2019. Many of the landscaped and human-manipulated material, ecological and structural changes that occurred on this land during the late 1800s, while a managed private estate, are also still traceable in the land today. The former formal gardens, the rockery made with Pulhamite (a fake stone made of rubble covered in cement, popular in the early 1900s) (Admin, 2008) the

stone viewing platform and the old dairy and farm tiling and ground infrastructure remain, in various ongoing processes of weathering, dereliction and ruin.

These places and their material structures are weathering, crumbling, rotting, eroding and in flux, becoming entangled with overgrowth of trees, vines, shrubs and understory brambles. The stone viewing platform now overlooks a duckweed-filled silted up pond (which I shall return to in Chapter 5). The orchard group deliver their outdoor sessions from the former dairy farm, in the northeast of the park, the architectural footprint of which remains through the broken brick walls, crumbling cement and stone dividing walls and a dark grey tiled floor emerging from beneath overgrowing woodland and shrubs. Multiple pathways and routes through this wooded area are forged and yet, at the time of this research in 2019-2020, were not over-managed, allowing thick shrub and understory growth. The place is frequently visited by many people. Secondary school pupils use this area of the park as a cut-through from their school out into the open meadows and across to the urban areas on the other edges of the park.

Highbury Hall and the estate of 30 acres are now held in a charitable trust (Chamberlain Highbury Trust, no date). The trust, the friends of the park and many associated local historians, ecologists and geologists have written extensively about this place (see Highbury Park Friends, 2022). The hall and gardens are recognised as Grade II listed by Historic England (Historic England, 2022) and some areas of the park are designated as Site of Local Importance for Nature Conservation (SLINC) (Slater, 2020). Various ecological surveys have been conducted in this park, including for fungi and for plants in 2016 (ibid). Within the park, Slater records a range of habitats including tall sward and scrub, short sward and bare ground, woodland floor, standing trees, decaying wood, wet woodland, wetland, peatland, running water, marshland (ibid; 46). Pisolkar (2018) notes 43 species of birds and more than 70 different species of trees living in the park, including 38 'veteran trees' with girths over 3 metres and over 15 lichen species, for example (ibid). Slater has completed an invertebrate survey of the park (Slater, 2020), recording at least 48 species of hoverfly and 29 species of bees.

As well as the wooded area to the north of this park where most of the remnants of the designed 'pleasure gardens' emerge through the trees, the park has numerous other places, ecologies and stories to tell (many of which shall be articulated through the analysis chapters of this research). To the northwest of the park a pinetum, with over 35 different conifers, was planted in the 1990s, although recent plans are considering removing this in efforts to return the park to older historical planting designs (Chamberlain Highbury Trust, 2021). An older circular beech copse grows close by, planted again during the landscaping of the park in the 1880s (Historic England, 2022), where people have carved extensive words, phrases, dates and scribblings into the wood over decades. There are five ponds and swamp grounds in this park, all sustaining very different ecologies (Slater, 2020). Running east to west through the top third of the park is a long pond, the biggest pond (also the former boating pond) which is fed by the Shuttock Stream that runs in from the north before heading out to the west end and into a storm drain to join one of the main rivers in the city, the River Rea (we spent a lot of time with(in) this stream). South of this, the park is mostly open meadows, one with a small stream, a natural spring emerging from the ground, with thin strips of mixed woodland that cut across the meadows.

In the middle of the southern section of the park, remains a tall brick wall which formed part of the garden wall of the Henbury Estate, which had been recorded on maps since 1798. Both the ongoing presence of this wall and the fact that this estate had a major trainline constructed through it in the 1830s (Historic England, 2022), before the estate was demolished in the 1960s, become important aspects of our research which I will return to in Chapters 5 and 6. To the southeast of the park are more wooded areas, with mature copper beech, oak, beech and sycamore trees, on an embankment and Henbury Pond, the oldest pond in the park dating to the 1600s, noted as one of the most diverse ponds in the city (Pisolkar, 2018). I describe this historical and ecological context because many of these more-than-humans and places became returning figures within our research. We frequently spent time in the meadows, wading down the streams and springs, walking through the woodlands, touching the brick walls and old stone architecture of the formal gardens. It therefore is

important to contextualise how these histories and ecologies entangle with pastpresent day interactions and curiosities from our research assemblage.

In terms of contemporary ownership and use of the park, as well as the orchard group I have already described, there are many other mixed groups with various relations to the park. The park remains publicly owned and managed by Birmingham City Council, with a park ranger team supporting the maintenance and tree management strategy. I had communication with the senior park ranger throughout the project. It was through this connection that we were then invited to plant some sapling trees in the park during one session (which I discuss in Chapter 6). Highbury Park has an active 'friends of the park' group, who have deliver regular guided walks and tours. At the time of the research, as well as the toddler and children's outdoor play groups that I mentioned, the orchard group also ran wellbeing sessions for adults, planting and gardening maintenance sessions for local volunteers, hosted community wassailing and festive events throughout the year and was connected to other local networks using allotments, woodlands and parks for community activities. In terms of facilities and access to the park, there are public tarmac walkways which cut through east to west of the park, as well as an access path from the north entrance. There is a carpark towards the southwestern end of the park. The park has a variety of different sized pathways throughout, including larger tarmacked ones and smaller soft mulch pathways that cut through the wooded areas. There are beehives within the woodlands, managed by a local beekeeper.

3.2.3 Refiguring presences and histories

Our situated research takes place, therefore, on land marked and living with the material traces, structures, ruins and more-than-human plants, shrubs, grasses and trees, many of which were purposefully planted, cultivated and built to fulfil the aesthetic and material requests of Joseph Chamberlain. As I have mentioned, this place cannot be fully separated and untangled from him and by extension, his political work and more broadly, that of the British Empire. His family's Birmingham-based industrialist screw and metal manufacturing companies made wealth from their industrialist, colonialist and political positions of power. As Colonial Secretary he supported imperial expansion of the British Empire (Cole, 2022). As I

have stated, much of this history and invested wealth was played out within Highbury Park and Hall. This complex history of land ownership and colonialism further entangles with the histories of the adjoining former estate owned by the Cadbury family (the land from both Chamberlain and Cadbury now forms most of Highbury Park), who, again, configures this place with contentious histories of cocoa farming, missionaries, poor labour conditions and colonialism in West Africa (Taylor, 2007; Penvenne, 2013; Saripalli, 2021).

As educators within common worlds, posthuman and Indigenous areas of scholarship recognise (often working and researching on unceded land and territories), in order to decolonialise land and education and to move away from dominant extractivist and colonial logics (Nxumalo, 2019; Nxumalo and Cedillo, 2017), different figurings of place are necessary. Nxumalo describes the pedagogical practices of 'refiguring presences' (Nxumalo, 2019: 160) to interfere with pastpresent settler colonialisms that have disregarded Indigenous relationalities with land, specifically, for her situated research, in unceded Coast Salish territories. She acknowledges that 'restorying place and place encounters' is not enough, but that it may go some way towards 'decolonizing nature-based early childhood education' (ibid) by unsettling dominant dialogues with place. She walks in forests with young children and asks, 'What might it mean for us to pause at the tree stumps, not to 'discover' nature, but to refigure what is already there?' (p.162).

Nxumalo's refiguring of stories other than those of settler colonialist logic on unceded land is clearly different from my telling the socio-material and political histories of Highbury Park. However, the impacts, legacies and ongoing structures that are entangled with this park in Birmingham affect the children who learn with this place, in the models of educational learning (Taylor, 2013) as well as the intersectionalities of participant children's identities, migrations and family heritages. Our encounters can, too, become pedagogical possibilities for refiguring other presences and taking seriously the everyday 'banal' and 'natural' places (ibid) within our research. They might also work towards using stories to 'unsettle innocent and romantic visions of children's relations to nature and take seriously the implications of

inheriting [settler] colonial histories' (Nxumalo, 2019: 165). This is something I discuss further in relation to the magnet fishing event in Chapter 6.

The Chamberlain Highbury Trust which manages Highbury Hall estate is beginning to address Chamberlain's colonial legacy and policies while Colonial Secretary (Chamberlain Highbury Trust, no date). While I was conducting this research, I was also working with the orchard group and another school (outside of this research) and together we visited this hall and had complex encounters with the legacy of Chamberlain's politics while sitting on his furniture and within the dark wooden panelled walls of his study. A trip with the young people from this research was organised but unable to take place due to Covid-19 halting the research. Further approaches to learning with place, that considers the impact of landownership and colonial histories within Britain, are required. As are approaches that consider the diverse temporalities and histories of place, to unsettle the 'innocence' of natures and place.
Given the complexity of the park's ecology and socio-material history, I have dramatically oversimplified the description of this place. In the analysis of this thesis, these places and stories take on many different forms and articulations, through speculative storying, embodied inquiry and affective becoming with the more-than-humans.

3.3 Research participants and school contexts

In this section, I discuss the research participants and the school contexts. This project worked with two schools; 18 children were involved altogether, nine from each (see Table 1 for information regarding the numbers of sessions attended by each participant). These children were aged between 8-11 (two were 8 years old, two were 9 years old, seven were 10 years old and six were 11 years old at the start of this research). Ten identified as male, eight as female. Of these participants, four were of British-Asian heritage, one was Black-British, one was Pakistani, one was Palestinian, one was Czech and the remaining ten were of white British heritage. Ten of these children were autistic, one child has Asperger's Syndrome and one has profound hearing loss. The other five children are included in their school's pastoral care group due to various social, emotional and additional learning support needs, as confirmed by the forest school leader within the school. While I acknowledge the posthuman call to

decentre the individual child, walking with these intersecting differences matters and makes our work political in queering the normative 'child in nature' constructs (Springgay and Truman, 2018), hence I do include the individual participating children and their extra-sectionalities (Horton and Kraftl, 2018).

Throughout this research, I refer to the schools as Oak and Beech; these are pseudonyms. In describing the two schools below, I have separated them out into two different sections. This is only a structural move to describe the detail of this project with all its nuances; it is not for comparison between the two groups. The two schools participated in some different processes within this research and thus this feels the clearest way to articulate the context of what we did. As I have already argued, this research is situated, messy, non-linear and with no desires to be replicable, generalizable or repeatable; it is about responding and relating with the specific situated encounters. My focus is on paying attention to the creative processes of children's relations with digital technologies and natures and therefore will be working from this basis when discussing the upcoming analysis chapters. In those chapters, I will signify which school and which child I am talking about where appropriate; however, I will not do this with every mention of the participants. Hence inclusion of the table of participant involvement after the following two sections, for clarity. I will also discuss some of the affective and sensory responses that are specific to some of the children (and their disability), for example, I discuss some of the embodied responses from Lucy, who has profound hearing loss, in Chapter 4.

3.3.1 The Oak school participants and context

The Oak school is an academy sponsor-led primary school, with roughly 350 pupils on the school roll in January 2019 (Ofsted, 2019). According to this report (undertaken in the same year I was researching with this school), almost 80% of the school pupils are from minority ethnic groups, with the largest proportion of pupils being of Pakistani background; over half of the pupils speak English as a second language (ibid). Furthermore, Ofsted note that the

school has a higher than English average of pupils supported by the pupil premium funding[8] as well as a higher than average 'mobility' (which refers to children joining the school at 'nonstandard times' (ibid; 10)). The report notes that of those joining at nonstandard times 'many' speak little or no English (ibid).

The group from the Oak school began walking in late October 2019 and their involvement ran weekly (minus a few cancellations and holiday periods) until mid-March 2020 when the Covid-19 pandemic abruptly stopped research. I met them (generally) once a week at the school for a two hour walk and, from the end of November to March, we also met (mostly fortnightly) for our footage watching and website 'editing/collaging' sessions, these also lasted generally around two hours. In the week before Christmas holidays and again the week before Easter, we didn't walk but instead held a creative workshop in the eco-room. In total, we walked together 11 times, had 6 website sessions and two creative workshops. Within the Oak school, I had been asked by the Headteacher to work with the 'pastoral care group' of children from Years 4, 5 and 6, aged 8-11, with numbers attending during a walking session ranging between seven and nine total participants; during our website sessions, I generally took two or three children at a time. Of these children, five were described by their parent/carers as male and four female; three as British Asian, four as White British, one as Czech and one as Palestinian; two children were identified as autistic and one with profound hearing loss. The students who attended this pastoral care group had a variety of different social, emotional and educational needs as well as disabilities; other support needs were related to family, social care and vulnerable housing situations. These are terms that I have chosen to include to describe the group from conversations with staff, parents and carers. Some parents/carers chose to disclose this information to me either through the consent forms or through the discussions we had at the beginning of the project.

Children who joined this pastoral care group were given weekly time out of the classroom with Holly, the school's forest school leader and a support teacher, who also attended our research,

[8] The pupil premium fund is a government fund awarded to schools for children from low-income families to help 'improve the attainment of disadvantaged children'. This might be spent on breakfast clubs, extra one-to-one support groups, extra teaching assistance, resources and catch-up sessions (TheSchoolRun, 2022)

along with two parent volunteers. Holly, as forest school leader, was employed to work with the whole school on a part-time basis; she mainly ran programmes from their small woodland on campus and from a terrapin 'eco-hut' in the school playground near the woodland. However, this pastoral care group had an existing arrangement to spend their weekly sessions attending the woodland play group that I volunteered with, along with families and toddlers from the local community. This meant that the children from the Oak school participating with this project had both a familiarity with the forest schools programme that was delivered on campus and a familiarity with the park and its woodlands; the regular practices of both programmes included fire lighting, den building, cooking, mud kitchen and arts and crafts. Furthermore, as this was a local primary school, many of the children's families lived nearby and as such walked through the park to get home or visited during weekends. Their knowledge of various features within the park is demonstrative of this familiarity with the place. However, this was not the same for all children; two children were new to the area and one was taxied to school from his foster home further away. For the duration of our research, the school agreed to switch the sessions so they could participate in this research instead of the local woodland play group. This agreement was fundamental to this research project because of my focus on what happens outside of structured or adult-led sessions and when children as research-creators investigate with digital technologies (which were not part of the woodland play sessions). We were therefore able to investigate and inquire without limitations of space, location, adult-led structure, other attendees or other agendas.

As with the Beech school, we spent lots of time in the eco-hut, preparing to head out and after returning, taking off wet waterproofs, chatting over hot chocolates at the end of walks and while immersed in our painting workshops. The affective atmosphere within the eco-hut and while out in the park was markedly different from the rest of the school day and site, with students using the forest school leader's first name (as well as mine and the parent/carer volunteers), with children giving cuddles, hand holding and lying down. More personal and intimate care was accepted during these times, such as Holly regularly walking ahead with one participant to discuss family issues and different practices of listening and communicating. For example, a Himalayan singing bowl with its pure singular sound, was often used to quieten

the eco-room and affect a different atmosphere. The eco-room in this school had a live snake living in a tank, which often meant us tiptoeing around so as not to wake it or coming up close to the tank to watch the snake sense our presence with its tongue. The room was also full with woodland materials, outdoor clothing hung on washing lines and sometimes the smell of hot chocolate sweetened the air (see Kraftl, 2014 for discussion of the different material, affective and architectural spaces and atmospheres of alternative educations).

As well as the forest school leader and the students, this assemblage also included an additional support teacher who was mainly focused on one individual child and two parent volunteers. These parents became prominent figures within the group in terms of caregiving and sharing of their knowledges and experiences within this place, as one parent had grown up walking in this same park. As I shall describe, one parent also made possible one of the emerging methods that has been very generative in this project through buying a magnet fishing set for her son (a participant) for Christmas; this was discussed with me prior to Christmas as something they were interested in doing and we talked about including it in our project.

3.3.2 The Beech school participants and context

The Beech school is an 'all-through Special' school, from ages 3-19, maintained by the local education authority (Ofsted, 2019a). In June 2019, there were roughly 190 pupils on the school roll, the majority of whom were from a white British background (ibid). Ofsted report that the majority of pupils 'are those with autistic spectrum disorders (ASD)' (ibid; 11), but they further add that many pupils have additional social, emotional and mental health needs (ibid). Ofsted report that roughly 46% of the school's pupils are 'disadvantaged', with many on the 'looked after' roll (ibid).

The Beech school began walking in mid-January and we walked together 5 times, held two video sessions and one creative workshop before Covid-19 stopped our research. This school started later than the Oak school due to scheduling logistics. From this school, I worked with

a class from Year 6, a total of nine children aged between 10 and 11, alongside their classroom teacher, two support staff and the school's full-time forest school leader. Of these children, five identified as male and four as female; six as white British, one as Black British, one as British-Bengali and one as Pakistani; eight were autistic and one had Asperger's Syndrome[9]. The school had recently employed a full-time forest school leader to develop and deliver a programme for the whole school within the wooded areas within the school grounds that are directly next to the park. Children attend this school from across the city, being bussed in; therefore, while all the children in the class had experienced a forest school programme in the school woods adjacent to the park where this research took place, none of them had walked within the park itself previously. Indeed, the classroom teacher commented on how one child did not walk in public urban greenspaces with his family at all.

Early in the project, the classroom teacher also mentioned how the school had previously not actively encouraged nature-based play and learning, however in the last year has now created a purpose-built eco-room which the forest school leader and classroom groups have worked into a space full of clay and cardboard sculptures, paintings, mosses, conkers, stones, leaves, branches, tree stumps, egg boxes, skulls, feathers and other materials. All along one wall is wallpapered a silver birch forest; as you enter the room you become part of a paper forest. Wellies, waterproofs and coats line the hallways and the smell of mud and soil mark this place as distinctly different from the classroom, where the group are regularly based. We spent time in this eco-room before and after our walks and during our workshop making a 3D model of the park with found materials. We also spent time in the Year 6 classroom, where we watched the video footage children had created and the teacher hosted drawing sessions. The classroom teacher was in the process of planning access to the school computers so that the children could begin our website collage and video editing sessions when the project was halted. Sadly, this meant that while the children were able to have two sessions watching some of their GoPro content creations (I selected footage from each child to play back during

[9] Please note that I use the terms chosen by the child's parent/carer on the forms they completed, which just left an empty space for them to complete if they wished, rather than ticking a box.

the video sessions so they could respond to the footage), they were unable to contribute to the website and experiment with editing.

Participant name	School	Number of walking sessions attended	Number of website editing sessions attended	Number of creative workshops attended	Info
Dino	Oak school	5	1	0	Moved school at Christmas 2019
Tyler	Oak school	10	4	2	
Pete Crash	Oak school	10	5	2	
Cinnamon	Oak school	9	4	2	
Strawberry	Oak school	8	2	2	
Kiwi	Oak school	2	0	0	Moved schools in November 2019
Leo	Oak school	10	4	2	
Lucy	Oak school	9	4	2	Joined school in November 2019
Chris	Oak school	3	2	1	Joined project in January 2020
Tyler's dad	Oak school	10	1	2	
Pete Crash's mum	Oak school	10	0	2	
Holly FS Leader	Oak school	10	0	2	
Support teacher	Oak school	4	1	0	
Max Ranger	Beech School	5	1	1	
Crazy	Beech School	5	1	2	
Sprout	Beech School	5	1	2	
Rainbow	Beech School	4	0	1	
Lottie	Beech School	4	1	2	
Lily Swirl	Beech School	5	1	2	
Batman	Beech School	5	1	1	
Aviary	Beech School	5	1	2	
Dolly	Beech School	5	1	2	
FS leader	Beech School	5	1	2	
Classroom teacher	Beech School	5	1	2	
Support teacher	Beech School	5	1	2	
Support teacher	Beech School	5	1	2	

Table 1: List of participants and number of sessions attended

3.3.3 Participation consents and ethical considerations

In this section, I shall briefly discuss some of the processes of consent that we went through together at the start of the project. With the Oak school, I discussed the scope of the project with each child and parent or carer separately; this enabled us to have a full discussion and for each child to ask questions about what they might be doing and what they might be able to do. For some children it also meant they could translate my English to their parent/carer's mother tongue and enable to parent/carer to ask further questions. Within this, we spoke about the GoPro that I would be wearing on my chest and how we might be working with both video and audio recordings with another GoPro and creating a website. We discussed how we would be maintaining anonymity of participants throughout the project. For the Beech school, because the children were bused-in from across the city, I was unable to speak with parents/carers directly but the classroom teacher called each family and also gave them the full documentation of information I prepared for both schools (see Appendices 9.1 – 9.5). This included an information sheet detailing the approach the project was taking, who I was and what kinds of things we could be doing; it also included a separate personal information sheet that could be anonymised and finally two consent forms, one for the parent/carer and one for the child participating. These were written consent forms, detailing all the different aspects of the project which I read out when meeting with the child and parent/carer and which I asked the classroom teacher to ensure the parent/carer also read with the child if I could not be present. In one case, the support staff verbally translated the documents for the child's carer into Urdu, thus overcoming barriers to participation and consent.

In co-productive and collaborative work with children and young people, there is a debate related to the ethical position of removing children's names and authorship from collaborative work (Giorza, 2018). However, for the university ethical procedures and protocols, as well as those of the participating schools, particularly considering that we were filming and going to be working with a website creation, their anonymity was required. This was furthermore necessary for some children who were in the care system and who had vulnerabilities in relation to family situations, for example. Therefore, we discussed that any footage used

within the research or included on the website would either have their faces blurred out or would not include their faces at all. I also asked each child to decide on a pseudonym of their choice, that they would be able to refer to themselves by throughout the project and in the filming and website creation (see Table 1 above for list of participants, including number of sessions attended). This goes some way to redistributing authorship and collaboration as the children were able to see where their names were used on the website and often switched between calling each other by these false names and their actual names during the walks. This was particularly amusing as some of the children had chosen names like 'Sprout', 'Aviary', 'Strawberry', 'Kiwi', 'Cinnamon', 'Crazy', 'Rainbow' and 'Pete Crash', thus bringing both nonhuman, birds, fruits and foodstuffs as well as characters from comics and computer games, such as 'Batman' and 'Dino', into the project. When I asked about their *becoming* Strawberry and Cinnamon, they answered because '*we are sweet*'.

The ethical procedures of this research were approved by the university ethics board before starting. All the footage gathered during the walks was copied onto two encrypted hard drives immediately after the sessions finished and deleted from the original cameras. These hard drives alongside the personal information of the participants were stored in a secured cabinet that only I could access. The website was an ongoing collaborative site which had been evolving alongside the project, which I shall discuss in Section 3.6.2. While we were creating the website, it existed in a draft, non-published mode, only available for those who logged on to see. This meant that we could play around with the content during our sessions and I did not need to be concerned that details or information would be published that would jeopardise participant anonymity. All information on the website is anonymous and in fact, the website was never published. This meant unfortunately, that because the website was not published, the participants within the project couldn't access the website when all engagement with the project stopped when the school went into its first lockdown. This was because of the immediate closure of the schools and thus the project during the first months of Covid-19. Both schools had to close, with parks shutting and families in lockdown in their homes; I left to be with my parents away from the research site. While the forest school leader in one school continued to attend the school to deliver to those children who couldn't stay at

home, no external visitors were allowed and these children were not part of the project. By the time the schools had re-opened, the year 6 pupils had left the school and the school was still not permitting external visitors in, so I was unable to access the school to continue the project anyway. It was therefore decided that I would write this project from where we stopped, in March 2020, recognising this as a limitation in terms of the collaborative approach to co-producing this work. While children from the Oak school participated in evolving co-analysis and editing of the footage through the website sessions, this was not possible with the Beech school who only saw some of their footage during two sessions.

3.3.4 Enrolment of participants within a research assemblage

This research is informed by posthuman and new materialist approaches which consider the entanglement of matter, of human and nonhuman actants in intra-action, whereby the agential potential of each actant is only performed through the entanglement of phenomena (following Barad, 2007). This approach, therefore, does not make a distinction between researcher and participant as dichotomous between knower and subject, instead it considers the research assemblage as encompassing all matter, theory, discourse, place, forces and affect that come together in different ways in the event of research (Hackett and Somerville, 2017). A research assemblage recognises that research is mediated through an assemblage of

> bodies things and abstractions that get caught up in social inquiry, including the events that are studied, the tools, models and precepts of research, and the researchers (Fox and Aldred in Clement, 2019: 151).

Boyd further argues 'In an ecological sense, assemblages are finite groupings of diverse elements that work together to produce effects' (Boyd, 2017: 20).

Assemblage thinking allows for the nonlinear dynamics between those included within the assemblage to all affect the research process differently throughout the research. Thus, the GoPro camera becomes an active participant within the research assemblage, affecting

relations between the child and the environment (Clement, 2019), as does the child become active and affective within the research at different moments, for example bringing the knowledge of magnet fishing into the assemblage and opening up different relations between the water, YouTube and the child. Feminist new materialists recognise that all knowledge is situated, partial and evolves from *within* the processes, forces and events of particular research assemblages (Ulmer, 2017a). Boyd continues to argue that assemblage thinking is radical in shifting the human-centred notion that we are special and instead, following, Jane Bennett (2010), recognises that '(O)ur will and intentionality overlap with the conflicting power of 'things'' (Boyd, 2017: 20). This assemblage thinking not only includes objects, things or the more-than-human, but also discourses, philosophical approaches, structures and systems. By approaching our walks as a research assemblage, I am encouraged to pay attention to the multiple and complex relations between child (including embodied, affective and sensory responses) and materialities, for example. These relations produce different agential possibilities, that acknowledge the child as one actant in flow with others, thus giving matter and the more-than-human vital and lively potential as living and affective, rather than inert, static or as background.

Given the diversity of the participants from both schools, the research assemblage began to also entangle various discourses, structural systems and frameworks. These discourses included those of disability; educational frameworks; SATs and mainstream academic performance exams (that most participants will not be participating in); ways of learning and communicating; differences between mainstream schooling and special schools; sign language and inclusivity for children with profound hearing loss; and discourses related to expectations of participation, engagement and what might be considered as disruption. From the Oak school, it was clear from conversations with staff that these children were coming out of their classroom lessons to participate both because they were deemed as children who would benefit from additional support and care but also perhaps *because* they were not going to be expected to sit the SATs in year 6 or were otherwise not expected to be working within the same performance measures as their classmates. In the Beech school, this project was seen by the classroom teacher as an extension of their existing forest school programme,

which was held in their school grounds (in part of the same park which was fenced within their boundaries), and which had just ended for this group for the year. The school had never taken their children out into the park, despite it being on their doorstep and as their classroom teacher mentioned, many of these children would not regularly walk to or with(in) environments like this. The classroom teacher and forest school leader were personally enthusiastic to contribute and develop some of the processes and inquiries (for example suggesting new technological solutions for the GoPros and offering contributions to the creative workshops).

This assemblage approach to postqualitative research also relates to my approach regarding learning. By this I mean, I do not consider the teacher/student relation as a knower/learner dualism, much like I don't consider the researcher/participant as expert/subject. In this socio-material assemblage approach, the researcher is as much part of affecting the research as the other participants (Hultin, 2019). I aim to take all learning, in its broadest sense, seriously and to open up possibilities for participants to share expertise, knowledge and positionalities.

3.4 Conceptualising research-creation

Throughout this research, I have employed 'research-creation' as a modality or mode of research inquiry (Georgis and Matthews, 2021). While the beginnings of the term research-creation are tied to Canadian social science funding streams recognising the need to award research grant to artists working within universities (St Hilaire, 2018), the term has evolved to encompass expansive transdisciplinary projects spanning academic and arts practices (Sheller, 2015). Research-creation has been differently termed a 'concept' (Truman, 2022), a 'technique' (Manning, 2016); a 'modality' (Georgis and Matthews, 2021; Shannon, 2021); and a 'process' (Springgay and Truman, 2019) which combines creative and scholarly research practices, intersecting art, theory and research as a 'thinking-making-doing' (Manning, 2016). Manning further considers it as a mode of inquiry that calls for 'new forms of valuation' (Manning, in Truman, 2020: 229) away from institutional procedures of research and towards the understanding of study as learning 'through and with the world' (ibid). I like the idea of it as a modality because it suggests a way of thinking and being while in the process of research-

creation, rather than a technique as something which feels separated and applied. Springgay and Truman propose research-creation as practices of 'enabling constraints' that 'are expansive and suggestive. They operate by delimiting process and possibility' (Springgay and Truman, 2016).

Most research-creation projects involve producing visual artwork, but the modality is concerned with the process of knowledge production as being more than language: towards a practice whereby making is a 'thinking in its own right' and whereby the experiential challenges the notion that knowledge can be quantified (Manning, 2016; 133). Loveless further articulates research-creation as an 'intervention into *academic* discourse and production' (Loveless, in Truman 2020: 225, emphasis in original). This means thinking and doing research differently, thinking 'data' and 'analysis' and 'outcomes' differently. For Truman (2022), this means not researching something that's already happened, or 'harvesting data' to represent events or creatively responding to a piece of research data (for example cutting up and collaging a transcript of an interview) but instead 'creating the thing/event that I want to investigate' (ibid: 14). Considering 'creation-as-research' as a pedagogical modality, it asks researchers to think with students in generating problems, events and practices that encourage thinking-doing *processes* (Myers in Truman, 2020: 239). For researchers working with children as collaborators and co-researchers, therefore, research-creation encompasses the *process* of the research *as* the research. For example, Pahl and Pool (2021) consider the work of their children as co-researchers as the work, rather than something to be extracted from. They further argue that:

> the stuff that matters in research with young people is an entangled assemblage of rhythms, flows and movements that can come to light in the making of something new together connecting to the flow of research with a charged immediacy of everyday life, forcing further questions and further movement (Pahl and Pool, 2021: 2).

Concerned with process, rather than outcome, research-creation emphasises what knowledge does in a relational and situated sense (Sweet, Nurminen and Koro-Ljungberg, 2020: 390), 'keeping a focus on what (is) to come, the incomplete and the ongoing' (Pahl and Pool, 2021). It opens up other ways of doing, presenting and communicating research and provides space

for messy, non-linear, affective and creative research (Shellar, 2015). Research-creation therefore, is fundamentally a situated, speculative thinking-making-doing creative practice, attending to the (sometimes collaborative) processes of making work and approaching the work *as* research rather than as data for coding or interpretation (Pahl and Pool, 2021). As Georgis and Matthews assert in their research-creation explorations, they felt it important to resist the 'insistence that research queries should be settled before the process of research begins and that these queries determine what follows' (2021: 6). This was something I felt strongly at the start of my research inquiry; I had a curiosity towards how children encountered urban woodlands in ways that might be different from the dominant narratives found within forest schools approaches and other structured outdoor learning programmes. I knew I wanted to inquire into other ways of being with urban woodlands, of affective, embodied and creative relations to the materialities of the woodland environments and walking encounters. I want to articulate my research project as research-creation in three ways: first, through walking (with GoPros) as research-creation; secondly through the footage watching, website editing/collaging and arts workshops as research-creation; thirdly through considering both myself and the children as research-creators. These processes entangle with each other but separating them out might help to consolidate these three aspects of my conceptualisation of research-creation. In what follows, I will describe the things we did and how I consider this part of the research-creation.

3.4.1 Walking as research-creation

Springgay and Truman consider walking as research-creation where 'the walk becomes an event of research where the generation of research and its knowledge dissemination cannot be separated out' (Springgay and Truman, 2019: 97). Their work folds transmaterial relations between humans and nonhumans and explores the geosocial formations of the more-than-human. Significantly, it focuses on affective subjectivities and movement as a way of knowing (Walking Lab, no date). They queer walking scholarship away from dominant notions of the walker (as able-bodied, white, male, adult, lone, middle-class) and open possibilities for other ways of walking (with disability, ethnicity, queerness, age and other intersections of identity).

The walk as an event of research generation and knowledge dissemination became appropriate for our research project in multiple ways. Firstly, with both schools, our assemblage of bodies was diverse, queering the able-bodied, white, male, adult flaneur walker trope (ibid). Children walked with disabilities and with intersecting identities, as minoritised ethnicities, for example. This mode of inquiry as queering walking and mobilising other ways of learning, is therefore inherently political and disrupts dominant and everyday discourses of walking and learning. Secondly, and relatedly, Springgay and Truman further counter conventional conceptions of walking in school as linked to linear, chronological time progressing forward towards better health and wellbeing and mobility (Springgay and Truman, 2019a). This project further adds to this countering of the 'purpose' of walking at school, through considering walking with materialities, stories and digital worlds. Entangled in this process the GoPro becomes a key companion in the children's *doing* of research-creation and therefore I suggest we were walking (with GoPros) as research-creation (which I discuss in 3.4.1.2). Thirdly, children were invited to lead these weekly walks and to move anywhere in the park they wanted to investigate. This evolved as the weeks went on into diverse groupings, rhythms, paces and movements and varied depending on who was present in the group, and the affective energies relating to what kind of weather we were walking with and the moods of the children. As I have mentioned, some of the children know the park and therefore the walks became opportunities to tell stories and share speculations about various places in the park; for others the walks enabled creative bodily performances and movements in relation to the ground, the water and the rain.

The walks became events of research for the participants and myself, inquiring *with* our bodies and with water, sharing speculative fabulations of the ruins, the trees, the ponds and the bricks. As Springgay and Truman argue (2019), walking research-creation combines walking and movement-making with creative practices that are in situ, acknowledging place as more than a site or a backdrop, but instead engaged with in a deep and transmaterial way (ibid). Hackett and Somerville (2017) consider a posthuman 'thinking in movement' which resonates with the thinking-making-doing approach to research-creation. As Hackett and Somerville argue:

> the proposition that thinking can originate in the body opens up new possibilities for understanding young children's emergent language and literacy practices as being generated directly and spontaneously through multiple bodies coming into being in the world (ibid, p.389).

This implies that children's literacies are seen as 'embedded in and inseparable from their entanglement with the world' (ibid). We walk with place in ways which entangle the multiple temporalities, processes, materialities and rhythms that are ongoing and coexisting. Through the embodied walking we relate and learn with these different materialities, tempos and temporalities (Hennessey and Rooney, 2021).

Walking, therefore, generates thought, inquiry, questions, ideas for events and relations to other knowledges. Of course, it is not just the act of walking that generates this transmaterial and transcorporeal (Springgay and Truman, 2017a) process of research-creation, but other embodied performances such as sitting with rain puddles, jumping with mud, lying with leaves under tree canopies, tracing the line of a very thin stream, walking with a red clay brick, extending the arm and selfie-stick high into the canopy of a tree are all movements of inquiry. In Chapters 4, 5 and 6, I will describe these events in detail and how they took our thinking elsewhere. Here, I want to position our walks as walks of research-creation, where the thinking and doing of the research took place in creative and embodied ways.

3.4.1.1 Walking with wonder and curiosity

Walking with urban woodlands invites and requires practices that produce methods and methodologies differently (Koro-Ljungberg, 2017). Koro-Ljungberg argues that these approaches might not be repeatable or easy to describe but instead are 'sensed' (ibid: 14). They might be encounters of wonder and moments of surprise (ibid) rather than controllable or predictable moments. She argues how sensing and seeing in forests 'creates infinite (methodological) possibilities' (ibid: 15) through amplified colours, sounds, smells and textures. In walking with the multitude of relations, materialities, weatherings, feelings and

material processes and bodies that we do while on our walks in the park, everything is constantly changing, in process and unstable.

As I introduced in Chapter 1, some generative thoughts and propositions emerged within our assemblage that have remained productive to think with throughout this project. One of these is the proposal of '*going behind the scenes of Highbury Park'*, articulated by participants in an early group chat about the project. This statement has come to be a thread that proposes to weave some of the stories in this research together. The Merriam-Webster dictionary definition of 'behind the scenes' is, firstly, being or working out of view of the public and secondly, to reveal or report on the hidden workings of something secreted away from public view (Merriam-Webster, 2022). To 'go behind the scenes' then, is to bring to attention, perhaps, the processes, the relations and complexities of how actants intra-act. While this might be considered as some kind of 'big reveal' of a reality or truth, instead I consider this as a paying attention to the workings, multiplicities and relations that are perhaps marginalised, mundane, out of sight, or reach, thus demanding different temporalities, tempos and scales (Horton and Kraftl, 2006).

Tim Ingold writes '(T)o correspond we need to go behind the scenes, to join with the creepers and to move along with them in real time' (Ingold, 2021: 7). This seems an apt way to consider our 'going behind the scenes' as corresponding with the world. Rather than 'behind the scenes' evoking a sense of their being a truer 'reality' to uncover or reveal, this joining in and moving along in real time opens us into relation with the multitude of ongoing happenings of corresponding with the world at multiple tempos, layers, scales and materialities. It also brings into focus the liveliness and active vitality of the park, as a situated place where things are going on, doing and becoming; this animates the more-than-human processes that we encounter and participate in. Furthermore, as Ingold argues, this corresponding with the world suggests that things 'are fundamentally open, and all participate in one indivisible world of becoming' (Ingold. 2021: 8).

This sense of liveliness is further revealed in a second generative thought introduced in Chapter 1. On one of the first website collage sessions, participants wrote in text boxes. One participant wrote '*have you ever wondered how the park came to life for the woodland explorers?*' This bringing to life of the park for the children through our 'going behind the scenes' further animates the socio-materialities of the park and the more-than-humans co-present. Of course, the park didn't 'come to life' *for* the woodland explorers, it was always already alive (Alaimo, 2016). However, our paying attention to this liveliness situates this work within the feminist new materialist theories of Jane Bennett (2010) and Karen Barad (2007) who specifically focus on the vitality and agential potential of forces, things (for Bennett) and phenomena in coming into relational entanglements. Together, recognising the liveliness of the park alongside the desire to inquire with and draw attention to our relations with its liveliness, these two thoughts are productive in generating other ways of enacting a 'thinking-making-doing' process of research-creation with GoPros and urban woodland places.

A third proposition, again introduced in Chapter 1, that relates to these other two proposals is the suggestion by one group of children to call their research project '*the woods full of wonders'*. This phrase opens opportunities for speculative curiosity, for surprise, astonishment and questioning. This keeps us always in the process of doing and relating, rather than foreclosing what might be emerging, with facts, explaining and teaching (Pacini-Ketchabaw and Blaise, 2021). Woodyer and Geoghegen (2012) reference Jane Bennett in their consideration of the idea of 'enchantment' as being:

> struck and shaken by the extraordinary that lives amid the familiar and everyday … enchantment entails a state of wonder … a momentarily immobilizing encounter; it is to be transfixed, spellbound (Bennett, 2001: 5 in Woodyer and Geoghegen, 2012: 196).

This, they further define as 'a sensory experience of unintelligibility and a mood of fullness or plenitude' (ibid). An approach of collective experimentation, inquiring and wonder doesn't shut down possibilities but instead maintains openness to difference and new knowledge generation. Boyd, following Braidotti, argues that:

> part of active participation in the world is a sense of wonder. To wonder is to stop and rest, to look towards the other, to contemplate (Boyd, 2017: 27).

Such wonder, according to Boyd, is to be called to witness, to sense, to participate, to think and relate beyond the notion of the self. These ideas of inquiry and wonder in relation to the research project evoke the sense of anticipation, curiosity, possibility and awe at what these places and this process might become. Kullman argues that 'an experimental attitude sees uncertainty and openness not only as an inevitable part of methods, but, crucially, as a source of adaptation and innovation' (Kullman, 2012: 12). These propositions of walking with correspondence, curiosity and wonder are considered not only with the more-than-human world in its becoming but also with imagined audiences (Parry and Taylor, 2021) and digital, technological and material worlds, bringing them into the eventing and worlding of our walking research.

3.4.1.2 Walking with GoPros

In this research, GoPros came to figure prominently as a digital technology and companion on our walks. Research using mobile methods and digital technologies such as the GoPro, enable multimodal and more-than-representational inquiry through the affordances of the GoPro to 'go-along', 'animating and witnessing' (Vannini and Stewart, 2020: 149) and also extend sensory possibilities. During the first year developing this project, before I met the children and before we began walking, I had planned to wear a GoPro attached to my chest to record our walks as a way of paying attention to the lively, multi-sensory, bodily and more-than-human encounters and movements (Richardson-Ngwenya, 2014) of the group and move away from the use of a Dictaphone and reliance on voice, written fieldnotes and representation. I was not thinking of the GoPro as the dominant digital technology companion with which the children would inquire (I thought we would also perhaps work with sound technologies). However, the GoPro came to affect our research in a forceful way.

The week before we started walking together, I spent time with the Oak school introducing the GoPro, explaining how I will be wearing it, talking through how to tell when it is recording and when it is turned off and handing round the camera so the participants could try turning it off and on and seeing the recording numbers roll and the red lights flashed. I wanted participants to experience what the camera felt like and how it would be operating so they could be informed when it was recording during the sessions. This playing with the camera filled them with desires to wear, hold and film with cameras themselves while we were walking.

During this initial session, relations were already being made by some participants between the materiality of the GoPro, its straps, its waterproof casing and YouTubers and vloggers who incorporate GoPros in the footage that many of these children encounter digitally online. Participants clearly had experience and knowledge of this technology, either through having used a selfie-stick before or through their online, everyday interactions with YouTube. One participant from Oak school shared with the group very early on about YouTube videos he watches with GoPros going underwater and finding metals and technologies like car parts and Go-Karts (this will become a prominent theme with this research, which I discuss in Chapter 4 and 6). In this sharing of everyday digital practices of participants watching YouTube and in the Oak school's naming of the project as a 'going behind the scenes' of the park, thinking emerged about the possibilities of the GoPro to film and record the park in ways that people could not otherwise through their physical bodies. Truman, in outlining her conceptualisation of research-creation, argues for an 'ethic of affirmation', following Braidotti (2014), an ethics of affirmation attends to 'a promise to respond to what happens: acknowledging that we can't know before an event occurs' (Truman, 2022: 20). Furthermore, this affirmation opens possibilities of new relations and new becomings, 'through encounters and minglings with other bodies, entitles, being and forces' (Braidotti, 2008: 26). In response to these early encounters with the children and the GoPro, I arranged for a second GoPro and selfie-stick for the participants to work with throughout the project as an opening for new relations and possibilities.

Each walking session included the GoPro, with both the Oak school and the Beech school when they joined after Christmas. Each participant had 10-15 minutes (minimum) time with the GoPro, which moved between the group according to a paper list I carried in my pocket. The walks therefore amassed a large quantity of video data (Hackett and Caton, 2018), which I discuss further in Chapter 4. The camera was waterproof (which participants from the Oak school quickly established, asking if they could 'put it to the test'). They also understood how to extend and shorten the selfie-stick. With the Oak school, we had one session trying out the head mount with the camera, but this was found to be uncomfortable, trapping hairs, being too tight, falling down over eyes and was taken off by some of the children after a short time wearing it. A wrist strap was donated to the project by the class teacher from the Beech school (her own strap) as a response to the crunching noises that the waterproof casing was recording when rotating on the selfie-stick axle. While the camera was always present and recording within the group, often children dragged the camera behind them while walking. Those who did not have the camera were engaged in other encounters that I shall also discuss in the analysis. However, the camera became a key companion and therefore I cannot separate out walking from walking with the GoPro (Clement, 2019). It was part of the assemblage.

This also highlighted how the GoPro and the children come in and out of focus (Kraftl, 2020) and were always performing in relation to the dynamic more-than-human natures and place we were walking with. While in Chapter 4, I pay attention to the relation specifically between the child and the GoPro, this was only one of many relations and collaborations unfolding during our walks. Watching two cameras simultaneously reminded me of the ongoing and multisensory embodied encounters happening at the same time; as one child was filming with the GoPros, around this others were rolling, running, crawling, ducking, climbing, shouting, laughing. Birds were flying away from our noise, ducks running back into the ponds, leaves were compressing into boggy soils under foot, trees were creaking under the movement of strong winds and heavy rain, water was transporting matter and debris fast towards the storm drain. Attention on the child and the GoPro, in Chapter 4, is therefore, one of many ongoing, unfolding and expanding relations taking place during our walks.

3.4.2 Collaborative website editing and creative workshops as research-creation

A second conceptualisation of research-creation as encountered in this project is through the website editing sessions and the three creative workshops that took place during the research. In outlining these processes, I will first discuss the website and video sessions, then the creative workshops and finally will elaborate more specifically on my processes of analysis and editing of the footage (in 3.5).

3.4.2.1 Website editing and video sessions

As I have described in the school context section, only the Oak school were able to participate in the website sessions. While the Beech school did have two sessions of watching some of the video footage, this was more so they had a sense of their work. However, with the Oak school, over a total of 6 sessions in the school's wellbeing room, a messy and often frustrating and stop-starting process of co-creating a website and co-editing some of the video footage emerged. For these sessions, I would arrive early, gain access to the school IT cupboard and set up two or three massive, old laptops. The IT technicians kindly loaded the relevant free video editing software applications on to the desktops and we were given permission to use google search and also set up a Wix website. This website is free and easy to work with to be able to create and move text boxes, insert photos, videos, links, screenshots of video stills and moving video clips. The fonts could be manipulated into different styles and sizes and frequently during our sessions, the various boxes were moved around, re-formatted and pulled apart as other participants interacted with the page. Most of the children from the Oak school learnt to work with this website very quickly. Importantly, the website had an editing feature that meant we could always work in draft mode, without having to publish the website; this both encouraged a sense of freedom and experimentation in that at no point we were making a 'finished' or 'public-facing' website and was important for the digital safety of these participants. It was planned that I would blur all faces and remove any audio referencing

real names and that the website would be checked by the Headteacher and other staff before publishing.[10]

Each session, after setting up the room, I would collect two or three participants from their classrooms (often from different year groups) and walk back together. The sessions were loosely framed as opportunities for the children to watch back some of the footage they had created and experiment with editing their work and creating a website. Frequently the slowness of the computers, the internet or the large size of the video files meant that the videos 'lagged' (I will discuss this in section 4.4.2 of Chapter 4) or crashed or wouldn't load. While this was frustrating for some, it also opened opportunity for creative responses to these laggings. Rather than using the footage to stimulate group discussions or prompt phenomenological questions about children's experiences (Green, 2016), I am concerned with the process and immersion in the children's listening, watching, moving, sounding, performing and responding creatively with the footage.

I consider the work of these sessions as events of research-creation and will discuss these in full in the analysis (in both Section 4.4.2 and 4.4.3 in Chapter 4). I am not focused on the representational interpretations of children's experiences but in the entangled, embodied, processual and material creative responses (Kind, 2013). Much of the creative thinking and (sometimes) embodied doing in these sessions generated new inquiry that was enacted when back in the park; this was often in response to watching specific video footage. For example, I will discuss the responses to underwater footage in Chapter 5. I will also discuss how access to the internet in these sessions opened up possibilities for children to share some of the magnet fishing YouTube videos they had been discussing while walking. Again, as Truman argues (2022), an ethics of affirmation opens up possibilities of inquiry and this was certainly productive in thinking about the entangling of children's informal, digital, online practices and their relation to encounters with natures and materialities.

[10] As it turned out, this website has never been published because of the way in which the project ended during Covid-19. While this would have been great for the children to be able to share with their families and friends, I do not consider this a failing as all the children were able to view their work as they created it and I am interested in this thesis in the processes of creating, rather than any finished, published work.

3.4.2.2 Creative workshops

The creative workshops were again emergent and responsive to the different school contexts. With the Oak school, we held two, two-hour workshops in the eco-room during which Holly and I laid out two large rolls of paper that she had across the floor and spread lots of paint, woodland materials such as leaves, glue and scraps of fabrics on the floor and the children responded to their walks. In these sessions, which I recorded with a GoPro placed on a cupboard, I am not concerned with in the finished pieces as a piece of extractable data (Kind, 2013), with representative images to interpret; instead, I focus (in Section 5.1.1, Chapter 5) on the process of doing and making. I pay attention to the embodied, affective and material flows and rhythms and movements. Again, I consider the processes of the doing within these events as the research-creation.

With the Beech school, over the course of the research, the children had been drawing their walks during class time, mostly when I was not present. This was something that emerged through the classroom teacher choosing to extend their work and inquiry in new ways within their school days when I wasn't present. I did witness one drawing session where they were drawing materialities and features from the park, however I was also later presented with lots of interpretive map drawings of the park. It was therefore decided that, instead of the approach taken with the Oak school, the children would collaboratively create a 3D model map of the park on a huge piece of cardboard laid on the floor, using a plethora of materials that were collected during our last walk and by the forest school leader. This included leaves, branches of conifer trees, moss, lichens, fabrics, feathers, sticks and clay. The session ran for roughly 2.5 hours and was one of the last sessions we held before Covid stopped our research; I also filmed this session using two GoPro on different tables. Again, I pay attention to the process of the creation and how this related to their learning with the park. The classroom teacher suggested it be a mapping model, which gave scope for children to include aspects of the walks that they remembered or enjoyed but significantly for me, the ways in which the children responded with the materials and their bodies to the more-than-representational, affective, sensory and material aspects of our walks was expressive of their being research-creators.

Particularly in the website sessions, in my own watching and editing of the footage (which I discuss below), and also through these workshops, I came to think with the concept of the diffractive 're-turn'. Haraway (1997) considered the idea of diffraction as a means to shift thinking away from reflexivity and reflective practices of research (Bozalek and Zembylas, 2017). Haraway's argument is that reflection simply 'displaces the same elsewhere' (Haraway, 1997: 16) and that this repetition of sameness is reductive in research practices. Diffraction, instead, emphasises the productiveness of differences produced in ongoing and multiple ways. It thus moves toward 'a way of understanding the world from within and as part of it' (Murris and Borcherds, 2019: 204). Both Haraway and Barad (2014) have pushed for a material-discursive approach to knowledge production that recognises the specific entanglements matter and the material (Bozalek and Zembylas, 2017). In a diffractive approach, attention is paid to 'how differences are made and what the effects of these differences are' (ibid: 112). Barad considers the idea of the 're-turn' as part of the methodological practice and process of diffracting, intra-acting, re-diffracting and making new spacetimematterings or diffraction patterns as 'an iterative (re)configuring of patterns of differentiating-entangling' (Barad, 2014: 168). I recognise the processes of re-turning and diffraction within this research and particularly in the relation between these workshops and our walking sessions. As I will discuss in the analysis (in section 4.4.4, Chapter 4), we re-turn (to) footage, responding to it differently with our bodies, senses and taking the footage 'with us' into new entanglements with materialities and bodies. There are multiple and ongoing re-turns in this research - both in re-turning (of/to/with) places, materials, encounters and environments and also re-turning (to) video footage, sounds, visuals, websites, GoPros and discussions. These re-turns are not reflections, or a returning to the same, but a diffractive re-turn to something different (Giorza, 2018). Giorza employs re-turning in an embodied and material process, re-turning (to) video footage, re-turning (to) the body.

3.5 My own video editing and narrative writing processes

In terms of my own process working with filming and walking, specifically through the video editing and through narrative writing, I will now discuss some of the emergent ways in which

I worked and responded with the events throughout the project. I will begin by discussing the days of walking research, including my approach to filming the walks, making voice notes, saving and storing the videos. I discuss working with and editing the footage, which evolved alongside and in relation to the editing sessions with the participants. I will then discuss how I came to write narratives from the walks, as well as how I came to draw out and structure the intersecting events and stories that matter in this project and that have formed the analysis chapters.

On the days of walking research-creation, I would generally cycle to the schools with a backpack full of waterproofs, hats, gloves, spare gloves, portable heat pads for warming hands, GoPros, cables, chargers, selfie-sticks, chest straps and hard drives. During the walking sessions, I did not take any written notes, but would wear the mounted GoPro strapped to my chest, constantly recording. After the sessions, I would push my bike away from the school through the park, while recording voice notes of things that felt significant from the session. I would then continue to a local coffee shop, order lunch and proceed to pull out tangled cables, hard drives, chargers and my computer in order to recharge the GoPros, upload and save all of the video footage onto my encrypted hard drive and wipe the memory cards clean before starting the afternoon sessions with the other school. During this time, I sometimes wrote some notes in a notebook but not always. Upon finishing any afternoon sessions, I would cycle home and go through the same process of emptying out my bag of muddy waterproofs, wet cables, chargers and GoPros. I would frequently spend the evening, mostly out of curiosity, watching the footage. This wasn't necessarily an intentional period of analysis running alongside fieldwork but, two emergent and generative processes developed during my time doing this.

By watching this footage, from both cameras and thus from multiple perspectives, I came to know the research as it was emerging from multiple positions. I could witness the footage from the participants' GoPro and notice some emergent points of attention. Each week (as I discuss below) this process would build stories, movements, narratives and inquiries emerging

from our walks, I came to notice new happenings and relate them to conversations, performances and encounters from the sessions.

Wearing the camera was initially conceived as a way to acknowledge being *present* in person, not taking notes or being 'removed' behind a digital camera as an observer, but to let the camera do the 'work'. However, wearing the camera became much more than that. Firstly, in the process of walking, the cameras often 'met' each other, filmed each other, looking closely into each other's lenses. Secondly, the multiple, overlapping perspectives of filming the walks proved to be a creative and productive way in which to (re)turn to the footage and observe the rhythms, flows and movements of the group and participants while we were walking. Thirdly, during the children's collaboration with the GoPro and selfie-stick, I was generally absent. As Hackett and Caton (2018) highlight, when children are wearing or filming without the researcher 'watching the video data back afterwards is not a process of re-encounter for the researcher' but rather of encounter and experimentation with the 'researcher-as-viewer' (ibid). This meant, when re-turning to the footage (following Giorza, 2018), I was able to watch the relations between children and the GoPro and selfie-stick.

Through playing with these two perspectives of footage on my computer side-by-side and simultaneously, I was afforded the possibility to observe the participants performing with GoPros, in relation to corresponding with the wider assemblage. In this way, the children, camera and more-than-human environment came into and out of focus throughout the walks. In Chapter 4, I will include some of the 'moments' where both cameras can provide two different perspectives related to encounters with trees and hedges. This situated the focus of the child and GoPro within the intra-actions, encounters and movements that I had not participated in during the walks.

As the footage mounted over the weeks, I began playing around with iMovie, in ways I later recognise as cutting, analysing and assembling footage, I discuss this in Section 4.4.1 of Chapter 4. I also began playing with overlaying the audio of participants telling stories of magnet fishing over footage from filming underwater. I cut the footage into the different

participants' work for each session, naming each file with the pseudonyms of the child who had filmed it. These were made available to participants during the website editing sessions so they could watch their work and begin to edit. As the project continued, I would do this after every walking day, so that there became an ever-increasing archive of footage – both the full mp3 files of the sessions by both cameras, as well as the different cuts and edits I was playing with. This playing and replaying back and forth of the footage, of cuts, of overlaying and overlapping of different perspectives became an ongoing shifting and returning to the footage differently. Through returning to footage, events that came to matter could be witnessed as emergent in stories told in earlier footage, such that a linear direction through the project (from fieldwork to analysis, for example) was productively complicated. Materialities such as stones, bricks, soils, water emerged as significant through both my viewing to the footage, but also through the website sessions and could then be returned to in walks; the walks and the editing informed each other.

In terms of the inclusion of the videos in this thesis writing, I played around with various ways of including the videos within this thesis. There are links to a selection of videos in Appendix 6. However, I am not concerned with the representation of finished works within this thesis, rather I am interested in the processes of making, creating and thinking with these footages and the partial ways in which they were experimented with. Within this thesis, and particularly throughout the analysis chapters, I am working with video footage as screenshots of 'moments' (following Kind, 2013). Thus, the screenshots included are from the video footage from both GoPros (the one mounted on my chest and the one mounted either on the selfie-stick, head strap or wrist strap, rotating around participants). I screenshotted these frames from the footage at various moments while returning, watching and analysing; these are not the screenshots made by some participants during our website editing sessions (apart from where I introduce these in section 4.4.5, Chapter 4). As I have discussed, by walking with two cameras, this multiple viewing and re-viewing enables a multi-situated encounter both in the analysis of the videos *during* the fieldwork and here in this writing.

My inclusion of these screenshots is, again, not to analyse the meaning of them as images but more as process, experimentation and movement, placed together in relation to other 'moments'. As such, I consider the pairing or placing of multiple screenshots together as one 'moment', they work together as a process, an event, or a movement. Kind argues for reading her article as an 'itinerant journey through these processes (…) it gathers together moments and aims to set out propositions for further inquiry' (ibid: 431). I too, consider this thesis writing as gathering moments, encounters, experimentations and inquiries together through narratives, screenshots, processes and materials. Furthermore, I want to consider the screenshots, the editing, the embodied responses to the videos (during the website sessions) and the processes within the creative workshops as fragments of the creative processes we were immersed in and as such are not to be read from an individualistic or developmental child perspective. Screenshots made by the participants during our editing sessions will be included in Chapter 4, sections 4.4.3 and 4.4.5, and are situated within screenshots of the website pages. There is, therefore, an entangling multi-layering of perspectives, which gives the opportunity to consider what the body and the camera and the video footage are doing in relation to the more-than-human and what these relations produce.

Regarding the written 'stories' or narratives that open many of the sections in the upcoming analysis chapters, these form other creative responses I made to the walks, the footage and the website sessions. After the walking research ended abruptly, and while isolating with my parents away from Birmingham, during the first covid lockdown, I felt increasingly removed from this project. The abruptness of the stopping of the research had jolted us all out of our process in ways which felt somewhat emotionally violent and confusing. After a period of not knowing how to re-engage, now alone, without the children or the park as collaborators, I started writing stories of events and encounters that had come to matter. I hadn't known what to do next, as it felt there was still so many lines of inquiry in process, still in tension. I re-turned to the footage, watching and re(-)membering and began writing creatively, re-turning to the work. I wrote over thirty stories, in documents I called 'brick wall', 'kinds of trees', 'watery encounters' and 'walled gardens'. The short stories had names like 'brick in a wall'; 'buried Bricky'; 'Bricky says hello'; 'oaks'; 'beeches'; 'conifer (douglas fir?)'; 'oozing yew resin';

‘water wet’; post-storm water’; ‘oil spill flows’; ‘algae ponds’; ‘bog i’; ‘bog ii’; ’bog iii’; and ‘stream and stone’. I wrote about stones and bricks and how magnet fishing had woven through the walks in obscure and abstract ways before becoming an emergent method of ours. Excerpts from some of these stories are within each analysis chapter as creative narratives of material encounters.

Writing about these stories now, more than a year later, I recognise this was a way to get unstuck in relation to this work. Much like my approach to the video footage, playing with the events that mattered, these also became the work of the research; narratives and stories of events that mattered and had been turning over in my thoughts. This writing without an outcome enabled me to situate these events in relation to each other. Through this creative writing release, I came (again) to notice the multiple watery bodies that figured prominently in our inquiry; I could relate the GoPro, YouTube and material encounters together in ways that opened up generative ideas of techno-naturecultures; and the speculative storytelling of rusted metals, stones and bricks that had been scattered through our walks emerged again through this writing. Attention to the multiple layers of this place also began to emerge, extending into the canopy, underwater and underground, towards digging and excavating of earth(l)y materials. These layers of place and their multiple scales and temporalities became further ways to thread these analysis chapters, attending to the canopy, the watery and the underground and earth(l)y.

Through this process of returning over and over, a narrative of how to tell this research-creation through this thesis emerged, weaving together the digital, the material and the embodied; the canopy, the underwater and the underground; the hydrologic and the geologic; in storying new ways of learning with natures. Following Sylvia Kind (2013) again, I include these ‘narrative moments’ within this thesis as moments ‘threaded through (that) resonate with the written discussion’ (p. 431), creating a ‘visual/textual interplay’ with other ‘moments’ from the research presented as screenshots playing between the footage from both GoPros as a ‘back-and-forth play’ (ibid).

3.6 The children and myself as research-creators

In my third conceptualisation of research-creation, I include the children as the researchers and creators of work, as well as myself. As Truman argues, she uses research-creation to create the work she wants to research (Truman, 2022) and recognises the scholar as the artist and creative within research-creation projects. With a background in both fine arts and anthropology and sociology, a masters in urban geography and forest schools training, I bring a transdisciplinary hybridity of artist-researcher (following Sheller, 2015) (or artist-geographer-anthropologist-environmental educator) to the project. My own creative practice is concerned with materialities and creative articulations of relations with the more-than-human. Many of the materials and processes addressed in this PhD research – rust, decay, human dumping, abandonment of materials, naturecultures, erosion and liminality – are also part of my artistic practice.

Manning (in Truman, 2020), following Fred Moten, conceptualises research-creation as a 'concept of study' (p. 228), a process and mode of inquiry, or study, calling for new ways of learning outside of institutional systems and proceduralism. Recognising study, learning and thought as a thinking-making-doing means engaging with learning that is processual and embodied. I recognise the children as research-creators, learning with techno-naturecultures. In this sense I further recognise children (in relation with the more-than-human) as knowledge producers, rather than knowledge consumers (following Murris and Borcherds, 2019). There were hours and hours of footage that was not viewed by the children, but the processes of making the footage were the research work and the creative outputs, the framing, the narration, the engagement of the imagined YouTube viewers, the use of the camera underwater, different shots and perspectives and layers, involving the camera in play fights, smelling, tasting - all of this is the work of research-creation.

Georgis and Matthews (2021) argue that researcher-creators enter their studies with a curiosity about a particular thing and it is that curiosity that sustains and opens up the research process, rather than a set of pre-determined questions. This is as much true for me as it was for the children as research-creators; their curiosities about materialities, place, water bodies

and other aspects of this research opened the research process. However, considering the children as co-researchers is limited because this research came to an abrupt stop due to the start of the Covid-19 pandemic in March 2020. Much of the research-creation and co-analysis was still evolving at that point. Rather than trying to adapt this project to a virtual / online / at home project (which would not have worked) we decided to stop the project and that I would continue with the writing. Sadly, as this pandemic has rolled on and I have had to move away from the city, other than thank you letters written to each participant, I have not had any further contact with the children since March 2020.

Understanding research-creation as a process and considering knowledge as a thinking-making-doing has been generous in this context. Having the video footage from both cameras has enabled my re-membering and re-turning (Barad, 2014; Giorza, 2018) to the events of the research. In their unfinished, partial, incomplete, yet-to-be-articulated and messy work in this project, the children remain researchers and creators, co-analysists and editors. While their involvement in the writing up of this work might have more fairly situated them as co-researchers, and certainly there are many things that I would like to share with them, I feel able to write with our inquiries and therefore to maintain a sense of collaboration in this work; after all it is their inquiries that I am writing with here. Furthermore, within situated research-creation projects, the tensions, or unfinished elements, as Pahl and Pool (2021) argue, *are* the research: the research *is* the incomplete, the unfolding and the creative process.

This idea of process, un-finishing and non-outcomes-based research was at times a point of tension with some of the adults within the project. While there were regular walking sessions and fortnightly video editing sessions planned, as I have mentioned the time spent during these sessions varied greatly and often involved doing what might be perceived as the 'same things', such as revisiting the stream or walking the 'same' routes through the park. This was a few times articulated as 'wasted', unstructured or confusing by some adults who accompanied the project. I sensed the frustration from adults joining the project to 'move the project on', to move the group on to the next 'place' or to hurry things up a bit, to get to

somewhere, or introduce a point of learning or know what is coming next, frustrated by the apparent 'lack' of organised learning outcomes.

This tension at times disrupted the flow of activity, demanding the assemblage to move differently. However, this is exemplary of the dominant approach to learning and to place that this project aimed to queer and speaks to Springgay and Truman's speculative temporalities and refusal of (school) time and walking as progress (2019). Furthermore, to consider the walks as being the 'same' is to prioritise the human and human-time and deny the agential vitality of the more-than-human environments we were walking with (Pacini-Ketchabaw and Kummen, 2016). In research-creation projects, Truman (2022) is clear to articulate, the planning and protocols of the project are focused on facilitating space for the research events themselves to always be in process. Re-turning to the watery bodies of the stream and the ponds, for example, demonstrated the ongoing-changing differences of water flow, whether it had been stormy or raining heavily, what traces of rubbish and plastics had collected at the drain gates, whether more of the bank had been eroded, the growth of nettles and grasses on the river bank, how we moved in relation to the weathering processes we were walking with (Rooney, 2018).

While children paid attention to this while walking with the stream, it was clear that there were certain adult participants who were sometimes unsettled by the disruption of the sessions not being filled with activities for children *to do* or plans that included a learning outcome or a focus for learning led by me and who thus presented this tension as concern of sameness and repetition. Thinking diffractively about these material-discursive walking research-creations means that nothing is ever 'the same' and therefore all the ongoing differences become productive knowledge-creation. It was through these unstructured and evolving processes of walking *with* that we learnt to pay attention to differences, to materials, to weather and other happenings and ways of becoming in the park.

3.7 Conclusion

In this chapter I have outlined the emergence of this project, in relation to both the situating of the project within Highbury Park and also the assemblage of participants and collaborators. In discussing the situated socio-material histories and ecologies of the park, I draw attention to the broader pastpresent place stories that matter in terms of placing this park within specific histories that (still) need troubling.

I have highlighted the ecological and material more-than-humans that live, die, decompose, crumble, degenerate, rot and erode in ongoing processes of living and dying in this place. These materialities and more-than-humans come to figure significantly within the following three analysis chapters. In these analysis chapters, I begin with focusing on the relations emerging between the child, GoPro, YouTube, the more-than-human and place, in order to highlight the processes of walking and filming as well as the editing and re-turning to footage during the website sessions. I start with these (digital) entanglements in Chapter 4 to then extend focus towards the more-than-humans and materialities in this situated place and how they interweave with the child and technologies in Chapters 5 and 6. As these chapters evolve, we move from the tree canopies, to underwater, to underground, thus encountering different layers, temporalities and scales as we 'go behind the scenes' of the park.

Thus, we extend with GoPros into the canopies of the standing trees, the beech copse, conifer pinetum and woodlands in Chapter 4 and further into the dense branches of shrubs and bushes of the rhododendron avenues and underground into the muddy bogs of the wetlands. We walk with and film with the (underwaters) of streams, ponds, bogs, swamps and storm drains in both Chapter 4 and 5 and further weather with these watery bodies in Chapter 5. We 'turn towards' (Pacini-Ketchabaw and Kummen 2016: 436) and speculate with these waters and technologies, imagining rusty, eroding and polluting car parts, fridges and other metals underwater in Chapters 4 and 5 before pulling minerals out with neodymium magnets in Chapter 6. In Chapter 6, both return underwater and move underground, encountering soils

and tree roots as well as weathering with bricks, sand, stones and clay pulled from the former rose garden wall.

As I have argued in this chapter, my approach to this research is a modality of research-creation. I attend to the processes of our research assemblage and the multiple, complex ways in which, again following Pahl and Pool, '*momentary stories stopped us in our habitual tracks and echoed across the project, they became the work'* (ibid: 8). Through the modality of thinking-making-doing as well as the diffractive re-turn (Barad, 2014) as tools to support what was going on in this research, emergent stories, narratives, movements, intra-actions and relations began to emerge as the 'work' of the project. Our research-creation emerges through walking as research-creation; walking with GoPros, walking with wonder and curiosity; editing, cutting, screenshotting and collaging footage and websites; and through processes within creative workshops. Through these emergent processes, which shift and open ways of becoming with others and of participating in the world (Boyd, 2017), we 'go behind the scenes', with the 'woods full of wonder', to consider (and trouble) 'how the park comes to life'. In doing so, both new ways of thinking with techno-naturecultures as well as persistent tensions of human-centric and extractivist logics will be discussed.

4 ENCOUNTERS WITH GOPROS, BECOMING YOUTUBE AND THE MORE-THAN-HUMAN

This chapter will consider the ways in which specific technologies and digital practices entangled with our walking events. I start with these relations to disrupt and extend dominant conceptions of technologies in environmental education and outdoor learning programmes. As I discussed in the literature review, digital technologies are commonly situated in binary opposition to natures within discourses of nature connection. Environmental education and learning programmes within Anglo-Western third sector and educational organisations frequently position the mobile phone, gaming, television, the internet and social media as reasons for children's so-called 'nature-deficit' (Louv, 2008) and 'toxic childhoods' (Palmer, 2006). Haraway writes of this dominant binary between nature and culture: '(I)f one loves organic nature, to express a love of technology makes one suspect' (Haraway, 2003: 10). Removing engagement with these technologies while outside, as well as reducing time spent with these technologies, are offered as solutions to increasing 'connection', environmentally friendly behaviours and better health and wellbeing. However, this approach is reductive and works again to situate humans as separate from both technologies and from natures in a hierarchical and human-centric way. It also oversimplifies technologies, natures and their relations with humans and removes potential ways of learning.

In this chapter, therefore, I aim to set up some of the processes of inquiry that emphasise techno-naturecultures, as relational within children's worlding practices, and how this can extend learning *with* materialities and natures. Chapters 5 and 6 tell stories that focus on the socio-materialities of encounters emerging from this assembling of techno-naturecultures. By acknowledging and inquiring with the entangling of the technological, the embodied, the material and more-than-human in our walking research, children's learning and responding with natures complicates any notion of a binary separation.

This chapter will will bring children into and out of focus (Kraftl, 2020) to discuss the affective, emotional and embodied ways in which we experiment with(in) these techno-naturecultures, so that at times children are at the forefront of the story but always in relation with the more-than-human. It will also bring the GoPro to the forefront of the research assemblage, with participants, in experimentation with optical, embodied, haptic and other sensorial encounters; these moments were ongoing, overlapping, messy, happening all at once, continually new, emerging and endless (Hackett and Somerville, 2017). I separate out these sections to pay attention to some specific differences ways this process evolved with the GoPros, with YouTube and with the website.

Thus, Section 4.1 will pay attention to how the body and GoPro perform together while walking, with the camera working as an extension of the body, with the child-and GoPro in relational assemblages and with the camera as companion. In this section I will not include the verbal narratives between the child and the camera, so this section may sound 'quiet'; this will come in section 4.3. Section 4.2 will draw attention to the ways in which children narrate, perform and become YouTube with this situated place and further with imagined YouTube audiences (Perry and Taylor, 2021). This will zoom out from the relation between child, camera and material environment towards the inclusion of an imagined digital world. Section 4.3 will then consider the agential GoPro, disrupting and affecting the process of filming, intra-acting with the child. This will include both moments when the camera distorts, blocks, cuts out, flops and swivels and the ways in which children worked with the camera; as well as moments when the camera is ignored and dragged along or forgotten but still filming. I consider what this does for creating different possibilities for learning with the footage (following Somerville et al., 2021).

This leads into the re-turning of the footage in section 4.4, where I will consider the process of video editing, watching footage and making/collaging/attempting a website (described in Chapter 3). Again, as with the previous sections, this playful and emergent approach to analysis, through the concept of the re-turn (Barad, 2014), expands research in which children engage with techno-naturecultures, rather than separated from them. Section 4.5, the final

section of this chapter, will conclude these encounters with digital technologies and websites and introduce the following chapter, which pays attention to our watery and weathering relations.

While not all the children in this research shared the same access, exposure, interests or knowledges regarding online and digital tech and gaming, an everyday vocabulary, bodily movement, expression, performance and affective atmosphere emerged throughout the project relating our research collective with YouTube, Minecraft, websites and GoPros. This atmosphere was affective amongst the children, as well as the teachers and parent volunteers. This meant that, despite not all the participants having watched the same videos on YouTube, for example, the whole research assemblage participated in enacting and performing YouTuber vocabulary or vlogger embodied practices. As shall be described in this chapter, their learning with these digital platforms extends into their relations with the places we encounter in our walks and through these relations new ways of thinking and learning with natures and materials emerge.

4.1 Engaging with GoPros and walking *with*

This section shall consider the embodied encounters, rhythms and movements with which participants engaged and collaborated with the GoPro, the selfie-stick, the materialities and more-than-human inhabitants of the park. As we walked, the GoPro camera and child assemblage was constantly shifting in relation with the more-than-human (Wargo, 2018; Änggård, 2015; Somerville et al., 2021). I will try to indicate some of these different encounters in separation, however of course these were enacted over each other, overlapping and contradicting each other in multiple and complex temporalities. And of course, while these particular encounters were happening between these actants that I have chosen to focus on, this does not deny the complexity of other ongoing, simultaneous encounters happening alongside this particular one (Hennessey and Rooney, 2021). The relation between child and GoPro (as well as the more-than-human) shifts between collaboration, companionship, communication and carelessness or unconcern. Sometimes these collaborations can be

considered destructive (Taylor and Pacini-Ketchabaw, 2015) while also being productive of different ways of intra-active learning with the digital and the material (Lenz-Taguchi, 2010).

4.1.1 The GoPro and selfie-stick as a hybrid extension of the body

Often during our walks, participants, when walking with the GoPro camera and selfie stick, would extend their arms and the camera-selfie-stick up into a tree canopy, into a hedgerow or through the dense branches of a bush. The camera is often crashing through branches, pushing apart leaves to get further into the middle, into thicker, denser, deeper, higher layers of the park. The movements of the arm thrusting the camera into the hedge can be sensed in the below moments, screenshots of the multi-situated perspectives afforded through the two cameras. Moment 1, recorded on my body camera, of the participant-camera-selfie-stick sticking the camera into a hedgerow on route to the park and the footage from this movement recorded on GoPro selfie-stick camera as it is pushed into a yew tree hedge (Moment 2).

Moment 1: Tyler and GoPro-selfie-stick pushing in and out rapidly into hedge, as witnessed from my mounted GoPro on chest

As well as extending up into tree canopies (Moment 3) and into dense hedges, the GoPro-selfie-stick also plunged underwater in rivers and ponds and into thick mud in the park. It was dragged through fast-running river water and dunked into very deep murky algae-filled waters. Sometimes this became as a testing rod for depth, murky-ness or to disturb and stir the water; sometimes it became a stick, to poke around and feel with. These were frequently fast rhythms and movements, pushing and pulling the camera rapidly in and out of a hedge for example or smacking into shallow puddles (Moment 4) or plunging into stream water and dragging the camera along, disturbing mud and silt from the water into clouds swirling in the water. Other times it smacks onto the pavement, peering through a drainage grate (see below

Moment 2: Tyler and GoPro-selfie-stick pushing in and out of hedge rapidly, from GoPro-selfie-stick

in Moment 5), is pushed into a rubbish bin in the park, or as far as it will go into the local post box mouth we pass. The fast plunging of the camera is both rapid in physical action and disorienting to view, with the camera twisting and swirling and the sounds becoming loud, crunching, rustling and distorting (I discuss this further in Section 4.3).

Moment 4: Leo and GoPro-selfie-stick smacking into a shallow puddle on a tarmac pavement

Moment 5: Pete Crash and GoPro-selfie-stick smacks down onto metal drain and drags along

Other movements were slow, with participants pausing to hold the camera-selfie-stick still while they 'zoomed' the camera in with their arms (Änggård, 2015), perhaps adjusting the selfie-stick to a smaller length to stop the swaying weight of the camera. Often these actions were not accompanied by verbal narration from the participant, despite their narrating at other points with the camera (in Section 4.2). The resulting footage from these slower movements tended to zoom into really close to plants, flowers, moss growing on stones or walls or fungi growing out of the ground (see Moment 6). When watched back within the longer video footage, these moments are affectively felt as breaks, pausing, a stillness when the participant and camera stop to pay attention to a specific material encounter.

Moment 6: Kiwi and GoPro-selfie-stick zooming in and pausing during one walk

In these moments, the child-GoPro-selfie-stick assemblage works whereby the camera is both a participant and an extension of the body itself (Kullman, 2012). I discuss in more detail in Section 4.3 how the GoPro enacts agential cuts that shift dynamic of actants and affect differences in the footage, becoming a 'material and sonic participant' (Pasek, 2015) in the assemblage. However, here, I want to consider the camera as an extension of the human body (Prout, 2004), with the child and GoPro working together in relation (Wargo, 2018), an extension of the physicality of the human body in collaboration with the GoPro and the affordances of the bushes, shrubs and canopies affecting differences in terms of the possible encounters. The assemblage of the camera (specifically with its visual and sonic recording affordances, its long battery power and its lightweight-ness, its solid, durable plastic waterproof casing), the selfie-stick (with its extending metal pole and attaching screw mount to fix the camera in place) and the child (particularly the child's arms or forehead depending on adaptation of wearing it), enables the child-camera to move into places that the child's body alone might not reach. While the materialities of the trees and shrubs present

opportunities for openings, for entry, for reaching and pushing through. This attunes to the rhythms and flows of the children moving in correspondence with the ground, the water, the tree branches and other materialities (Hackett and Rautio, 2019). The affordances of the camera work with the child-camera to roll and tumble and swoop with the camera as a participating extension of the child.

Vannini and Stewart (2020) consider how the optimal performance of the GoPro 'demands physical movement by its carrier and subjects' (p. 153). They refer to a specific 'mobile gaze' of the GoPro, as opposed to a still camera, highlighting the GoPro's abilities to film while in motion. They further argue that this is a mobile gaze 'whose pleasure is evident only in constant movement, in utter refusal of stasis, of stillness' (ibid). Kind (2013) troubles this notion of the 'gaze' as being employed to objectify, subjugate and present representations of 'actual' events. Instead, she argues for an entangling of working *with* the camera; it is the relational entanglement of body, camera and 'movement, recording bodied and haptic exchanges' that are the processes of walking and filming *with* the camera (p. 437). Kullman (2012) further considers the 'adaptation work between bodies and cameras' (p. 6) experimenting and inventing new ways of working together while walking. He argues that this is a 'collaborative pursuit, involving a shifting ensemble of bodies, spaces and materials' (ibid).

I am interested in this collaboration to consider what possible relations with the more-than-human can be forged. I discuss the learning that emerges through this embodied collaboration between GoPro and participant throughout much of this thesis. Here, this extension and collaboration facilitates a 'going behind the scenes', an encountering and touching materialities, with frequent (failed) attempts at seeing in detail the lichens, leaves, stones, gravelly, soiley grounds and underwaters. But also opens a feeling and sensing between the child, GoPro and more-than-human as it touches, pushes and crashing into, onto and through different materialities, felt as vibrational through the child's hand and body as it holds the selfie-stick. It also exposes their soundings as they are transformed through the camera microphone and played back through computer speakers (which I discuss in section 4.5.3).

While this collaborative extension opens potential (and often unmet) possibilities for participants to witness beyond their bodily physicality, many of these events employ the camera and selfie-stick in a physical collaboration whereby the selfie-stick becomes an extending arm, in an almost invasive and destructive way. As I re-turn to the footage, it emerges that the child-GoPro-selfie-stick assemblage performs intrusive actions in the poking and sticking of the camera into places and into living, matter, such as fungal fruiting bodies and bodies of water. For example, upon re-turning to watch the footage of Tyler pushing the camera on selfie-stick up into the oak tree branch (in Moment 3), the camera can be seen and heard scraping alongside lichens growing along the branches, crunching into leaf buds and likely knocking off and damaging the living lichen along the bark. The actions relate to those articulated by Taylor and Pacini-Ketchabaw (2015) in their work with young children who destroy ant hills, reminding us of the 'non-innocent' relations between children, place and the more-than-human (Blaise and Ryan, 2019).

In the actions of sticking-in and crashing and pushing through, the child and camera trample and snap and crush and compress. This resonates with how participants' bodies sometimes move without the camera, extending themselves into holes in hedges, reaching arms up to climb branches, pulling themselves through gaps, falling into dense bushes to be held by the strong branches bouncing them back out, crawling to lie down under trees and ducking and going through hedges on hands and knees. As the camera went further 'behind the scenes', so too were children articulating desires to push through and into and underneath the layers of the park. Both with their bodies and with the camera, there is a desire to immerse themselves more deeply 'into' the park. Pete-Crash particularly articulates this by pushing himself into a hedge, pulling the whole group through with him and out of the other side, branches pulling, bending, snapping back, spiking, whipping our legs and hitting our faces forcing our bodies to move, shift and duck to avoid these often-painful encounters (Moment 7). There is a sense of both the child and the camera being in correspondence with the environment, entangling, bending, shifting with trees and hedges.

Moment 7: Pete-Crash and others going through hedge and emerging

Through recognising the tensions of the child-camera extension in motion, we can consider the sometimes-damaging effects of the human-centred desire to move and push ourselves into and onto the environment for our own curiosities, rather than consideration or attention to these bodies as complex living and agential ecologies. While this learning with the camera, touching and extending into new places opens opportunity for more depth of inquiry, we neglected, in these occasions, the vitality and liveliness of the trees and hedges. The camera as extension of the body affords a zoomed in and expanded visual and oral sensorial relation to the trees, but so far, this remains a human-centric inquiry following the movements, flows and practices of the child as. Later examples of tree planting (in Chapter 6) will address trees as agential but still highlight the tensions of destructive actions of slicing through roots.

4.1.2 Relating with the GoPro as companion

As well as the camera as a collaborating extension of the body, the camera also becomes a companion, afforded the possibility to be able to smell and taste. Leo and the camera would smell flowers and he would invite the camera to taste flowers and grass (see Moment 8). He encourages the camera to kiss a tree trunk, voicing ‘mwah, mwah’ as the camera taps and hits into contact with the tree (I return to this in Chapter 6). Leo and the camera often fought and rolled on the grass together. Leo would punch the camera repeatedly while making sounds like ‘ataaaaah’ and ‘yaaa yaaaa’. He would hit the camera into the ground and then bring it

close to his face and punch it (see Moment 9). Crazy and Batman in the other group would also play fight together with the camera, hitting it into the ground and wrestling with it, rolling along the ground. Kind (2013) argues that the camera 'runs with a child, crouches down, lies in the grass, or stands on a hill. It jumps, skips, dances, twirls, rests, and moves' (p. 437). In these moments, the camera becomes a sensory companion, a participant in the playful and sensory encounters, touching and communicating with the world, in relation with the child, sharing in sensory encounters which extend and invite further sensory inquiry of the child.

Moment 8: Left: Leo and camera-selfie-stick with mahonia flowers, Leo says 'Let the camera smell it, sniff sniff'. Right: Leo and camera-selfie-stick with grass 'Leo says 'Ok I'll give you some grass…mwah…mwah'

Moment 9: Leo rolling, punching and fighting with the GoPro-selfie-stick (above) and as recorded on my chest mounted camera (below). Leo can be heard saying ‘Ok let’s fight, take that camera’

The GoPro as companion is different from the Go-Po as extension; as companion, the GoPro becomes its own sensorial actant, invited as (an anthropomorphized) GoPro to participate in the sensorial encounters. Änggård (2015) considers how the digital video camera (not a GoPro) works as a ‘playmate’ in practices where children ‘act’ in front of the camera (p. 11), which certainly relates to these examples of role-play fighting but also to the ways in which children performed YouTube that I will discuss in Section 4.3. Änggård’s study also highlights how the intra-actions between the camera and the child creates a distance between children as they focus on the screen and relate to the technology rather than other children. However, I would articulate that the camera-child as companion provided diverse encounters, emotions and responses in their learning with place, rather than attention on the screen itself. The

camera accompanied children as a listening, sensing, moving, seeing, feeling companion to articulate their walks. As well as Leo's inviting the camera to taste and smell, Max Ranger often took the camera for a walk away from other children to confide in the camera and show the camera (and perhaps also the imagined 'audience' listening) the collection of materials he was gathering on a tree stump.

Having now introduced the embodied movements and sensory encounters of the participants and the GoPro-selfie-stick and discussed some of the ways in which the camera-selfie-stick acts as an extension of the body, as companion and collaborator, I will now consider some of the other ways in which the camera-selfie-stick became collaborative. These will focus on narrative and verbally communicative encounters, that extend beyond the participant-camera-park assemblage to include the imagined audiences from a YouTube digital platform.

4.2 Becoming YouTube(rs): performing with the GoPro

> *Dolly takes over the selfie stick, the camera lifts into the air and she shouts 'Guys! Say hello to the YouTubers! Say hello to the YouTubers!' and instantly Max Ranger shouts 'I am not a YouTuber! Booooooo'. Dolly continues to shout 'Hello Youtubers' during her time with the camera, invoking others to respond, often running up to the camera and shouting: 'it's just a website' (Avery) and 'we are not YouTubers!' (Crazy). As Avery takes his turn, he points the camera to Dolly and states: 'this lady over here thinks that it's YouTube but it's not', to which she responds: 'it is YouTube' and shouts directly into the camera 'hi Thomas Sanders! Hi Thomas!' (a later search on YouTube reveals Thomas Sanders as a youtuber with 3.49 million viewers who posts content for young people related to civil rights, LGBTQ rights, identity and mental health). Avery continues to turn the camera to himself and state that 'this is a website; this is a website'. The debate goes on as Crazy takes his turn. At the end of the session, walking back up the path, Dolly has the camera for her second turn and is shouting 'Youtubers! Youtubers!' Once Crazy had declared this was his YouTube channel, most of the other participants in this group began addressing the 'YouTube viewers'. Crazy, walking with Dolly at the end of the session said: 'I hope you like this and drop a big fat like, we are trying to get one million subscribers and if we do it, we'll give you cookies at your front door'.*

In this section, the GoPro camera and child become entangled with the digital worlds of the online platform of YouTube. During my introduction to the participants at the start of this project, no mention was made of YouTube. However, as we began walking with the cameras, participants began working with the GoPro as YouTube(rs), creating 'content' and narrating for audiences. In the encounters that follow in this section, I am again considering the relation between the GoPro and the participant as research-creation, whereby the participants are in the process of creating when walking and filming with the camera. These processes of *becoming YouTube* matter in relation to some of the emerging curiosities, inquiries and attentions that became significant within this research-creation project. For example, the incorporation and articulation with(in) our walks, of participants' online knowledges from specific YouTube channels or videos, both opened children's relations to the more-than-human materialities of the park but also related to other places and temporalities.

Much of the analysis in the coming chapters relates to this becoming 'YouTubers', the creation of YouTube content and the entangling of YouTube audiences in the embodied inquiries in place. These encounters productively opened possibilities for children to learn with techno-naturecultures and situate themselves within common worlds. The narratives of participants depicted in this section are from the footage created while walking and performing YouTube. Depending on the perceived imagined audience, their content creation shifted, as did how they moved their bodies, worked with the camera, narrated and intra-acted with the camera (Änggård, 2015). The narrative with which I opened this section, written in response to re-watching footage with the Beech School, describes the tensions between different participants related to how they conceived of the camera as YouTube or not. The back and forth between this group over two sessions as to what the camera 'was' and what that meant in terms of how they engaged with the camera is notable in contextualising the following two sections, where embodied performances are markedly different depending on what participants perceived the camera to be becoming. While some participants considered themselves to be making a website, others were 'gamers', others still were 'YouTubers'; these differing engagements with online platforms presented different ways of being with the

camera, different performances with their imagined audiences and ways of encountering the more-than-human park.

While performing narrations for his website audience, Avery becomes a presenter of nature documentaries, extending the camera high above the heads of the participants, using the phrase '*and here we see…*' before introducing the camera and audience to various people in their 'habitats' (the 'addicted youtubers') and imagined animals (a 'panda') (see Moments 10 and 11). Sparrman also notes how children use video cameras to become news reporters (Sparrman, 2005 in Änggård, 2015). In this case we see Aviary taking on the role of nature presenter, using some of the narrations and phrases of popular nature documentaries observing animals in their habitats. At other times, Aviary becomes interviewer, holding the camera in one hand while extending out his other arm as clenched hand/microphone, asking Max Ranger about the success of his participation in burying a brick (which I shall discuss in Chapter 6) and asking Rainbow to respond to our walks: '*any thoughts on how this experiment is going? Any thoughts at all?*' Participants also narrated their filming in relation to episodes and seasons '*it's an episode of (the) park*' (Max Ranger) and '*Ok, I assume you met the people before, yes, you met them before in the first episode'* (Crazy) to which Max Ranger responds '*and now, it's season 2, when is the season going to come out? You'll never know'.* These differing interactive presenting styles, of nature documentary, interviewer and seasons of filming, further incorporates ideas of going 'behind the scenes'. Children work with the camera to film participants-as-pandas in their 'natural habitats' and articulate their learning from nature documentaries and television series as ways of relating to their walks in the park and sharing these walks with audiences who might watch this footage.

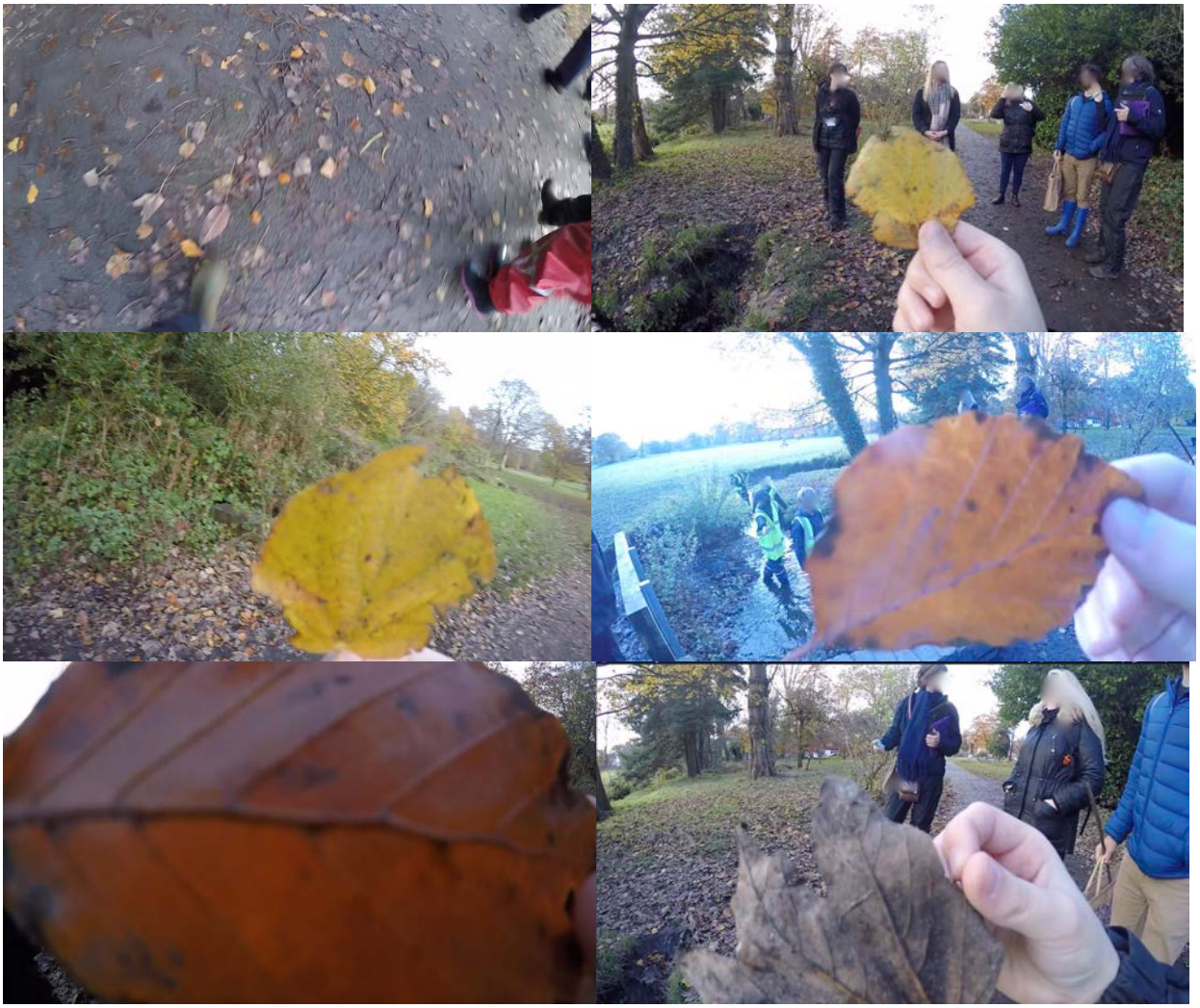
Moment 10: Avery: *And now we meet the habitat of the addicted people from YouTube* Crazy: *Hi YouTube!*

Moment 11: Avery: '*And here we see the majestic panda, wearing a jacket from school … here we are, the natural habitat of the panda, in China, even though it's Britain not China, but you know what I mean. And there she is, the majestic panda!*'

When narrating with the camera, participants frequently also became YouTubers. This becoming 'YouTube' occurs in a variety of ways, either through narrating and sharing learning with leaves and birds, asking viewers to participate in the inquiry by commenting, liking and subscribing, or by positioning the camera facing their bodies, extending the camera out on the selfie-stick rotated towards them, talking directly to viewers as if they were viewing in real time. Leo regularly spoke to his YouTube audience; he films a short clip about the processes of leaves changing colours (see Moment 12). On returning to watch the footage from the

camera-selfie-stick after the session, I watch him selecting different leaves from the ground and bringing them close up to the camera, filling the screen, often touching the camera lens, twirling the leaf in his fingers, pinching the leaves between his fingers, to show their changing colours and textures, the veins of the leaf and mottled brown patches or torn leaf edges in zoom close-up, while talking through how they change from green to brown. He frequently worked with the camera to reach into areas of the undergrowth or canopy that he couldn't reach, however, in a different manner from the examples introduced in the first section, where the camera is shoved in and out of different canopies without becoming YouTube. In these instances, Leo instead can be heard asking the YouTube viewers '*I can't get past there, but you guys can, so guys, tell me what you see in there?*' (see Moment 13). He asks viewers to respond to his questions, '*putting them inside'* places he would '*like to see'* but extending the opportunity of seeing to these viewers instead. In other encounters, he states '*I'm going to show you what I see guys, this is what I see'*, something similar to Dolly who states: '*guys, these are my eyes'* as she moves the camera around her view, sharing what she sees as the camera becomes her eyes.

In these encounters, Leo talks with the viewers in live time, viewing something he will not be able to see, both the camera and the viewers come into the park, to both record, witness and comment about what it is they can see in the places he cannot reach. The material and the digital entangle becoming YouTube in the park. Other times Leo exclaims '*that's a high tree guys, comment down below if you could climb this tree guys*'. During a really wet session, he plunges the YouTube viewers underwater asking them to '*see what they can see'* and to agree how wet it is, as the camera pulls out with water droplets falling from the camera (Moment 14). Children extend their learning with the park to learning with their imagined audiences, requesting their input, suggestions and responses to their embodied encounters. In this sense, learning becomes extended into imagined digital audiences, entangling the digital and physical through techno-naturecultures.



Moment 12: Leo and camera-selfie-stick and leaves: '*Hey guys, so as you can see the leaves just change colour …. As you can see leaves change colour like this right here, so basically a leaf, like, basically starts with green and then it starts changing colour to yellow and then it turns into this right here … and then it's going to change into orange right here and then it's guna change into this right here*'

Moment 13: Leo and camera-selfie-stick: '*Okay guys, so I wanted to show you this, so I can't get past there but you guys can, so guys, tell me what you see in there. Hello? I'm guna put you inside there and then, what do you see? I would like to see. And then, what do you see? Alright guys, when Miss calls me I'm guna have to go, I'm guna have to go but make sure to subscribe to the channel and hit the subscribe button*'

Moment 14: Leo and camera-selfie-stick '*it's so wet guys, it's so wet*'

Dino performs his 'YouTuber' narration with an Americanised accent, saying '*What's up guys?! 'Sup 'YouTube fam*?' Dino continues: ''*Sup, YouTube*?' while Leo runs in front of the camera and demands people subscribe to the channel. Dino then jumps into the river and shouts '*Eyyyyy bro, yeah yeah, guys, what's happenin'? ….. Just remember fam, the entirety of YouTube wants to see me jump off that mountain'*. His performance conjures the atmosphere of YouTube(rs) into the park. During one of her times with the camera, Cinnamon turns the camera to face her, extended as far as possible on the selfie stick and proclaims: '*so today, YouTubers, please subscribe, like and follow the best channel and ring the bell ding ding and smack that (GoPro) and flex on the haters'.* She explains to me while doing this that this is how Youtubers use the camera, turning it towards them and talking direct to the camera.

For Crazy and Dolly, becoming YouTubers involves getting subscribers, stating: 'we *are trying to get to one million subscribers so hit the like button, subscribe now*' (Crazy). Getting subscribers includes creating new content and content that will result in 'likes'. For Crazy and Dolly, as with other participants, this involves their attempts to share encounters with the more-than-humans. Crazy turns the camera to face him and states: '*so this is our third YouTube channel … so today we are going to do some different stuff, right Dolly? Search for birds… birds! Birds*!' before running with Dolly after seeing birds in the sky. Running down the hill, he turns the camera to his face and states, while running: '*if we see birds, we'll get more likes on our YouTube channel'.* While kicking leaves, he quietens down the others and states: '*guys, girls, we are trying to hear the birds so we can get so many likes …. This is me and Dolly's*

YouTube channel'. Later during the session, Dolly walks with the camera extended high, down a narrow stream that cuts through the middle of the park (see Moment 15).

Moment 15: Dolly and GoPro '*Guys, leave a comment down below. What is the river? Where does it lead to?*

We hear the splashing of her wellies in the water as she asks viewers to 'comment down below' in response to questions she has about the stream: '*Guys, leave a comment down below. What is this river? What does it lead to?'* Dolly and Crazy then engage their audience in their inquiry of correspondence with and coming to know the park and the materials found. They find a glove in the river and ask viewers whether it belongs to any of the viewers or if the viewers know who's it is: '*Boy or girl, is this yours? Leave a comment down below'* (Dolly). She

states to Crazy, '*I don't think they are leaving a comment'* and they then proceed to bury the glove in the river, telling YouTube viewers where to find it. They film the glove buried in the mud and tell the viewers that it is near a house that they then zoom the camera out to show, creating a digital-material mapping of the materialities in place.

As part of a learning-with approach, digital technologies in the above discussions aren't used for digital literacy or mastery as a tool, but instead as a companion for unfamiliar learning-with place (Land et al, 2019). The relations with the camera, child and place shifted, affecting the movements and embodied ways in which the environments were encountered. Bodies moved with camera and place, arms are extended, bodies crouch down to the ground, focusing and slowing and speeding up in relation to their filming, walking and moving in place; these movements then affected the ways in which participants narrated and 'performed' during the walks. At points, the technology becomes a companion, dragged along, or communicated with and partnered with (Goodenough et al 2021) in play fighting, smelling and embodied interactions. In further ways still, the assemblage interacts with digital platforms such as YouTube, with the camera-child becoming YouTubers, creating the potential for the possibility for telling 'digital lively place stories' (Land et al, 2019). As Dino mentioned at the start of the project, '*we are going behind the scenes of the park'*, in the next two chapters, these lively place stories will emerge through these encounters. This shifting of going into the canopies, underwater and underground with the camera, submerging and emerging through different layers, materialities and bodies (of water, of trees) becomes a rhythm of movement in collaboration with the GoPro and our bodies. In encountering and corresponding with these different layers of place, scale and temporalities, in Chapters 5 and 6, the more-than-human and lively matter of place comes more into focus.

I consider the processes of filming and walking during this research as research-creation; the emergent processes while walking encouraged a curious inquiry within the research assemblage. Perry and Taylor (2021) consider the 'emergent approach to digital authoring' which arises as 'process rather than predetermined or curriculum-oriented learning objective' (p.157); this process of emergent lively digital storying with place and imagined YouTube

audiences relates to our encounters. This shifted, evolved and unfolded through the research process of this project. As such, the GoPro cameras participated in this research in multiple ways, a significant collaborator in how children participants engaged, experimented and communicated with the environment on the walks as well as how they engaged with and incorporated a wider (digital, imagined) audience into the research. Following Clement, the children, the camera and walking can be considered as 'GoProing' (Clement, 2019). The GoPro was entangled in conversations, knowledges and stories that were shared between the research assemblage and beyond into other spacetimematterings (Barad, 2007). As I will discuss in Section 4.4, the GoPros also became a companion in the co-analysis and editing of this research, relating the footage made in our walks and other footage from online platforms such as YouTube. The GoPro and the digital platforms such as YouTube that are entangled in this research facilitate exciting ways through which children, materials, technologies and natures relate.

4.3 Agential GoPro

So far, the child has figured prominently in my discussion of collaborations, extensions and companionship with the GoPro. I have described the embodied and performed ways that participants interacted with the camera during our walks but still privileging the child as a central actor in these encounters. In this third section of this chapter, I will further consider how the GoPro intra-acts, disrupts and affects relations in ways which complicate the idea of human control or dominance over the technology or the more-than-human, for example the camera running out of battery or breaking from its selfie-stick holder. As I have highlighted, often the camera and the child were actively engaged in creating content, inquiring with the more-than-human and extending the sensory and embodied possibilities of inquiry, while at other times, the camera was dragged behind the child, bouncing off the mud and soil, yet still filming, still moving 'with the ways of the world', in assemblage in 'the children's choreography of movements, compositions and performances' (Kind, 2013: 437). The different ways in which the camera comes into focus within the research assemblage at certain points but regardless is always present, still recording, brings the camera into relational agential

potential (Barad, 2007), continuing to record, despite human inattention or lack of intention (see moment 16).

Moment 16: GoPro-selfie-stick filming grass

The shifting centrality of and attention towards the camera can be considered in a Deluezian assemblage understanding of territorialisation and deterritorialization, acknowledging the different agential possibilities of matter as being in constant flux and movement (Kind, 2013). Further, as Änggård (2015) argues, these relations of phenomenon intra-acting are not symmetrical, but, instead, different intra-acting actants exert different agency at different moments. I am not considering the GoPro from a non-human phenomenological approach (Pasek, 2015) but rather from a relational approach, recognising the productive differences that are inherent between human and nonhuman. I am not trying to think like a GoPro or narrate via an object-oriented ontology, which as Pasek argues, is limited in its attempting to communicate the experiences and internal life of the nonhuman. Instead, following feminist new materialist thinking, there is an ethical recognition of the limited situated knowledges between human and nonhuman and a productive recognition that these differences matter (Pasek, 2015). Rather than trying to bridge a divide through a kind of thinking like a material object, instead, the differences between entities are productive and become where generative differences of knowledge are produced. Therefore, for the GoPro and child relation, I am interested in what happens with this relation, the cuts that the GoPro enacts through its participating in failed communication not as a tool but as a participant. As Pasek argues, this dance between human and technology is relational and 'in this unfolding of

oblique interactions and indirect perceptions, a narrative of failed communication emerges' (Pasek, 2015: no page). This, for our research, emerges through watching back of the footage, whereby the failure of the communication between the camera, the environment and the child produces other relations, other sounds and movements and footage.

The camera continually records other encounters with the more-than-human, picking up the ongoing sounds, noises, vibrations (following Gallagher, 2016), close-up encounters with blades of grass, soil, mud and disorienting flows of rhythmic, swirling, bouncing up and down onto earth or muffled into clothing (see Moment 17). The crumpling, scrunching, scraping sounds of waterproof materials accompany the darkness of the image of the footage when revisited. In these moments, when watching back footage of the 'discarded' camera, the child is decentred, allowing for other relations and assemblages to including actants that are more-than-human. The camera records other zoomings-in, other extensions, other layers of the park, other more-than-human encounters, without the active child-camera collaboration, enacting its vital liveliness or 'thing-power' (Bennett, 2010).

Moment 17: GoPro filming

The GoPro also acts to disrupt the filming and research-creation processes in multiple other ways which affect how we come to know the park. The GoPro endured some brutal, violent

and extreme conditions, being smashed and hit and dunked into different bodies and matter. Over time, the camera began to respond, scratches to its plastic casing obscure the screen, it began to wobble on its mount, it started to loosen on its screw pivot. Oftentimes, as screws loosened, it would flop over to one side, recording from odd positions, not staying put, frustrating those filming. During a couple of walks, it stopped filming as it ran out of battery, at other times it stopped as it ran out of storage space. At other times, the water-proof casing would creak and crack and crunch as the camera rotated and moved around, layering the footage with sounds, noises and distortions that were uncomfortable to listen back to (I discuss this in Section 4.4.3). This led to one group using an arm strap instead of a selfie-stick for a few sessions (see Moment 18).

Moment 18: Crazy, Aviary and Dolly with GoPro and wrist strap

Moment 19: Aviary and GoPro-arm-strap '*you're seeing the world upside down'*

The GoPro-arm-strap forced the child to either walk with their arm held out at a right angle from the body to keep the camera filming upright, otherwise, when the arm was moving with the body, down at the side or in motion while walking or running, the camera would continue film from this angle. Aviary tried to rotate the camera, commenting '*you're seeing the world upside down'* but the camera would not stay positioned upright every time Aviary wanted to

move his arm. The camera-arm-strap enacted a tension between uncomfortable movements and arm positions or '*seeing the world upside down'* (Moment 19). This tension and discomfort was also experienced when experimenting with wearing GoPro and a head-strap mount. The camera strap continually loosened and the camera frequently fell in front of children's eyes. At other times the strap was too tight and trapped hair, squeezed heads and caused pain - *'burning my head'* as Dino exclaimed (see Moment 20). Due to the pain caused by the head-strap, during this walk, the GoPro-head-strap was refused by the children and instead was mainly carried around, dangling at waist-height, or the strap was wrapped around wrists. At other times during this session, I was called upon to re-mount the camera to the selfie-stick which caused us to stop and wait while my cold fingers attempted to force a tight crew loose, the camera filming flopping around and sounding crunching and snapping as it is rotated onto the selfie-stick mount.

Moment 20: Dino and GoPro head-strap '*oh no, oh, no make sure it doesn't burn my head*'

As I have discussed in section 4.1, the GoPro extends the opportunity to record and encounter the more-than-human materialities, sounds and environments that the participants cannot reach. However, during the walks, it records in silence and the camera screen turns off after a certain duration of time (while continuing to film). In the moment of the encounter then, only the GoPro can sense the places it extends to. Thus, only through watching-back and re-turning to this encounter could participants witness where the camera had been and what is had recorded and frequently the camera refused this witnessing. In Chapter 5, I discuss how the camera, when filming murky, duckweed-filled underwater bodies, would obscure and obstruct children from these environments through recording only bubbling sounds and darkness. The

water is too dark, too murky, the camera goes black or can't focus and therefore this optical extension of the GoPro-child assemblage is refused, the water remains unknown and the GoPro camera acts differently from how the child desired. The camera thus also disrupts the notion of a child-centred 'reality'; it also prevents 'going behind the scenes'. We can only *hope* to see in the future what we *hope* the camera is seeing in the present. The filming *now* for future encountering is speculative and hopeful but also shifts the dominant human at the centre of this assemblage. The camera is, then, an active participant in the future-past-present multiple temporalities of filming for future witnessing of past presents; this productively disrupts ideas of time as linear and progressive (Land et al, 2022). The GoPro and selfie-stick become a hopeful yet partial and unreliable extension of the body, the assemblage of child-camera fails to record or produce a linear, 'reality' or account, instead distorting, blurring, smearing and disrupting into a messy, rich multiplicity of relations with matter.

Of course, the camera is not the only agential actant disrupting, distorting and refusing children's encounters with the park. In the watery example described above, the participant uses the camera to disturb and disrupt the stagnant duckweed-filled pond, which then emits a strong pungent smell as the camera is removed, duckweed sticking to the camera and to our bodies. The duckweed and the stagnant smells of the water both affecting participants' encounter with the watery body, at once both affecting a repulsion and a curiosity at the smell and the slimy slippery strands of weeds entangling over participants' bodies and wellies. At other times, thick mud sticks to the camera, blurring the lens, smearing over hands and clothes when attempts are made to wipe the mud away. The mud thus acting to obscure the possible extended optics afforded by this collaboration. While this collaboration between participant and GoPro has the potential to enable the participants to witness natures and environments that usually exist out of human perception through re-turning to the footage, this frequently fails. In the following Section 4.5, I will further consider how returning to this (distorted) footage affects our encounters with the more-than-human and the digital during our website editing workshops.

4.4 Re-turning (to) video footage

In this section, I discuss the various approaches to the video footage editing and analysis that emerged during the research. In the first section (4.4.1), I focus on *my* process of viewing and editing the footage during the project. This process, as I described in Chapter 3, became one of the central approaches through which I came to the research writing. In section 4.4.2. I will then move to discuss the collaborative website and video sessions held with children. As I have discussed in Chapter 3, the Beech School didn't have the opportunity to begin the website process. Therefore, this section will focus on the Oak school sessions, which were both generative and frustrating. I will work with Karen Barad's notion of the diffractive re-turn (Barad, 2014) to consider the workshops in relation to our walking research.

Barad doesn't use the phrase 'returning *to'* something, but rather, uses 'return' or 're-turn something'. I understand Barad's 'returning' as a turning over; a returning the videos, returning the materials almost as a turning over of matter, or a shifting, or rotation which enables something new. During this research, there were ongoing re-turns, both in re-turning (to) places, materials, encounters and re-turning (to) videos, sounds, visuals, websites, technologies and discussions. Frigerio et al. quote Barad's re-turning as:

> a multiplicity of processes, such as the kinds of earthworms revel in while helping to make compost or otherwise being busy at work and at play (Barad, 2014: 168 in Frigerio et al, 2018: 392)

They argue that re-turning breathes new light and transformations into the data assemblage that open other fluid material-discursive intra-actions. As Giorza (2018) argues, this re-turn is not a reflection, or a returning to the same, but a diffractive re-turn to something different: 'the apparatus offers me new views of a past that is not fixed but returning in new ways' (Giorza, 2018: 228).

4.4.1 Re-turning, cutting, reconfiguring

I will now discuss the ways in which I played with re-turning (to) the footage. By wearing a mounted GoPro on my chest, as well as participants working with the GoPros on selfie-sticks, our assemblage created a lot of video content that became the work of our research practice. At home in the evenings after the walking sessions, as I have described in Chapter 3, I began cutting and editing footage, watching, pausing, making notes and playing around; the footage made me respond to it (Rautio, in Somerville et al., 2021: 289). Rautio describes video footage as being 'too heavy', 'too big' and that the data 'rejected' her, becoming almost too difficult to watch (ibid). I felt this. My first re-watching of the footage recorded on the selfie-sticks made me feel physically sick (in a similar response to Rautio's account of feeling sick while watching children's GoPro footage, in Somerville et al. 2021; see also Jones and Osborne, 2020; and Hackett and Caton, 2018). I had to look away when the camera was swirling and rollercoasting around. Yet, by playing with the footage, I began 'crafting the archive…animating thinking in creative and unexpected ways' (in a similar mode as Duhn and Galvez in Somerville et al., 2021: 287). In cutting and splicing together clips, thinking with the video footage, I was in constant 'reconfiguration and re-engagement' (ibid: 288) with the process. Different clips began relating and joining together, creating new and unstable archives (I return to the notion of the archive in Chapter 5). As more footage was created over the walking sessions, I cut together clips of footage that stood out or that related to the reoccurring, returning and ongoing (re)actions and events of our walks.

I cut together footage of the camera-selfie-stick going 'underwater'; I cut together footage of the camera going up 'into the canopy'; I cut together all the footage of the camera 'zooming into' the hedgerows and tree canopies; I cut together all the footage of the participants becoming YouTubers. I created other short video clips such as 'algae camera', 'tree trunks', 'GoPro in', 'YouTube in', 'body movements'. In creating and naming these archives of clips, 'the archive represents what was sense, felt, touched and intuited when naming it' (Somerville et al. 2021: 288). I also cut the footage into clips recorded by the different participants, so that

there are videos with titles like Leo, Strawberry, Tyler, Dino, Pete Crash, Dolly, Crazy, Kiwi, Cinnamon, Aviary, Lucy, Max Ranger.

This cutting-together-apart (following Barad) created new digital encounters with place, an intensity of underwater-ing or zooming or YouTubing in short video clips. I became immersed in the movements, sounds and affective liveliness of the intra-actions between camera, materialities and participant. The clips were cut together creating new encounters, ones that squash, condense, or stretch out temporalities; that become an ongoing submersion in water, water droplets forming on the camera, the *plopping* and *gurgling* of the camera moving in water, a continual dunking in and out of water (see Moment 21), or an ongoing encounter with wet leaves, decomposing leaves, green waxy leaves.

Moment 21: screenshots from 'Underwater 13 11 19' video clip

The materialities and sounds of the encounters are pushed to the fore, intensifying the relations between the camera and the material. As Somerville et al. argue, this kind of representation is an 'enlived and proliferative post-representationalism and experimentation in methodologies' (ibid: 288). The footage is thus not understood as linear or sequential but as a proliferation of lively stories that come to matter in the research.

These videos were all saved and stored on an encrypted, orange-cased hard-drive and in some sense then 'archived'. However, in fact, the videos did not become an archive at all, in the sense that they were not relegated to the past, to static categorisation, for later analysis or to be later excavated (Springgay, Truman and MacLean, 2020). Rather, the footage, the messy and incomplete archive, iMovie, my computer and the hard-drive itself became active participants within the research, both through my returning and continual playing and editing of videos during the research project, as well as through their involvement in the website

sessions and filming with watery bodies with the children (as mentioned, I discuss this in Chapter 5). I will now discuss the collaborative footage watching, editing and website experimentation sessions.

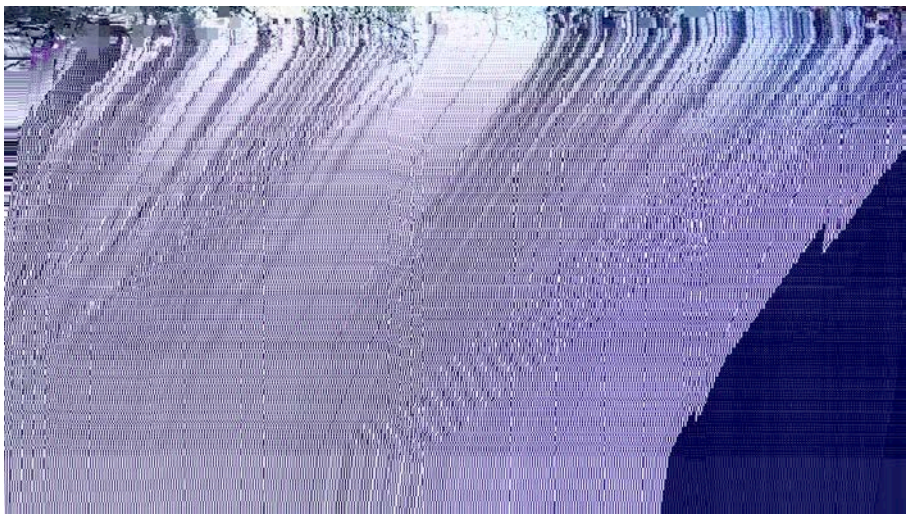
4.4.2 Lagging videos 'not really moving'

> *We are sitting in a classroom back at the school, a small room used for therapeutic time out and wellbeing sessions. There are sofas, beanbags, a table with five chairs, strings of coloured lights across the walls, a long piece of blue fabric with white clouds hanging down one wall, a poster of different birds, a poster with plastic pollution washed up on beaches, a tall lava-lamp with plastic fish floating around inside. Four clunky large laptop computers are set up in the middle of the table, wires stretching off the table to plug sockets; two of the computers are refusing to connect to the internet. Cables extend out of the computers, across the room to plug sockets in the walls. My own personal MacBook pro computer also sits on the table with a bright orange cable connected to a silver and orange hard-drive, storing – under encrypted password protection - the video footage we have been recording and creating with the GoPros during our walks. We are settling into seats to start watching some of this footage for the first time. The GoPro sits on the windowsill, the recording light flashing red, recording the event.*

I will now discuss the fortnightly collaborative website and video editing sessions themselves. The sessions, which included the participants and me (and sometimes a parent volunteer or teacher), were opportunities for the participants to revisit, watch and respond to the footage and to edit, cut, analyse and collaborate to create a website. This website functioned as an ongoing collage and experimental space, which involved a continual shifting, adding, taking away and moving of the materials on the page, as I shall discuss below.

These sessions varied greatly in terms of how we *did* things together with the various technologies in the room. Often the atmosphere of these sessions was one of frustration, a sense of impatience and urgency. The technologies often refused speeds, demands and human instruction, for example when playing videos back, they were often slow to load or '*lagging'* as participants referred to it. Other times, the videos sped up really fast or suddenly muted the sound. At abrupt and sporadic moments the children managed to play with adjusting the sounds to echo or reverb and pull around the colour saturations and gradients.

Often the internet would stall and the software didn't do as we expected it might; the footage was manipulated by the software, making us respond differently. 'Lagging' became part of our website sessions, the glitching of the videos which made them stutter or go silent or black out or pause (see moment 22), refusing us footage or offering other footage.



Moment 22: lagging, distorting camera footage

The lagging highlighted the multiplicities of temporalities that were ongoing, pulling us back, affecting us to stop, wait, feel frustration, become impatient but also witness other happenings with the videos as they froze at particular moments or motions. Often participants were affected to jump up out of seats, to move around the room, to collapse on sofas, to draw on the whiteboard, stand at the window, say hello to the GoPro recording the session, heaving sighs and loud exhalations of air, jiggingly legs, clenching fists. Some would become frustrated with power of my computer, offering how I should upgrade my systems, clean my computer and download other apps. These tensions meant that other events would emerge, participants would begin watching another video together, scrolling through Google images, changing computers, sharing screens, or editing the website while we watched for videos to load or editing software to download. In these moments the shifting power relations within the assemblage emerge, as participants knew more than me about computer software, different programmes, or online places to access particular images, footage or antivirus 'stuff' that might 'fix' or stop the lagging videos. This collaborative research process is responsive to

the knowledges and expertise of the participants, where I am not considered as all-knowing 'researcher' but instead positioned in horizontal relation to participant researchers. The below moments (Moment 23) are phrases from recordings of participants, placed together in 'lagging and slowness' articulations.

Tyler: It's lagging, you know why it's lagging? Polly? Because it's wifi, Polly it's lagging wifi

Tyler: Polly I'm watching the video that I put on here

Leo: Because if you upgrade it to Windows 10 or 8 or 9 it's going to go a lot faster
Tyler: Polly it's really slow

Leo: You've just got to make it a bit faster by downloading good stuff like antiviruses and stuff like that and upgrading it.

Tyler: It's not really moving
Leo: Maybe it's a lag

Tyler: I pressed space to try and pause it because the sound wasn't working

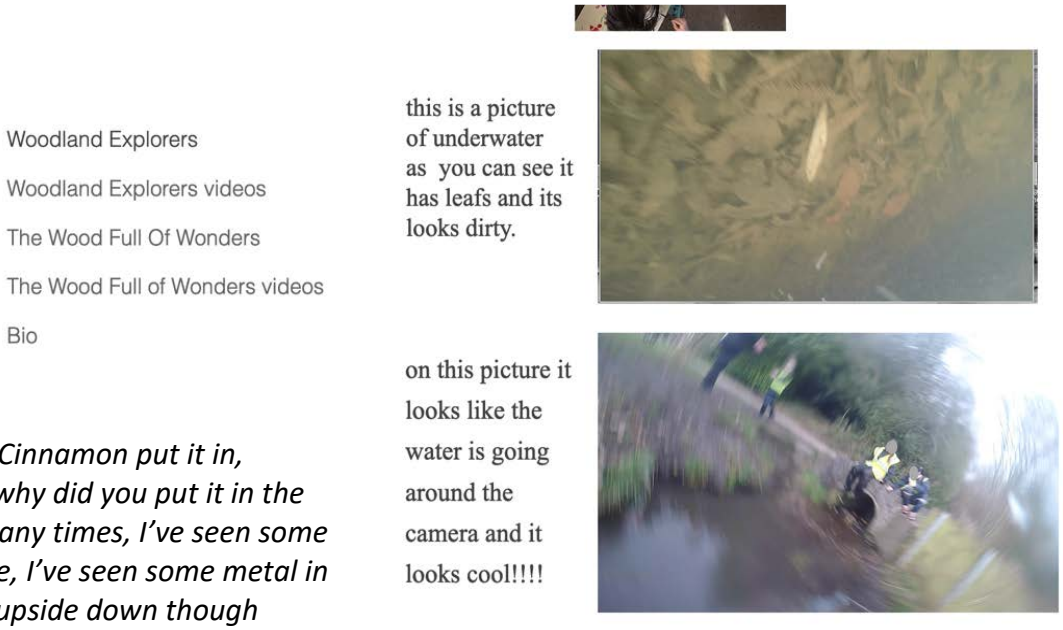
Leo: Oh is this inside the wall? No it's lagging and now it's playing when it's paused

Moment 23: Lagging during website editing sessions

4.4.3 Watching, responding, performing with the videos

Thinking *with* the footage (Wargo, 2018), re-visiting footage, watching, pausing, playing back and editing wasn't a way of seeing video as a 'window on the world' or an objective 'slice of reality' (following Wargo, Murris and Menning, in Postqualitative Research, 2021) but instead a playful cutting-with and retuning to (ibid) data to produce knowledge differently. My cutting together of clips at home was also a response to the screenshotting, pausing, rewinding, re-watching and retelling of the footage by the children. Somerville et al. (2021) consider how this 'archaeological' process of excavating the 'data' of the video archive brings the data alive; the 'lifefulness' of the footage of the walks becomes animated, mobile and affective through being crafted, edited, cut and played with. For the participants and me, this became our way

of co-analysis. The playfulness and liveliness of the video sessions relates to the liveliness of the walking research-creation; the materialities came to life within the video sessions and inspired other proposals for learning with the camera in future walking sessions. The below screenshot (Moment 24) is taken from the website, where participants have added screenshots taken from video stills and have also added their own text boxes and comments related to the screen stills. This is accompanied by the comment from Leo when watching back and responding to the footage seen in the top screenshot of underwater. He sees 'metal' and is asking Cinnamon to put the camera in the water, bringing the watery footage to life and blurring the temporalities of the filming. I return to the metal within water bodies in Chapters 5 and 6.



Leo: Wow, Cinnamon put it in, Cinnamon why did you put it in the water so many times, I've seen some metal inside, I've seen some metal in the water, upside down though

Moment 24: Relations with our website collaging

This coming to life or 'lifefulness' of the footage is not only felt through the watching, screenshotting and editing of the footage but also felt as uncomfortable, distorted sounds and noises. Firstly, for Tyler, when watching and listening to the footage, the sounds of the cracking and crunching of the camera in its waterproof casing as it rolled around the riverbed, affected his embodied recoiling at the sounds of '*bones crunching'*, his body becoming the

camera cracking and crunching off stones and gravel and moving in the waterproof casing. For Leo, the distorted sounds from the camera change how his voice sounds in the footage, making him embarrassed at how his voice is heard as a baby's voice (see Moment 25).

(Crunching from the video)
Leo: Awhhhhhh
Tyler: ***Sounds like my bones are breaking***
Tyler's dad: It's the crunch of the camera
Leo: Oh look, there's me
Tyler: ***Sounds like I am breaking my bones***
Leo: ***Yeah it kind of sounds like you are breaking them right now***
Tyler's dad: is it the crunch of the leaves?
Me: It's erm, you know how the camera is in a waterproof case

Tyler: Are you going to cry? (puts hand behind Leo's neck and looks at him in eyes)
Leo: No, I'm not crying, I'm embarrassed
Me: Why are you embarrassed?
Leo: It sounds so weird
Me: It doesn't, it's just cuz the camera is inside a box
Leo: ***No, I sound like a two-year-old but right now I sound like a younger than two year old***
Me: It's just because the microphone is inside that plastic casing, so it sounds different

Moment 25: Sensing the footage

Secondly, the footage was also performed by participants in movement and flow; the below narrative moment is my response to witnessing Lucy's embodied performing of water while watching the underwater footage. Lucy, who has profound hearing loss and does not speak English, watched this footage with the rest of the group and articulated her becoming water through performing watery flows with her hands.

Lucy's fingers and hands ripple up and down in a flowing movement through the air, making waves. They dive downwards and pull up again, as if coming up for air. Her hands are water, are underwater, are moving in water. Her hands are waves, dancing through the air. She forms sounds which sound like 'Ola', she voices over and over. Ola meaning wave in Spanish, I think. But maybe not ola, maybe something else entirely. On the computer the underwater video plays, air bubbles pop up to the surface, the camera rushes across the bottom of the riverbed, through greeny yellow liquid stones, pebbles, leaves, grains of dirt rise and float around. Bubbling sounds fill the classroom, watery pops and swooshes and crunches. Crunching sounds and tinny voices from the video sound. Swills of gravel and mud are disturbed up by the movement of the GoPro through the water, sending plumes of silt, clouding the screen before the individual particles swirl,

separate and sink back down towards the bottom of the riverbed. In the classroom Lucy's hands swirl and swill and flow between each other, she is water, responding, affected in this watery dance by the watery body she has become part of.

The footage affected Lucy to respond 'as' wave and as underwater, her performance an affective and creative swimming responding dancing with the underwater footage, playing as she moved. Her hands animating the vitality and fluidity of the watery movements of leaves and silt billowing around. Her becoming-water in the classroom enacted an entangling learning and thinking *with* water, an affective feeling out of how to move as water. This 'thought beyond its articulation in language' (Manning, 2016: 134) takes seriously the generation of learning and knowledge through experience and movement situated in the process of the event rather than the subject. The assemblage of hands, bodies, footage, the vitality of the underwater watery material affect Lucy to become response-able, to affectively respond to the encounter in an embodied watery movement of thinking as moving. Following Manning's research-creation, this thinking-as-doing affects other bodies in the room, with participants responding to Lucy's becoming-water. Following Crinall and Somerville (2020) this response is one many responses that

> are the flow of how learning as living moves, with and as water, with and as art, through and around is in various, multiple modes, including the academic writing process (p. 1321).

Myrvang Brown et al (2008) argue that the GoPro headcam footage from their research could not only communicate a visual and audio encounter but further, that it 'could also communicate and invoke understanding of experiences relating to taste, touch, emotions and physicality' (p. 5). While watching footage, we encounter Leo crying and in distress while walking in wet soggy weather, we hear his emotion and sense his frustration in this weathering of his body becoming damp and uncomfortable. We hear participants sounding of shock and surprise as water fills their wellies and soaks through their socks; we hear participants crying at their cold hands and numb toes; we witness participants intra-acting with thorny plants and sharp spikey bushes as their bodies are briefly stabbed. We witness the various moods and

feelings of boredom, frustration and contentment (ibid). During one walk, participants lie down in the leaves in the beech copse. In this moment of lying with the leaves we sense the oscillating calm, rest and boredom from Leo as he first shifts around with the camera, moving to film himself and then the sky, the footage sounds the camera crunching as it rotates in its plastic casing before Leo settles and heaves a sigh setting the camera on the ground next to him. It becomes quiet as other participants either lie down or walk quietly amongst the still bodies. The camera stops crunching and Leo takes a deep long in and out breath he lies with the camera still for minutes, staring at the camera with one eye open, watching it while it films him and then filming the ground (see Moment 26).

Moment 26: Leo and GoPro-selfie-stick lying with the beech copse.

4.4.4 Re-turning footage and learning with digital encounters

As well as embodied, affective and sensory relations to the footage, as articulated above, responding and re-turning to these videos also created a curiosity with what potential materials might be found in the rivers and ponds in the park. This continued to unfold as our research-creation developed with the park, as I will return to throughout this thesis, emerging in imaginings as we walked as well as during our re-turning of underwater footage. Participants, while watching the underwater footage, wanted to '*see what it feels like'* to go underwater (see short extract in Moment 27). While we watched the underwater footage in these sessions, Pete Crash began to search Google for magnet fishing photos and videos he has seen on YouTube and to tell us about the metals and things found underwater. Our footage became entangled with other online underwater footage, other rivers, other footage, affecting desires to be underwater, looking for metal and ships and cars. This learning with

online videos, our footage and our walks articulates a form of processual learning as 'thinking-making-doing', bringing together the sensory, affective, embodied, performative and digital to create inquiries that extend our learning and knowledge of the materialities and the more-than-human of the park.

Leo: I didn't know it was waterproof at that point
Me: Aha, because there's another video when you are going underwater with it isn't there?
Leo: Yeahhhh I wish I could see that one
Me: We can show you that one too
*Leo: **I want to see what it feels like***

*Pete: **I'm trying to find magnet fishing***
Me: maybe try exploring Shutterstock? That's got lots of photos in it
Pete: look at that
Me: and then you need to type in the search for magnet fishing again like you were doing

Me: Do you remember? You wanted to look under the water and see
*Pete Crash: **Yeah and in er, in (the) park there's an actual car***
Me: Oh, in Highbury Park
*Pete Crash: **Yeah, an actual car that isn't rusty, it's still.... in good shape***
*Dino: **It is rusty***
Pete Crash: No
Dino: it's an old Rolls
Pete Crash: No! I saw red paint still on it, no rust
*Dino: **Yeah that's because the side it's leaning on is underwater***

Moment 27: Thinking speculatively with the footage

There is an argument here that the opportunity provided by the footage - that opens up digital encounters with environments that are out of reach to the participant – relates the imagined with the material in affective ways. Kullman argues that, for his walking research, when reviewing with the children digital images taken while walking, they were sharing 'embodied memories', re-sensing or re-feeling the embodied encounters through the 'vibrations of moving images' or blurred images (Kullman, 2012: 12). This certainly relates to many of the ways in which children responded to the viewing of their footage in our video sessions, relating and re-membering (following Barad, 2018) the affective, embodied and sensuous memories of our walks, for example, of walking, running and moving with the park. As McCormack

argues (2008), this memory of the event of research-creation remains as a 'kind of field of virtual potential that never quite exhausts itself in the process of becoming more than it never (actually) was' (p. 8). This potential of the event propels the research to new inquiries and possibilities. However, the viewing of footage from underwaters, canopies or places that didn't have an 'embodied memory', encompassed other processes that relates to the digital platforms that participants shared during the research.

Jones and Osborne (2020) consider 'postmemory' as the imaginative, affective memories formed from second-hand accounts of places people haven't encountered. 'Virtual landscapes' (of digital games, for Jones and Osborne) overlap with and inform material environments 'giving insight into what that landscape would be like in the material world' (p. 202). Furthermore, Vannini and Stewart (2020) consider the 'GoPro gaze' as 'problematiz(ing) more than any camera before the notion of presence and being there' (p. 153). In witnessing underwater environments both through YouTube videos of magnet fishing and through watching back our GoPro underwater footage, participants entangle the underwaters of *other* inaccessible or virtual places and form imaginative and speculative knowledges of these environments, including, for this research, the materialities that exist within these bodies of water; 'postmemory works through individuals bringing their imagination to the events and narratives they do not witness directly' (Jones and Osborne, 2020: 199). Thus, the participants learn with an affective sense of these environments without physically encountering them. This, Jones and Osborne argue, has a performative and material affect on participants. Sumartojo and Graves (2021) consider the 'entanglement of digital screens, the material and sensory settings' (p.247), 'touching' us and affecting the emergence of feelings, emotions, responses and relations between viewers and the footage. Puig de la Bellacasa, (2017) further considers 'digital touching technologies' as more-than-human assemblages of care, which affect a 'reciprocity' (p.19), through 'touching' the other. These notions of entanglements or assemblages of digital screens, materialities, postmemories and sensory encounters affecting children's relations to the underwater footage, bringing them 'closer' to our embodied encounters in the park will be further addressed in 5.5.3 but, here, relates to how we come to know underwater YouTube videos. For participants watching YouTube videos of underwater

magnet fishing, of Jake the YouTuber encountering metals and artefacts in virtual (for participants) bodies of water, these materials are then imagined within the bodies of water in our research and participants become YouTuber magnet fishers. There is an entangling of virtual and material that shapes and shifts the learning with technologies and materialities.

Further learning includes other images of watery bodies from posters on the classroom wall and material artefacts within the classroom that we are conducting our website sessions within. Upon watching the footage recorded during these website creation sessions, I pay attention to how Pete Crash is noticing a photo on the wall of the classroom of two photos of plastic pollution on an island 10 years apart. During the session he had called me to look at the rubbish washed up on the beach in the photo. I notice upon watching the video Pete Crash then playing with the lava lamp with plastic fish floating around inside, bobbing around plastic in water (Moment 28). Pete Crash puts his hands behind the tube of water and plays with water distorting his hand and thumbs making them bulge in the water, as plastic fish bob around inside the tube and distorted underwater videos play on the computer. These emergent embodied and material-discursive responses to the footage and other materialities in the classroom (the YouTube videos, the pollution poster, the plastic fish) became ever more entangled with the embodied doings in the park (which I discuss in Chapters 5 and 6). Pete Crash's stories about finding cars, metals and rubbish in other bodies of water and imagining these materials in the ponds and streams we are submerged with become related to plastics on beaches and metals and other machines, technologies and materials in other watery bodies and further related to discourses about pollution and 'saving the world' (see Moment 29 and section 4.4.5).

Moment 28: Pete Crash distorting hands behind a watery lava lamp with plastic fish

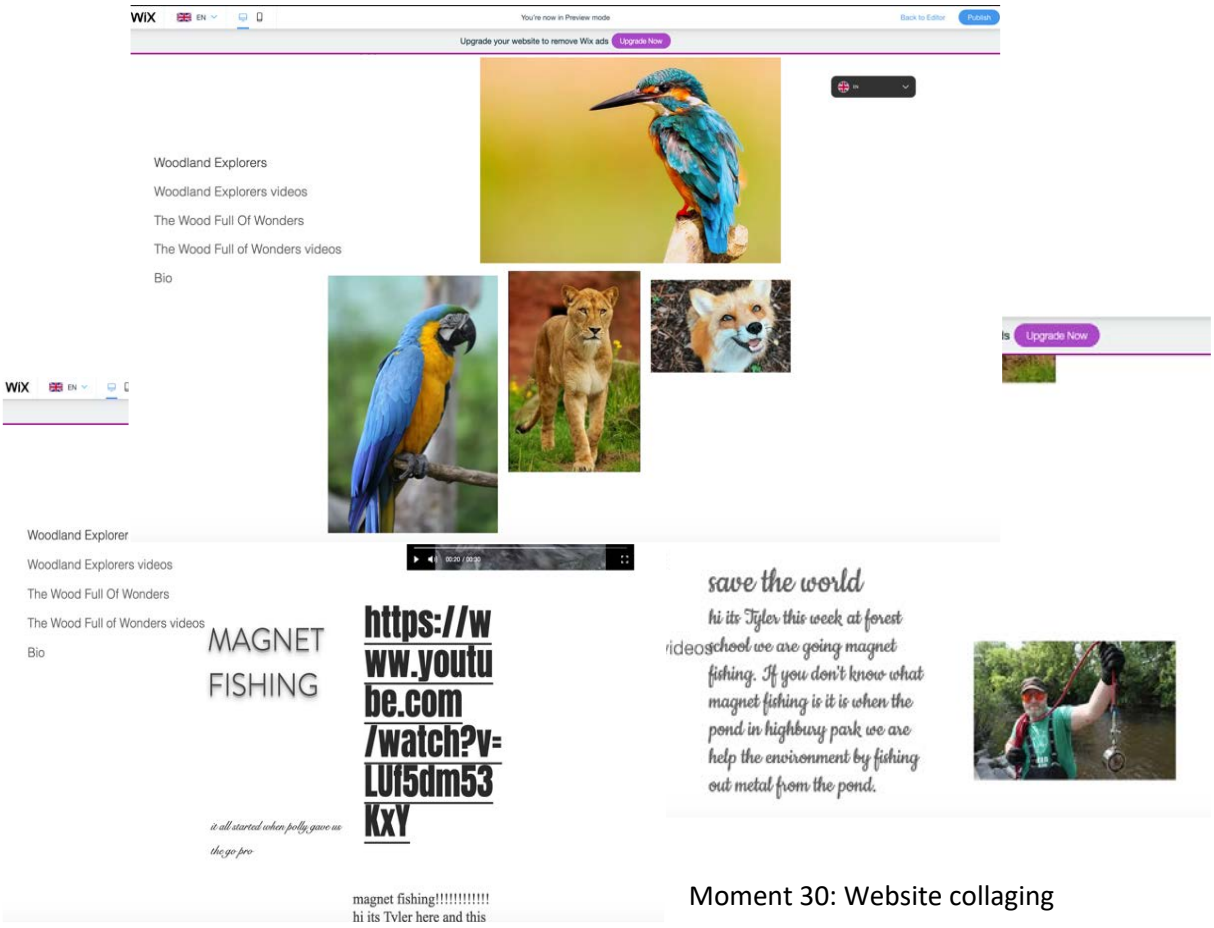
Pete Crash: I've got something to say and ***it's about this guy finding a go kart in the river***
Cinnamon: Oh I've seen that
Me: Ohhh
Tyler: Is that the YouTube one?
Pete Crash: Yes
Me: So, that's interesting you are thinking about the things that are inside, underneath the pond, under the water
Cinnamon: Litter obviously
Me: Different bits of metal
Pete Crash: Yea, I wana see what's under there
Dino: No, no you're not dumping me in there
(all laugh)
*Pete Crash****: I want, I want them to come with me underwater and see if there's metal, like a ship or something***
Tyler: I'll come with you

Moment 29: Speculative underwater conversations

4.4.5 Website collaging

The video watching and editing sessions were also an opportunity for us to experiment with making a website together. In Wix, a blank page afforded us opportunity to collage with the footage, through pulling out footage, creating text boxes, writing text, linking to YouTube clips and adding in google images. Wix allowed us to create an unpublished website; the process of which became an experimental collage. A collage is a technique or art creation by which art emerges from an assemblage of different forms. In using the term collage, I mean to consider this as an ongoing process of learning within the thinking-making-doing *collaging* event of the website sessions, where doing and thought exist simultaneously in the 'work' of collaging (Springgay and Truman, 2018), rather than how I present these moments in this text. I do not mean to consider the images presented here as collage. Instead, the website creation sessions themselves were events where the material-discursive collaging of google searches, watching and editing videos, adding texts, moving text boxes around, resizing, pulling image jpgs from computer desktops into the Wix page, reshaping, reforming of text fonts, sizes, adding links to YouTube videos, watching YouTube videos of magnet fishing while making the website, sensing the sounds of the videos playing affecting the atmosphere of the classroom while

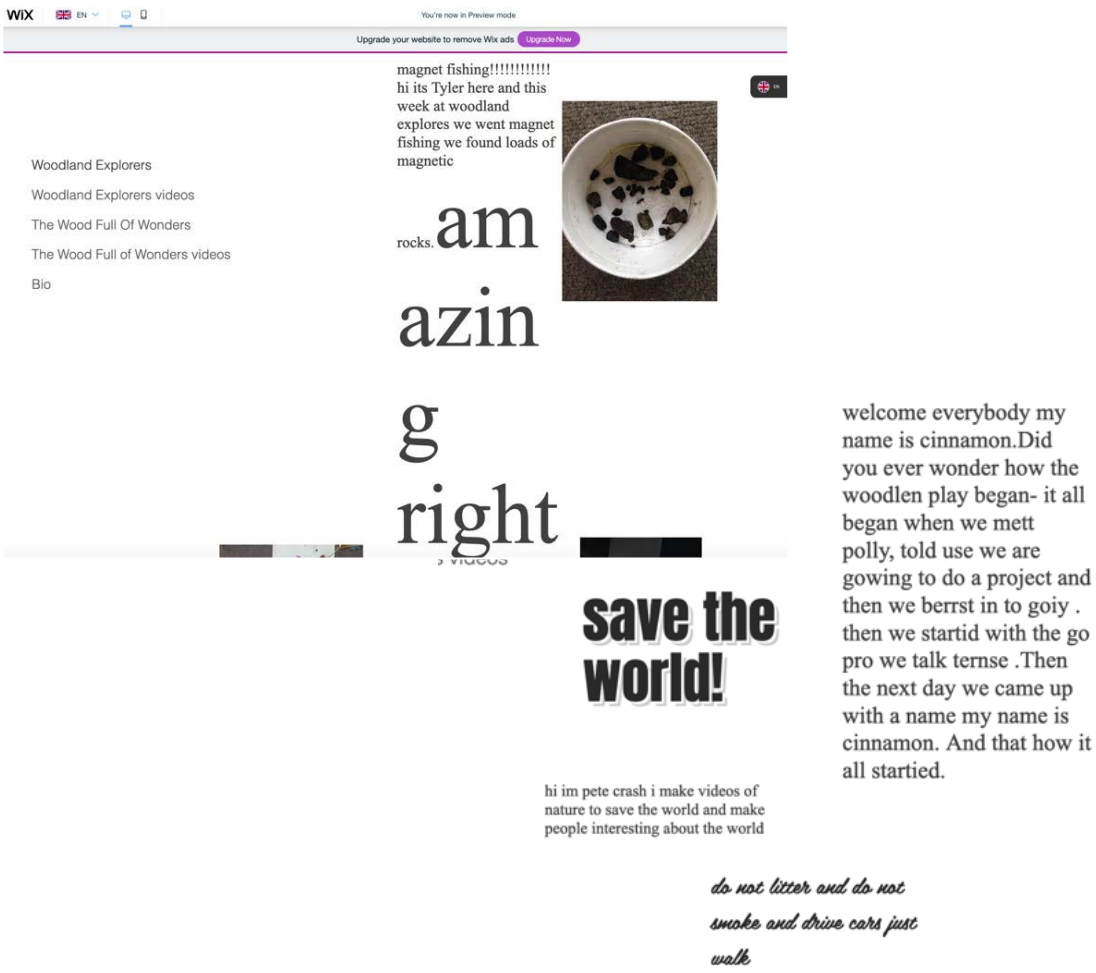
forming the website as an ongoing act or work of collaging of medias, events, materialities and affects (see Moments 30 and 31). The assembling and reassembling of these processes as *collaging* happened in the website sessions, with children assembling different thoughts and relations together on the website page, affected the learning within our ongoing research. We became 'aware of and enter into these soaking, flowing, sustaining relations that move' (Crinall and Somerville, 2020: 1321). These collaging processes created relations between child and website-Google-video-computer-sound-water-GoPro-editing software that produced new ways of relating with the encounters themselves. These processes created opportunity for inclusion of multiple forms of learning and knowledge production and creation. For example, searching for google images of parrots that shared kin with the parrots living in the homes of two of the participants and foxes that live in relation to those that might live in the park. Screenshots of magnet fishing events in American rivers and lakes entangled phenomena through YouTube in relation with the underwater videos from our research-creation.



Moment 30: Website collaging

The more we re-turned to this data in our video sessions, different ways of relating to and learning with the digital and embodied encounters continually opened other lines of flight for the research assemblage, creating other ways of learning with place and with the video data in its material form. Becoming-water with the videos, for example, opened up discussions and desires to swim underwater, to '*be under there*' (Pete Crash), to see better underwater, to travel with the camera underwater and investigate imagined materialities in the ponds in the park. This desire for learning with the body, to inquire with the body and the water and to see and feel what it's like to swim highlights learning as a thinking-making-doing process. These proposals or propositions activate opportunities for inquiry and experimentation in our research (Shannon, 2020). This related to the google images of magnet fishermen that were pasted while collaging with the website, as well as YouTube links to videos of rusted pieces of metal and garden strimmers being pulled out of water by large magnets.

These links and images assemble together on the page with text from Pete Crash writing '*I make videos of nature to save the world and make people interesting about the world*' and from Tyler writing '*if you don't know what magnet fishing is, it is when the pond in highbury park, we are help[ing] the environment by fishing out metal from the pond*'. Discourses about 'saving the world' and 'helping the environment' emerged through this writing on the website, having not been discussed before and not having been part of the framing of our research to this point. Pete Crash's immersion in the YouTube videos from 'Outdoors Weekly' - an young white American male called Jake, who films his magnet fishing encounters, often pulling out huge chunks of rusted metal objects such as nails, metal bars, old railroad pieces, motor engines, hedge strimmers, fridges and, as Pete Crash noted, a go-kart – related these videos to a discourse of river pollution from human dumping of waste materials. His use of the website text boxes to compose small messages such as '*SAVE THE WORLD!*' and '*do not litter and do not smoke and drive cars just walk*' relating the discourse of humans saving the world by cleaning up pollution learnt in school, with the images on his classroom wall and the narration from the magnet fishing YouTube accounts.



Moment 31: website collaging

This collaging process also then relates to the creative workshops that I shall discuss in Chapters 5 and 6, where participants worked with various materials including paints but also leaves, clay, mud, sticks, moss, branches, pinecones. I mention them here to highlight the multiple events that occurred during our research-creation and how they intra-acted together, affecting embodied and material-discursive learning and relations between the participants and the more-than-human and material in the park. By consistently re-turning to the footage, re-viewing and responding in various material ways, we were collectively creating a relational thinking-making-doing learning with the park, the materialities, footage, technologies and wider discourses of pollution and waste that had emerged during the research.

These video watching/editing/collaging events further relate to other events that took place in the schools. This occurred, for example, through a teacher's desire to respond with the participants to the research while I was not present. Children drew from their walks and re-member the materialities of the walks in the classroom with pencils and paints. These maps were again re-visited in a later creative workshop when participants worked with found materials from the park to re-imagine the park in a large floor-based model of sorts. I do not discuss or include the drawings within this research as I am not concerned with the representations from the maps drawn or interpreting their images as representations of the children's experiences or as a means to evidence some tangible reality or world (Kind, 2013), but rather I am interested in the processes of the modelling event itself. As such, this speaks more to Powell's (2016) multimodal map making as a multisensory as well as visual, 'evoking place as lived, embodied and produced' (Powell, 2016: 4). Much of the materials gathered in the classroom for this workshop were found and collated by the school's forest school leader, again collaborating with the research process in new ways. These changes and shifts in our assemblage, enfold new materialities, technologies and processes of doing and thinking and highlight the research as creation. I will discuss the creative workshops in the other analysis chapters but here highlight how these relate to the collaging processes of the website events.

4.5 Conclusion

In this chapter I have begun to open up some of the processes of learning as thinking-making-doing, specifically paying attention to how the digital entangles with the embodied and the more-than-human. I have intentionally focused on the various ways in which the GoPro extended and entangled with the socio-material practices of walking and filming with place. By opening these analysis chapters detailing these specific relations, with attention on the children's relations with digital technologies specifically, rather than paying more attention to the more-than-human here, it is hoped that these processes of learning will resonate while articulating the following two chapters. As both the GoPro and YouTube became powerful actants in many of these encounters, outlining the ways in which children and digital

technologies worked together within this chapter will become relevant within the following two chapters.

These experimental processes have opened up ways of learning with techno-naturecultures in multiple ways. Firstly, I have discussed how the GoPro afforded and refused possibilities of learning with natures – collaborating *with* the body and place to extend up into canopies, into hedges and underwater. This opened new multisensorial possibilities and ways of learning with place in a 'going behind the scenes' extending to 'touch', hear and witness unreachable materialities and layers of place. However, I have also highlighted how these possibilities were often refused and obstructed by refusals and disruptions performed by the GoPro and the more-than-human. I will discuss further these refusals in relation to how we came to learn with watery bodies in Chapter 5. The socio-material affordances of the GoPro and its popular association with the online platform of YouTube has further opened our learning with place in new ways. Through performing and *becoming* YouTube with the park, participants entangled their digital practices with our walking research-creation, creating speculative inquiries with imagined online viewers who were invited to particate and respond with these inquiries. This becoming YouTube draws attention to the entanglement of techno-naturecultures and how children learn with the digital and naturecultures in unfolding and relational ways. The digital and the online are not separate here, instead the digital vocabulary, embodied movements and materialities encountered in online videos become part of our storying and walking in this situated place. As such we begin to inquire with online watery bodies as entangled with the water bodies we touch while walking; I examine this further in Chapter 5.

Research-creation is understood as the 'simultaneous doing of research and creation' (Shannon, 2021: 62), activated by propositions that bring something new about how things *might* be rather than what is (ibid). In this way, proposals that emerge through the thinking-making-doing of research-creation projects become responsive ways to develop thought through the doing and creating of research. Shannon understands how propositions are emergent *with* the research, which prompt further 'experimentation and thought' (ibid). As

our research evolved, propositions emerged such as ‘going behind the scenes of the park’, ‘explore the woods full of wonder’, or other propositions such as ‘to be under there’, ‘to see underwater’, to ‘come underwater’ shift our lines of inquiry.

In considering walking and filming as making and thinking processes in their own right, this opens up the possibility for less adult-ist, hierarchical and structured ways of both doing research and practising environmental educations. It takes seriously the generation of thinking and learning in the processes of doing and thus this becomes a process of learning together, a collaborative but also non-instructional, non-performance or attainment-based way of learning and thinking. This affirms children in the practice of doing research and learning through walking and filming with place and the more-than-human, rather than foreclosing the kind of learning encounters children can have through restricting learning to developmentalist and science-based, rationalist approaches. The power relations within the research assemblage are thus shifted away from researcher/participant towards collaborative and collective processes of learning *with* (Pahl and Pool, 2021), including learning with each other, with technologies, with place and with matter. It thus opens learning to include the body, the sensory, the digital, the material and the more-than-human as entangled processes rather than focusing attention on the individual child learning *in* nature.

There were multiple points of re-turns that shifted the research. By, firstly, returning to (walk) the places over period of six months, our assemblage witnessed the always already ongoing differences and became part of those ongoing changes. Returning, secondly, to the footage to create by cutting screenshotting, performing and editing with the footage, our inquiries take new directions, as I will now highlight in the upcoming two chapters. The introduction of the various socio-material encounters in this chapter are intended to frame the processes of walking, filming and collaborative editing and returning to the footage which relate to the following two chapters in detailing the processes that opened up the possibilities for the multiple stories and diffractive learning opportunities that are discussed.

5 ENCOUNTERS WITH WATERY BODIES, WEATHERING AND GOPROS

In this chapter I discuss how water came to figure prominently in our research as we inquired and learnt with rainwater, weather(ings) and go underwater with watery bodies in the park. As I briefly outlined in the description of the park and woodlands in Chapter 3, and as has already been introduced in the previous chapter on technologies, there are many different bodies of water that flow through and emerge within this park. These include two late 19th century man-made ponds, as well as ponds dating back to the 17th century, natural springs, swamps, bogs, marshes and a stream flowing to the west into a storm drain and away out the park, a tributary of one of the main rivers of the city. During our walks we became submerged with(in) these environments; we were learning with water and place. We also learn with wet weathering processes of rain. This chapter is mainly focused on different relations to water, with weathering and rain (wet weather) also relevant. These encounters, as with those storied in the other chapters, contribute to the unsettling of 'innocent and romantic visions of children's relations to nature' (Nxumalo, 2019: 165) in different ways: we meet water as polluted, contaminated, full with waste and dumped materials. Water bodies, together with GoPros and YouTube videos, situate us in relation to other places and we begin to learn to take seriously other material-discursive stories of polluted bodies of water that entangle the *here* and the *elsewhere*. Water pools, sticks, smells and dampens our bodies and moods, it enlivens and excites, energizing us. Wet weather envelops us, we become stuck and unstuck with water. Water congeals, gloops and entraps. We learn with storm water, smelly stagnant water, boggy water, viscous thick mud, rainwater, oily water, paint water. We think with water bodies and GoPros, going under the surface, making connections to waters as dumping grounds, carrying pollution, as places of the unknown and hosts of other bodies.

This chapter will describe how we came to inquire and learn *with* water, rather than about water (and weather) (Rooney, Blaise and Royds, 2021). The storying of child-water and child-weather relations will unfold from first considering the bodily and affective relations, to creative processes of (wet) weathering, to then how these practices opened possibilities for

inquiry that attended to the hydro-logics (Neimanis, 2013; Horton and Kraftl, 2018) of watery bodies. I will first discuss (following Vannini et al., 2012) how learning to walk and thus 'live' with weather and rain during our walking sessions was a way of corresponding with the world and becoming weathered and dwelling in place. In this first section (5.1), I will talk of the embodied, affective, creative and multisensory relations with weathering and water. I will then, in the following sections, share a series of speculations and stories of becoming worldly with water (Pacini-Ketchabaw and Clark, 2016) that employ Neimanis' (2013) hydro-logics of water as ways of thinking beyond its 'fluidity' (ibid: 33), bringing watery ontologies into relation with digital practices and creative processes. I will discuss how learning with water differently (from it just being a resource) opens opportunity for thinking of water as (following Neimanis) transformative (section 5.2), as communicator (5.3), as unknowable (5.4) and as archive (section 5.5). To this figure of water as archive, I extend the possibility of the digital archives of watery bodies as speculative ways that relate children to (digital) more-than-human others.

5.1 Becoming weathered: embodied and multisensory weathering

> *Water flows off the ends of the waterproof jackets, running down into rolled-up sleeves, back up wrists and soaks into cotton school jumpers; it mixes with snot and drips off cold, raw, sore noses; slides down faces, gloops together hair, sticking hair to skin before beading off smooth ends and down the backs of necks. Some hoods are up, water dripping over peaks or running down drawstring cords; other hoods dangle from their last zip tooth, slowly collecting pools of water inside. We strain to hear each other from within hoods as the swishing of ten pairs of waterproof trousers paces our walk up to the park. Muffled sounds dampened by wet plastic. Bodies hunched over, hands in pockets.*

In the above narration, rain weathers us as we walk. Our walking research took place between October and March and therefore much of our time outdoors moved through the wetter, colder and windier seasons of autumn and winter in the UK. This meant crisp, dry, sunny days but also many icy, drizzly, damp or very rainy days. As we came to walk with both place and weather(s), in processes Vannini et al. (2012) describe as dwelling and weathering, we came

to relate to the park through embodied 'weathering skills' (ibid: 370) of understanding how to move, play with, dwell and weather place. Learning to move with weather and learning to weather places affected (and was affected by) participants' mood, emotions, days at school and feelings of joy, elation, excitement, freedom, but also of illness, tiredness, boredom and frustration. Weathering sometimes became emotionally and physically about enduring; other times about embracing. Vannini et al. argue this embodied process of weathering with place creates 'weather-places' (ibid: 373): embodied, affective and sensual practices and experiences with weather and place that impact different events and relations. The walk narrated above was one of our wettest walks; with torrential downpouring rain, the weather became oppressive and for some participants sometimes, difficult to endure. We became weathered, eroded even, as snot and make up and creams and skin cells and tears are eroded from our bodies by the rain and the wetness. Learning weathering also involved discomfort, pain, sadness and anxiety. On one cold walk children without gloves shook their freezing hands, rubbed them together or came to others to place our hands around theirs. Sore noses became red raw with wet, soggy tissues, glove-less hands became throbbing, pulsating blocks, numb with hot coldness; cold, wet, icy, windy weather was not always easy weather to weather. These bodily sensations led to emotional responses to the weather that affected how we came to know this place. Sometimes the rain encouraged a submission to wetness and a playful response of submersion and soaking (see below). For others, who found the rain too much while sick and anxious, the weather-place affected bodies to hunch over, for Leo to sob and state '*I hate this*' and later affected creative responses, figuring in paintings and drawings during our indoor session (discussed below).

During one walking session, the Beech school group spreads out walking down a small stream that flows up out of the ground in the middle of an open grass land part of the park, children walk with the narrow flow of water, flowing with it down towards a boggy reed bed with tall reeds and grasses. We observe one participant down in the boggy watery soil as takes off her wellies to feel the wet earth soak into her socks and her feet. The class teacher explains to me how she often would do this to feel the bodily sensations in relation to (or correspondence with, following Ingold (2021)) the ground or materialities she was encountering. We quietly

observe her standing feeling the wet, soft and squishy waterlogged ground, water soaking into her socks. Within this group of autistic participants, from the Beech school, this is not obstructed by adult-ist controlling of her encounter but rather observed as her responding in relation to place.

In another moment, with the Oak school, Tyler responds with the rain by sitting down in a large puddle collecting on a tarmac path, underneath a canopy of drenched and dripping trees. Others join him until there's a group of children sitting (in waterproofs) semi-submerged in brown, muddy rainwater mixing with leaves, soil, duck poo and runoff from the grass. Tyler asks those standing to splash him, so for a short while others run through the puddle, dragging the GoPro through the puddles, displacing the water over their legs as those sitting down scream with delight, soaking water (see Moment 32).

Moment 32: Weathering-place

These embodied responses relate to how Hackett and Rautio (2019) consider Ingold's 'correspondence' as an intra-active relation between child and the world; the child responding and answering the world. Hackett and Rautio argue that this correspondence with place and environment is a more-than-human relation whereby the child's body is in multimodal communication and meaning-making with the liveliness of the world. Here, it is not the bound, individual child, acting within developmental child-centred approaches of individual agency and pre-determined intention, but rather an intra-active and emergent relation or correspondence between the child and the more-than-human (rain, puddle, tarmac, waterproofs, wellies) that animates the running through puddles we witness (ibid). In this sense the 'animating capacity of gravel and puddles materialise when rock and water join

forces with human children' (ibid: 1028), through running. This correspondence, for Hackett and Rautio, articulates multimodal literacies and meaning making but can also relate to weathering and learning with place and weather as intra-active.

Blaise, Rooney and Pollitt (2019) move weathering further beyond an affective, embodied and emotional weathering-place, as articulated above with Vannini, towards learning with weathering and the more-than-human. They argue that, often within developmental and mainstream Anglo-Western educational approaches, learning about the weather involves learning about the weather from inside classrooms, naming weather 'as external to a child's body and external to the learning space' (ibid: 166). They argue that often this results in staying inside in 'adverse' weathers. Instead of this approach to learning abstractly and detached from weather*ing* processes, they propose 'weather wanderings' as a more-than-human pedagogical practice whereby children are 'always on the move with-weather, and where the discomforts of weather are seen as generative and always entangled, rather than something to avoid' (ibid). As we move with the rain, place and weather, bodies move and change, again this is intra-active and relational. Weather affords movement and how we move in our weather wanderings and with weather-places also become ways of relating to place and knowing it differently (ibid). Weather wanderings entangle human bodies with the more-than-human bodies that also weather and are weathered. We come to learn with different temporalities and tempos of weathering. While we are weathered and eroded, so too are the more-than-humans we weather with. This includes the flows of rainwater coalescing with soils, humus, stones, gravel and leaves and other creatures washing out and through the park; it further extends to the other stories told in this chapter of weather wanderings. In this sense, in the above articulations of our bodily responses to weather, I am drawing attention to the discomforts and pleasures experienced by our bodies during our weather wanderings as generative in how we learn with weather. These temporary bodily discomforts of cold and wet walks, as well as the excitement from corresponding with puddles and rainfall, entangle children with weather and influence how they learn with weather; this is further clear from Leo's creative response to our walks and to Tyler's processes of running with water and his

water rain painting from our creative workshops which I articulate in the upcoming narrative below.

Extending with weathering, we also come to learn with other earth(ly) processes. On two walks, after heavy rain, we all collectively become stuck in the mud. We all huddled together in a mud pit, pulling on each other's coats and sleeves as we try to balance in moving ground. Mud smeared (Horton and Kraftl, 2018) into our clothes, onto our bodies; the GoPro thwacked into the mud and surfaced with globs of thick grassy earthy sticky soil stuck over it. Lucy tried to clean the camera, but mud smeared across the screen and all over her hands. Squelching sounds erupt as wellies create air pockets when pulled out of the earth. Chris fell over, his wellies wedged in place, sucked underground by the viscous muddy earth, toppling him backwards onto his bottom; the mud, suction and child working intra-actively to pull down others with him. While stuck in mud, children's bodies become *other;* we cannot move as we do without mud, without our feet sucked underground. In this moment we are learning not only with our bodies in relation to weathering but also in correspondence with the earth(l)y processes of the geologic, as water erodes soils as clays, sand, stones, humus into muddy pits; the pedologics of soil formations creating these specific soil distributions and formations; and the limnologics of inland water bodies forming into bogs and swamps in the park.

Pete Crash, later, when watching these videos back during our editing sessions, further relates this encounter to learning with trees as he states: '*I get stuck up there, I go like a tree'*. Dino replies: '*you'll literally see me, walk up there and just draaaaaag you out*'. To which Pete Crash declares '*I want to stay in the mud and be a tree forever*'. This speculative arboreality or quality of living in/with/becoming 'tree-like', roots Pete Crash in weather-geologic-pedologic-place. In returning to the footage, we watch together as he becomes tree, solid, feet under/in the earth, extending below the surface, his trunk stiff and unmoving, top branches flailing around as if caught in a storm. He is with the muddy earth, weathering as tree until he gets *draaaaaaaged* out, uprooted, extracted by Dino. This performance relates to the uprooting and extracting from place of the large oak and beech trees that we encounter in the park and that I will discuss in Chapter 6.

5.1.1 Creating, performing and responding to (wet) weathering

Further learning with (wet) weathering emerges in two different creative workshops held, one with each group. These creative responses to our walks articulate how weathering-place and weather wanderings are performed in relation with assemblages of materialities, such as paints, ribbons, branches and leaves. Participants respond to becoming weathered and to encountering weathering trees, soils and water bodies in these workshops. I will detail the work of these sessions here, first introducing the watery processes from the Oak school workshop before moving on to the windy and watery processes from the Beech school.

The encounters with watery and muddy submersions, the fullness of the sounding and movement with rain while sitting with watery puddles and the smearing of mud affected the processes of the creative workshop where children from Oak school had the opportunity to respond to their encounters. The research-creation processes of the workshop articulate a further learning with water:

> *Two long rolls of paper are laid out across the spikey carpeted floor in the eco room. Runny poster paints are squeezed out of tubes into plastic mixing pots, water from taps sits vibrating in cups placed around the room and wiry splayed-haired paint brushes are dropped next to them. Bodies on bellies sprawl around the edges of the rolls of paper. On one end of the roll, blue and green and yellow liquids are mixed together by Pete Crash and paintbrush, stirring distinct colours together until brown, mixing round and round with more yellow and green slopped in, spilling over the containers and up paintbrushes. Up the paper roll, red and blue and green are raining frantically down from a height, hitting the paper with force, a rhythmic splatting drummed out by a paintbrush and Tyler's arms and torso. In between these two affective performances, Chris declares 'soil comes to life' as mud brown smears across the paper, spreading across the white and covering everything it touches in thick wet liquid. The paint-rain drumming is spitting droplets of fine liquid onto green school jumpers and over the grey carpet. It's raining paint in this corner of the room; mud is seeping across another corner, liquid is spilling over containers and up paintbrushes, over hands and into other containers. On the other paper roll, red wellies are filling up with blue liquid-paint-water; blue lines are pouring down over a stick body, arms extended, a speech bubble exclaiming 'why?!'; blue water-paint lines trace river paths, collecting and pooling in small bowls of the paper, wrinkling as they dry out.*

In this event, Tyler and the paint brush's beating rhythmic drumming of rain affects us. I became aware of a tempo, a sounding and beating that was vibrating and filling the room but was not fully attentive to the source of this beating or the atmosphere it was creating and the affect it was having until returning again to the event when watching the footage. I would like to consider this as an affective process of research-creation, responding to learning and thinking with paint as rain, to sound rain and splat paint-rain across paper and clothing and carpets. Hackett and Somerville (2017) argue that movement and vibrations of sounding of the more-than-human world entangle with the actions of young children and their literacy practices: 'it is the rhythm of the flowing river (…) that drives movement and action, that generates sounds and words' (p. 387). Here it is the rhythm of the brush and arm and paint splatting on cardboard, relating with the embodied memories of rain and puddles and splashing and becoming weather that generates learning with water and weather in the eco-room. This relates to coming to know place and worlding practices as relational, emergent and ongoing process of thinking making doing: 'surfaces come together through movement of water, mud, bodies, movement, sounds, words and stories' (ibid). This movement and sounding and multimodal literacy practices can be sensed in Tyler's creative response to the rhythms of rain and weathering encountered while in the park. It affirms, following Pahl and Pool (2021):

> that the stuff that matters in research with young people is an entangled assemblage of rhythms, flows and movements that can come to light in the making of something new together connecting to the flow of research with the charged immediacy of everyday life, forcing further questions and further movement (p. 2).

He begins to articulate with 'vibrational movement of bodies' (Hackett and Somerville, 2017). In this embodied response to the weathering encounters in the park, Tyler further begins to perhaps recognise water as destructive (Neimanis, 2013). Mixed, muddied water-paint is smearing and splatting and pouring across the paper, pooling and soaking. Other participants are disrupted, affected as water-paint spills over other materials, surfaces, clothing, their own paintings. Tyler's drumming of paint-rain distresses and frustrates and causes bodies to move,

to take shelter elsewhere, to try and avoid the splattering and (for Leo) to moan and cry out for it to stop, much like the effect of the heavy rain on Leo during our weathered walks. Here, creative learning processes experiment with, following Neimanis' hydro-logics, water as destructive and uncontrollable, unable to be mastered.

Beyond the rhythmic raining from the Oak school, we also respond to other processes of weathering-places with the creative workshop at the Beech school, during which trees uproot, wind and water swirls above the park and the sun shines. Extending from map making work that the children and classroom teacher had developed alongside our walking research, it was suggested that we make a 3D model of the park. In this event, I am interested in work of the flows, rhythms and movements unfolding in relation to the materials, the large cardboard sheet on the eco-room floor and the walking encounters in the park.

Smells of sweet conifer trees fills the room, piles of thick, dark green needles and branches mound atop a blue plastic classroom table. Tables have been pushed back into one corner of the classroom; a large sheet of cardboard lies at the other end on the grey floor. The walls of the classroom fill with tall, black and white paper prints of beech tree woodlands, the tree trunks extending from floor to ceiling; large slices of tree trunks, wellies and a red pulley cart sit around the room. Green plastic school trays hold colourful blue, pink, yellow ribbons, pipe cleaners, red and orange fabric leaves. Pinecones, twigs, branches, alder catkins, browning beech and oak leaves and other organic matter pile together on another table. Two bags of grey clay heap at the base of the table legs. Children begin picking up and turning over matter. Sounds of twigs snapping. Hands extending down into clay bags, pulling out small, pinched clumps, selecting twigs or thicker branches green with lichen coatings before moving to kneel and sit beside the cardboard, squishing the clay and moulding the branch so that it stands upright. Blue and green ribbons land on the cardboard. Murmuring, chattering, woowwws, chairs scraping, feet stomping, branches snapping, singing, humming, clapping entangle with words 'trees', 'where's the clay', 'mud', 'this is the hill', 'a duck', 'birds have the same sight as drones', 'there's lots of trees', 'trees are big'. Lily Swirl stands above the group swirling a long yellow ribbon round and round blowing, streaming and flowing between and through the other bodies. 'This is water' Rainbow says. Leaves become mud, trees grow up out of the cardboard, clumping together. Larger heavy pine needle branches flop over and drop to the ground as they move and detach from their clay bases. Lily Swirl wraps the yellow ribbon round and round a branch before unravelling in with a fast turning of her arm. Crazy carries over four large intersections of tree stumps and places

them in the middle of the cardboard. 'More trees!' 'How many trees are you going to get?' 'Lots!' Pinecones are attached to branches with clay clumps and stand upright. 'Don't hurt the tree'.

While the children had been encouraged by teachers to creatively respond to the concept of mapping the park, this 'mapping' became more than a 'linear, topographical conception of space' (following Land et al., 2020: 140) or of geographical features, instead the event became a process of research-creation as a creative, lively, multimodal, affective and embodied process of doing place, weathering and worlding, in response to our walking research. This thinking-making-doing process extends our learning with our walks in the park. We learn with tree branches as they fill up the cardboard, creating a grove of trees, leaning, blowing over, uprooting and toppling as the session continues. Lily Swirl performs watery, windy movements with ribbons, flowing through the other bodies in the classroom. The ribbons making mini tornado formations, weathering above the park. Hills are formed and removed, the ground changing as the park emerges, trees fall over, streams extend, leaves fall onto the ground, a sun of circular cut of wood wrapped in yellow satin shines in a corner of the park, a rock stone from the sensory garden stands. In these processes of material-discursive creation, materials, place and children intra-act and become other ways of learning with and knowing the materiality, weathering and place of the park.

The weathering encounters narrated above articulate affective, embodied and more-than-human relations between participants, weather and place, as well as some of the research-creation processes that emerged with these events. In learning and corresponding with weather and place, these processes are significant in opening up ways that participants creatively related to the park as 'weather-place'. Our walks also came to be concerned with some materialities and 'nonhuman copresences' that were, following Horton and Kraftl (2018) 'unpleasant, pungent or unsettling' (p. 930). I will now turn to relate these other watery encounters to the hydro-logics of Neimanis (2013), which are productive in extending how we might learn with water and consider the everyday socio-material processes of urban childhoods and outdoor learning. Horton and Kraftl (2018) have extended Neimanis' hydro-logics by arguing that they animate the 'smearing-swarming-percolating' (p. 928) social-

material processes found within children's everyday environments. I want to further employ Neimanis' hydro-logics to entangle them with children's digital practices and online knowledges from YouTube alongside their embodied encounters in the park. Evidently, water cannot be portioned out, separated and contained, as such the hydro-logics I attend to in these following sections all merge and appear through all these events, however I will focus on different hydro-logics separately, in order to pay more attention to how they specifically enable other ways of learning.

5.2 Water as transformational: relations with stormy streams

> *Water is fast moving, high and murkier than previous weeks; rain splats onto the rumbling surface, droplets displace, pinging into the air and plopping back in to join the stream. The bank is muddy with wet decaying leaves, grasses, branches and mud streaming down to join the water course. Dark brown watery matter flows out of the circular concrete tunnel under the footpath before carving around the wide, shallow bend and gushing towards the narrow, steeper straight, covered by thick brambles and bushes on the banks. A line of hi-vis and waterproof-ed participants slosh down the watercourse; coldness wraps their wellies as they push forward, deeper into the channel. The stream deepens, water rushes into wellies. The hi-vis bodies flow downstream with the water, moving towards the storm drain. Here water runs back underground and under the road away from the park. Bodies reach the storm grate, a metal barrier surrounding the storm tunnel. Wet leaves, plastic rubbish, logs, branches and debris are wedged against the metal cage, leaf debris congealing together and causing new arriving water to rise up and over the blockage. The pool on the other side of the barrier is shallower than at the blocked end.*

The high level of fast flowing water in the stream follows days of heavy rain in the week preceding this particular walk. Debris had built up against the storm grate, damming the water and creating deeper water backing up the channel. Water is destructive; rainwater, storms and high winds cause tree branches and other debris to fall into watercourses, blocking drains and leading waters to rise and flood. Neimanis refers to water's '*capacity to dissolve*' (Neimanis, 2013: 30), to erode, to wash away, to transform. In our case, the transformation is in the flooding of water into wellies, transforming dry to wet; the eroding of the muddy banks, washing downstream with the water but further eroded as we climb back out of the stream; in the depth, brownness and pace of the water flow; and the debris swirling, floating and

jamming down the stream. However, elsewhere the rises of water levels and seasonal weather patterns, cause destructive floods to houses, land and lives (Hadfield-Hill and Zara, 2019a). In much of the dissolving, transforming and washing away is a potential for destruction.

We come to notice the transformational and destructive force of water alongside noticing the impacts of the destructive habits of humans through the plastic, metal and glass rubbish backing up against the storm drain (see Moment 33). With gloves, Tyler, Cinnamon and Strawberry want to remove the blockage. With this water, full with storm debris and litter, it becomes more than playing with ideas of water displacement and scientific processes of water capacity and flow (Pacini-Ketchabaw and Clark, 2016). Learning with water as transformational and destructive becomes related to global concerns of polluted water bodies, dumping of waste and contamination (Nxumalo and Rubin, 2018). Tyler climbs over to the shallower water on the other side and pulls at the compacted chunk of debris. Crisp packets are untangled from the brown mushy leaves but as more water continually arrives, it brings with it more 'stuff'; we cannot 'fix' the problem and must stay with the trouble instead (Haraway, 2016). Dino chucks a huge log into the water as if to signify the futility of Tyler's unblocking attempts by blocking the drain further. As Land et al. (2020) argue:

> Crafting water stories with local places means that we attend to complex knowledge and stories that are always present: how do we stay with the trouble of the water stories we inherit and create (unevenly) with children? (p. 139).

Moment 33: watery-bodies as transformational

We slosh around with the stuff that water cannot dissolve (Horton and Kraftl, 2018; Kraftl, 2020), the waste of human living and consumption that is washed into water bodies. We also learn with this stuff of the limitations or futility of human-centred saviourism; we cannot 'fix' the problem (Taylor and Ketchabaw, 2015). These moments relate to our website sessions, articulated in Chapter 4, where Pete Crash created a text-box with text in bold, curvy italics declaring: '***do not litter and do not smoke and drive cars just walk'***. His concern from our encounters with waste articulated in this text box again reflects his already somewhat rehearsed, practiced human-mastery approach to learning about pollution, reiterating the individualised, instructional 'good behaviours' discourse familiar with mainstream learning about pollution, littering and environmentally friendly behaviours (Nxumalo and Rubin, 2018). This discourse relates with his attention to the concerns expressed through his learning through YouTube as he tells me again during this walk of all the metal technologies, go-karts, knives and car parts that Jake the YouTuber pulls out of rivers in America with strong neodymium magnets. Our encounters with this stormy water body complicate these discourses: the stuff keeps coming, we become entangled with it.

Through witnessing, touching and standing with the coursing of these waters full with debris, pulling out these material pieces of litter, we are attending to matters of concern and extending an ethics of care towards these watery bodies (ibid). This moves learning with water away from it as a play resource, or resource to learn about measurement, for example. However, the children's responses to the litter and rubbish highlight the ways in which constructions of pollution have been individualised into 'good citizen' narratives of care as a human-centric act (I discuss care further towards the end of this chapter). In later walks, the children ask to do a litter pick, taking gloves and a bag out and picking up materials found under trees and amongst the hedges of the park, but as Pete Crash remarks, '*there's just more stuff*'. On occasions, the GoPro camera and selfie stick are pushed inside a bin to see the rubbish inside; other times the GoPro is held flat against a drain-grate in a pavement in the park, to try and see what is being carried by the water below. Again, the water eludes us, even with the camera potentially extending our optics, we cannot see the 'stuff' that is held with the water that flows beneath our feet, under the park and away into other rivers. In these

examples, water is not a backdrop (Neimanis, 2013: 28) but becomes entangled with us as we are weathered and move with water. However, while this inquiry with GoPro cameras and bodies *with* water, extends our learning beyond water as clean, knowable and related to measurement and play, there exists persistent, ongoing narratives of neoliberal and developmental approaches to education – children articulating 'good citizen' behaviours and performances of care *for* the environment through cleaning, litter picking and instructing others not to litter. This attends to the progress of the individual child into a responsible adult but negates the complexities of ongoing living with polluted water bodies and of neoliberal systems upholding unequal access to potable water, polluting water bodies at industrial and global scales, removing laws and restrictions to limit contaminants entering water systems. Mainstream education focuses attention on learning about individual polluting habits, litter picking, recycling and reducing plastics but neglects the complexities of staying with the trouble of the already ongoing global systems of polluting industries as well as neglecting consideration of multispecies care (Nxumalo and Rubin, 2018; Puig de la Bellacasa, 2017).

5.3 Water as communicator: metallic oil spills

> *'You can hear the water' states Strawberry as we wait for cars to slosh pass before we cross, surface water running down the side of the road. As we reach the pavement on the other side Cinnamon exclaims 'Look at this stream!' Below our feet, a rainbow of metallic colours float atop the surface rainwater, puddling and pooling down the tarmac slope. The shiny pinks, blues, yellows, greens give off a strong fumy smell, a car garage type smell rising up from it as it smears down the tarmac. The GoPro is lowered to the tarmac, filming up close, picking up a coating of liquid. Oil sticks to the bottoms of wellies, leaving traces as we walk down the pavement. Streams of oil appear further down the pavement, re-joining with other patches as the oil finds various routes down the hill, ending at the grass where soil soaks it up. Pete Crash is worried 'I have oil on my shoes' and repeatedly shouts 'I am the oil monster' as oil comes with us into the school grounds and into the eco-room.*

In ways which also entangle with other logics of water, the above encounter with an oily, fumy, colourful petrol spill as we walk back from the park highlights Neimanis' hydro-logic of water as a 'medium of communication' (Neimanis, 2013: 31) of other bodies and processes. As

Neimanis argues, the water that sustains our bodies is also the water that brings and circulates 'other transcorporeal transits' (ibid). Oil that spills from an unknown source down tarmac roads is carried atop the surface water from a rainy day; water is here the messenger, couriering oil towards our feet (see Moment 34). The cars rusting underwater that figure speculatively in our magnet fishing conversations (introduced in Chapter 4) are also the cars that spill oil or petrol onto road surfaces, which leaks and oozes down tarmac and into grassy banks and onto our wellies before eventually finding its way into watercourses and back into future waters that we drink - treated and clean, in some geographies, dirty and contaminated in others (Taylor et al., 2020; Berry et al., 2020). Cars and watery bodies are present in our research in multiple ways and we encounter other smelly, shiny, watery forms during other walks that I will discuss in section 5.4. These highlight the uneasy entangled transcorporeal relations we have with man-made, polluting technologies, materials and objects of human consumption and capitalist everyday utility, such as the car. As Alaimo argues (2016a) trans-corporeality considers the subject as a material being, 'inextricably interlinked with the circulating substances, materialities, and forces of the wider world', (p. 49), as oil sticks to us, our wellies and onto the carpets of the eco-room, we are also further interlinked with material:

> heap of things that have been produced for consumerist desires, the production of which has entailed the destruction of many nonhuman creatures and habitats, (and) also produces networks of harm to humans at the places of extraction, manufacturing, consumption and disposal (ibid: 50).

I will return to this transcorporeality in my discussion of magnet fishing in 6.1. Here, it highlights how oil entangles with us, cars, the grass, the water system and our imaginations. In our encounter with the oil spill, Pete Crash becomes an 'oil monster', perhaps a figure recognising the monstrosity of the uncontainable, sticky and pervasiveness of oil which seeps into our thinking and makes us feel uncomfortably attached and stuck to/with oil. He repeatedly shouts this as he runs down the road; he appears simultaneously thrilled and anxious, worried about having oil on his welly, trying to remove it in puddles and escape it by

running away. Much like the debris we encountered in the previous section, continually washing up against the storm drain in the stream, the 'stuff' keeps coming back. In watching the footage, I hear Dino shouting '*Oil be back*!', a Terminator reference, acknowledging, perhaps, an awareness of how this oil follows us down the road and into our research inquiry but also pervades our contemporary lives in the form of plastics, fuels and a multitude of other fossil-fuel-man-made matter (See Kraftl, 2020 for discussion about plastic childhoods).

Often when walking to the park Dino performs different cars; he tells me which car he is, how much horsepower he has and revs his engine, making spluttering sounds and revving noises, as he drives over slopes and verges. As car, he enacts and performs its powerful, fast, destructive and domineering potential, evoking the complex tensions within a consumer-based human-centred world where the car figures as status, power and dominance over the more-than-human world. In the park, with Dino-as-car, the GoPro camera becomes a 'dashboard-cam' mounted on the front of a 4x4, smashing into mud, off-road racing. Tyler too pays attention to cars, zooming the camera into cars parked on the sides of the road, noticing their make and model and filming close up to their metallic chassis and rubber tyres; while Pete Crash continues to tell versions of stories of a rusting car he sees half-submerged in a nearby lake. At home, I surf the internet for one of the YouTube videos of Jake the magnet fisher, recommended to me by Pete Crash and watch the pulling out of an old motorbike with a magnet and a metal hook; all the old oil from the tank spilling out along with brown water full of rusty particles of metals and into the river as the motorbike pulls out from the lake. All these vehicles - imagined and encountered - and their oily watery residues become uneasy matters of concern in our walking inquiries. They keep returning in various forms, communicating and diffracting (Barad, 2007) our thinking with water and materialities; they figure in much of this watery chapter and will return below when I discuss water as an archive.


Moment 34: water as communicator

5.4 Water as unknowable: duckweed and darkness

> *A thick, bright greeny-yellow form carpets the surface, its spread of green tiny leaves so densely packed it's like a layer of paint. The green layer rests, no movement give hints of the water beneath. Branches of smooth, wet rotting deadwood appear stuck, trapped, half in and out of the greenness. Dead leaves lie atop. A stick is tentatively poked into the green, a brief unsettling of surface sending a slow jelly-like wobble across its skin. A stale smell of rotting mush oozes out. The stick pokes in further and with an increasingly aggressive swirl of an arm it begins to unsettle, to move the sludgy, smelly, stagnant water below. The lemna duckweed leaves stir, shifting as if one entity, gently rocking the nearby fallen branches from their cemented positions. Small cracks appear, opening gaps in the green where thinner watery-water is exposed. A thwack of a log thrown with force shatters more green, splatting the lemna off the top and opening gaps for the dark water beneath to appear. The camera is plunged deep into dark water, disappearing, the selfie stick is pushed back and forth, nudging the camera further into the underwater unknown. It is pulled back out and brings with it a smearing of dark green gunk across its plastic casing. The gunge gloops around the camera as it is taken towards another area of the pond and plunged back under. Feet in wellies edge in and under the gloop, it envelops them as they dunk under the surface and disappear from view. Tiny lemna leaves all entangled together at the roots pull up with the boot, like spit still attached to the mouth, dripping and stringy.*

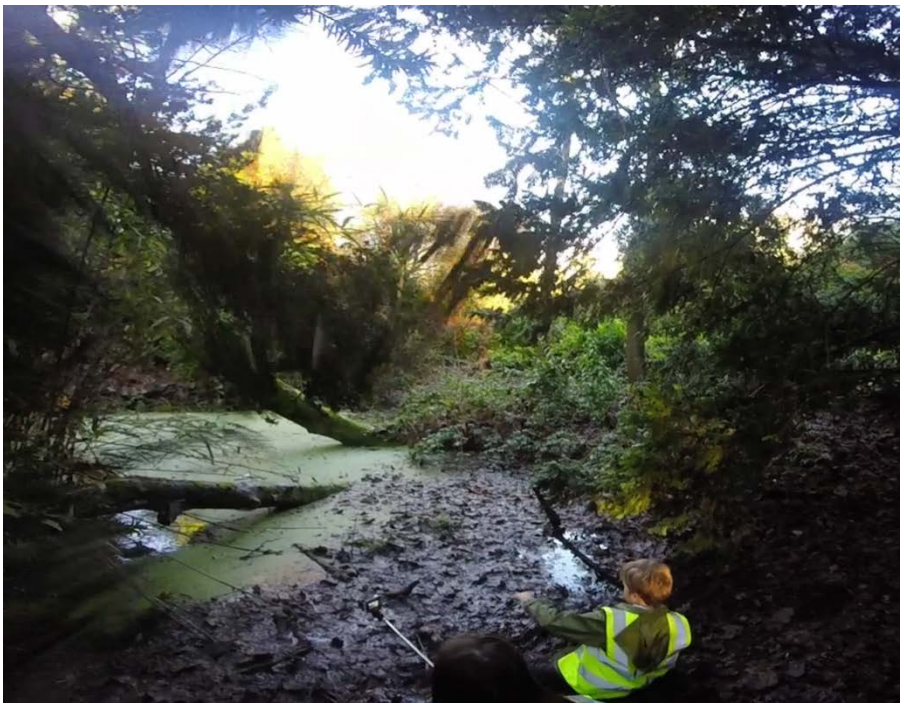
Another of Neimanis' hydro-logics considers water as 'unknowable' with a 'capacity to safeguard infinity and serve as a limit to mastery' (Neimanis, 2013: 32). She argues this in relation to the futurity of water, the plurality of possible futures of water, but also its geography, given the limits of the human body to be able to ever master all bodies of water, particularly deep water. I want to consider how we played with this within our research by focusing on this encounter with one pond found within the late 19th century former 'pleasure

gardens', below a grand and crumbling stone viewing platform where former views across the meadows beyond are now hidden by mature woodland tree growth. The pond has silted up and is covered with a layer of bright green lemna leaves, otherwise known as duckweed minor (as described in my above narration); the pond is thick with scrub around its banks and boggy ground running off to the southern end of the pond. Pete Crash asked to take the rest of his group on a walk to this place he calls the 'ruins', where this pond is situated. He was interested in inquiring with what might be under the water, particularly what metal objects could be there.

Moment 35: water as unknowable

As the children inquired with this pond, sticks were prodded into the water and swirled around to expose the brown water beneath the green duckweed. The three video stills above (Moment 35) are screenshots taken by me while watching the footage Dino recorded on the GoPro on selfie stick. Dino holds the selfie-stick with the GoPro attached and in the footage Pete Crash moves the stick in the water before Dino plunges the camera in. The footage reveals the camera recording itself just above the watery surface, the red light flashing as it records, hitting the water and then going immediately dark. In the footage, swooshing and slushing sounds accompany the blackness, as the camera moves around underwater,

remaining dark until the camera is pulled back out of the water. In Moment 36 below, the camera and selfie-stick can be seen as it is pulled out of the pond again by Strawberry after a second attempt at filming underwater.



Moment 36: Camera-selfie-stick re-emerges from underneath

Our attempts to master water fail (Neimanis, 2013); water 'eludes our efforts to contain it' (Horton and Kraftl, 2018: 935). Water is unknowable in its entirety and cannot be mastered by humans; instead, we must learn to know 'alongside' water (following Spivak, in Do Nascimento, 2019). In desiring to '*see what's underwater*', to '*go behind the scenes*', to search for car parts and dumped objects, participants work with the GoPro and selfie stick to extend their sensory capacities. Yet – and also when watching back this footage – water remains unknowable, eluding us and the camera. It therefore reminds us that we must learn alongside water, to respond with water's unknown qualities rather than master it (Pacini-Ketchabaw and Clark, 2016). In the eco-room Leo imagines a '*camera that is waterproof and you can basically control it and see what it sees and you can put it inside the water and you can go how deep you want*' and yet, thick brown, murky and silted water would still likely prevent us being able to see beyond and within it.

Around this pond, participants become affected by a smell: '*I can smell it, it's stinky, smells like apple juice and smelly socks'*, notices Pete Crash. The camera drips with smelly, slimy watery gloop, the screen is smeared and tiny strands of duckweed trail down the selfie-stick and stick to our wellies, residues of the stagnant pond life accompanying us. Tyler asks if anyone '*wants a poo stick'*, lifting a stick out of the water. Participants begin refusing the camera, pushing it on others, not wanting to hold it. One parent volunteer tries to steer the group away from the pond. We come to recognise the water as stagnant, full of decaying organic matter and sediment with smells, sensations and matter unknown and perhaps not often attributed to understandings of water by these participants. Here we are engaging with the water in ways that 'considers our bodies in relation to the water of the planet' (Do Nascimento, 2019: 49). Not all water bodies are knowable or clean or clear or fluid (Hadfield-Hill and Zara, 2019). Freshwater bodies such as this can be full with decaying plant and animal matter and multispecies structures of bacteria and algae at microscopic scales; others are teeming with aquatic vegetation and animal life. The health and ongoing living of more-than-human life within water bodies affected by industrial and agricultural waste, sewage, wastewater and nutrient run-off, industry, oil pollution, nutrient enrichment.

In emergent and diffractive ways, our learning with oil spills, storm water, plastics debris, duckweed, imagined rusty car parts, poster paints and (as the next section will enfold) magnetite, opens up water to be much *more* unknowable, complex and lively. By noticing, submerging, becoming with water through touching (Rooney, Blaise and Royds, 2021) (albeit with a stick), smelling and sticking with the water, filming and sensing, rewatching and remembering, our research begins to pay attention in ways that opens up generative possibilities of water while staying with the trouble of learning with impure, unclean, smelly sticky and stagnant waters.

5.5 Water as archive: speculating with metals and car parts

Pete Crash: I have something to say, there's a video and it's about this guy finding a Go-Kart in a river
Cinnamon: Oh I've seen that!
Tyler: The YouTube one?
Pete Crash: Yes
Me: So, that's interesting, you're thinking about the different kinds of things that are inside the pond, underwater?
Pete Crash: Yes
Cinnamon: Litter obviously
Me: Is that what you are talking about?
Pete Crash: Yeah, I wana see what's under there, I wana ..
Dino: No, no you're not dumping me in there
Pete Crash: I want one of them to come with me underwater
Tyler: I'll come with you
Pete Crash: And see if there's metal, like a ship or something

In this section, I will return to conversations (above) already introduced in Moment 29, and to Neimanis' hydro-logics to consider a final logic of 'water as archive' (2013); as Horton and Kraftl describe:

> literally and/or metaphorically holding flotsam, rubbish, chemicals, bodies living and dead, binding mud particles, lubricating the passage of excrement within and outside animal bodies, acting as a container for oral histories, traditions, rodent life-cycled, and rumour (Horton and Kraftl, 2018: 935).

I will employ this figuration in relation to Berry et al.'s (2020) further extended figuration of river as 'curator'. I do this in order to return again to one of the speculative stories introduced in Chapter 4 that runs through much of our research: magnet fishing. Both these figures of water as archive and river as curator relate to our encounters with the streams, ponds and water bodies in the park, as well as to the speculative and digital bodies of water that were storied during our research-creation. I will then extend this notion of water as archive and curator to the digital underwater videos from YouTube. Considering these figurations in

relation to Puig de la Bellacasa's (2017) articulation of 'touching technologies' as more-than-human assemblages of care, I will play with this term in relation to the proximity of YouTube videos in extending matters of care to digital water bodies (and by extension to the water bodies within our walking research).

As I have introduced in Chapter 4, magnet fishing emerged as an event through our inquiries with the stream, the duckweed pond and multiple water bodies and with participants' online knowledges from YouTube. In Chapter 4 I focused on how footage from underwater affected participants to share stories and speculate with online YouTube footage of magnet fishing events. There, murky video footage of GoPros filming dumped metal machinic technologies and materials such as car parts, fridges and go-karts prompted us to speculate and inquire further with the water bodies in the park. Here, I want to return to this to consider how these digital and embodied inquiries enabled us to think differently about firstly, water (and digital footage of watery bodies) as an archive and as curator, and secondly about the tensions that this emergent event generated. In Chapter 6, I will again return to magnet fishing to discuss the entanglement of the geologic through our event of magnet fishing itself.

5.5.1 Desires of metal car parts

During our walks, stories about car parts, trolleys and pieces of rusty metals and technologies seen in various canals, rivers and lakes in the city circulated through the Oak school group. As the previous sections have articulated, our walks with the stream, the storm water, the duckweed pond and oil spills submerged us with bodies of water and entangled us in relation to many different contaminating materialities, plastics, rubbish and unknown organic debris in affective, multi-sensory and embodied ways. We were smelly and sticky and soggy *with* these water bodies. They gurgled and splashed, splatted and swooshed as we moved with them. They emitted smells of stagnant, moulding, rotting matter. They were slimy and gungy and slippery to touch. However, the car parts, trollies, knives, go-karts, guns, fridges and pieces of rusty and rusting technologies and metals that so often became part of our walks were only ever present as speculative imaginings, evoked as present absences through, firstly, stories told, in a similar way to Nxumalo and Rubin's (2018) 'waste stories', of other local

rivers, lakes and canals near participants' homes and secondly, through returning to stories of online YouTube videos of magnet fishing events. When wading in the streams with the GoPro, participants would lower the GoPro-selfie-stick underwater and drag it along as it filmed the stones and leaf litter and small particles of matter moving with the water flow. As the children watched this footage in our website sessions, this footage would mix up with Pete Crash's stories of YouTube videos of Jake '*who picks up trash from the river',* uses a GoPro and uploads his footage to YouTube to '*show the stuff he finds'*. Our walks with water became full of desires and proposals, such as Leo's to '*go underwater and see the metal in the pond',* to swim underwater and to fly Jake and the magnet over to help pull out the cars from the local ponds. As we came to learn with water as transformative, a medium of communication, unknowable and destructive, so too did we begin to consider water as an archive (Neimanis, 2013).

5.5.2 Figuring (digital) water as archive and curator

This figuration of water as the archive, perhaps, of memories, is also one of human consumption and 'material repositories of the past' (Neimanis, 2013: 32). The Merriam-Webster definition of 'archive' includes the idea of preservation, a physical place where materials are preserved, or the archive as the preserved materials themselves (Merriam-Webster, 2022a). As Springgay, Truman and MacLean (2020) argue, the archive is often considered stable, static, linear and linked to human-centric power, colonialism and conquest. Figuring water as archive shifts this conception towards an agential, processual archiving event, whereby dumped, rusting, spilling and polluting technologies and man-made, manufactured materials are held in tension with the archiving figure of the water, in ongoing, unstable, shifting processes of preserving these eroding, rusting, lively materials; the materials are at once polluting and at the same time held or archived by the water bodies. The non-innocent entanglement of humans and the more-than-human in naturecultures is held in tension in this archiving process of human waste and other organic and geologic matter. This logic of water as archive 'draws us deeper into water' (Neimanis, 2013) and presents us with an ethical and political response-ability and ethics of care, particularly if we are to understand ourselves as part of the global hydro-commons and as ourselves bodies of water.

Springgay and Truman, (2017) queer the notion of the archive as something fixed and fixing objects in the past, by offering rocks as 'queer archives' that, while archiving the earth's history, do so through producing difference as they 'erode, melt, collapse, invert' (p. 81). Queer archives, they argue, share 'the affective tone of a process or event rather than replay strict chronologies or typologies of identification' (p. 860). I will return to this recognition of the vitality of rocks in Chapter 6; here I want to consider the queering of the archive of the 'inhuman' (as Springgay and Truman refer to rocks) by also considering this queering of water bodies and the materialities they host as archive. As the water and the matter archived within its bodies erode, rust, decompose and spill we can consider this archive as a lively process of ongoing difference whereby water and matter are vibrant, full with animacy (Bennett, 2010).

Berry et al. (2020) add a further figuration of river as 'curator', gathering

> small artefacts of the world and arrang(ing) them in ways that call attention to the stories these materials continue to carry, even after human disposal' (p. 283).

The dictionary definition of 'curator' is 'one who has the care and superintendence of something', one who 'looks after', 'watches over' or is the guardian of something (Merriam-Webster, 2022b). This further animates water as gatherer, curator, carer. Water becomes an affective curator of archives of (sometimes speculative) dumped metal parts, stones, minerals, plastics, organic matter in ongoing processes of eroding, rusting and weathering. I would like to extend these figurations of water into the digital worlds of YouTube.

Our inquiries with water as archive and curator extend beyond the materiality of the water we become submerged in, to also encompass the digital bodies of water in our video footage and archived online through YouTube (see Moment 37 for screenshots from our footage and from Outdoors Weekly YouTube magnet fishing channel). In a digital archive, such as the hosting and the curation of videos within a YouTube channel, through the development of a public collection of footage, videos of watery bodies become differently curated, *archiving* digital footage of watery bodies, *themselves* figuring as archives. Springgay, Truman and

MacLean (2020) further consider ‘anarchiving’ processes that disrupt what is archivable (affects, bodies, performances) and highlight how digital technologies are transforming what can be archived. Perhaps the digital archives of footage of water bodies that figure in our research, as archives of rusting metals and matter, could be considered as disrupting dominant discourses of water as pure and clean (Berry et al., 2020). Instead, through the online archives of underwater video footage from Jake the American Youtuber (in the months before our magnet fishing event materialised), research participants are entangled with the ‘affective tones’ (Springgay, Truman and MacLean, 2018) of Jake pulling up these artefacts of dumping, discarding of evidence, weapons and unwanted manufactured and man-made technologies such as bed springs, railway sleeper nails, safes, washing machine drums, bikes, coins, keys, coils, cars, motorbikes and fridges in bodies of water far away from those we are walking with. This entangling of spacetimemattering between different (digital and material) water bodies, extends our concerns beyond the physical, local and immediate towards concern with the global hydro-commons. In a somewhat murky and meandering way, then, these digital archives create an ethical response-ability through the affective *proximity* of the digital underwater footage (both our footage and that archived on YouTube).

Moment 37: Pete Crash (l) touching leaves and sediment underwater in Highbury Park; screen shot from Outdoors Weekly (2019) YouTube channel (r) pulling car rim out of riverbed in America

Puig de la Bellacasa (2017) considers ‘touching technologies’ (as in digital touch screens) as more-than-human assemblages that remake what touching and care means. She considers the ethical obligations of ‘technology as touch’, arguing that:

> touch's unique quality of reversibility, that is, the fact of being touched by what we touch, puts the question of reciprocity at the heart of thinking and living with care (ibid: 19).

While YouTube videos are not 'touching technologies', I want to consider this notion of proximity that is affective within these encounters with underwater videos. Both filming and watching these videos, participants are moved to respond. As I discussed in Chapter 4 Lucy is *moved* to become water with her hands; Tyler *senses* the grinding of camera against stones and metals underwater as his bones crunching; Pete Crash wants to *swim* with the watery bodies. These embodied, sensory responses to the footage *moves* us into proximity with these underwater archives, almost touching; we are affected by and affecting our relations with (digital) water bodies.

YouTube magnet fishing channels can also become a (digital) watery archive, hosting or curating processes of rusting, contaminating and transforming technologies, metals and materialities from around the world, bringing them into digital proximity, almost touching and immersing viewers, affecting a response from watchers and entangling techno-naturecultures in productive and generative relations. This online archive of videos of water as archive affects Pete Crash; as I have mentioned on our website he writes that he '*wants to make people interested in the world*' and told me he '*wants to save the world*' through cleaning pollution from the rivers. We learn with YouTube underwater archives and our own video footage, as we learn with smelly, contaminated unknowable water.

In their touching of and proximity to these watery materialities both watching footage and during our walks (and before our magnet fishing event, which took place towards the end of our walking research), this intensification of involvement, relation and proximity, following Puig de la Bellacasa (2017) becomes a (more-than-human) way of knowing and embodying care. Through recognition of water as lively, agential curator and archive, these notions of care and attention extend beyond the human and the children participant's articulation of care and attention towards the water bodies. Water bodies – and the digital archives on YouTube - are

also in ongoing, animate acts of collecting, preserving, looking after and watching over rusting, lively metals and dumped manufactured technologies.

Water, figured as the caring, guardian curator of lively, agential archives of rusting metals and polluting dumped materials, asks us to stay with the tensions of the pervasive, non-innocent human relations with the earth (Berry et al., 2020); that the earth continues to respond, sustain and care despite or alongside the toxic and harmful materialities it hosts. This further demands that we consider the idea of care as a more-than-human capacity, that is not without contradictions and harmful iterations and that demands recognition of the liveliness of water bodies as more than just a resource. However, notions of care and responsibility, more frequently recognised within a developmental notion of 'good citizens', caring *for* the environment, through innocent altruism (Berry et al., 2020), were also communicated through participants responses when asked by the forest school leader *why* we were doing magnet fishing (in part to respond to the questions from the headteacher when we were asked to justify the event). While much of their curiosity regarding metals that might be found underwater relates also to a curiosity and wonder with the unknown and unknowable, children also responded, '*to save the world'* and '*to help the rivers'* and '*to clean'*. These were not repeats of conversations we had held together previously with the children but were residues of the discourses of litter dropping and pollution being bad that are dominant within primary schools and mainstream education systems. Children learn not to be 'litter bugs' from an early age and often schools implement litter picks to encourage children to be responsible citizens as well as to practice environmentally 'good' behaviours such as recycling.

This individualisation of care and responsibility for the environment and climate change can be critiqued through the neoliberal individualisation of the good consumer, whereby emphasis on personal responsibility shifts attention away from the global systems and conglomerations of polluting industries, fossil fuel industries and other huge polluting industries such as fashion. Yet, as I have discussed earlier in this chapter, participants also instigated litter picks, bringing out gloves and bags to collect litter in, putting the GoPro inside the bins, noticing and pointing out litter in trees during our walks. These events where

participants position themselves as good citizens and situate their behaviours as 'saving the world' occur simultaneously and entangled with the messy, non-innocence of these relations (Taylor and Pacini-Ketchabaw, 2015). Both are true at once. Children were keen to demonstrate their recognition that litter was bad and in many ways this magnet fishing can be considered as effectively a large-scale extractivist litter picking exercise. However, at the same time, it is important to extend beyond these individualistic and altruistic responses *and* to trouble the commonly-taught understanding of pristine, pure, cleansing water (Berry et al. 2020; Nxumalo and Rubin, 2018). Thus considering (digital) water as archive and curator of polluting, rusting, ongoing metals, technologies and plastics opens up opportunities to learn with watery bodies in new ways that are productive in staying with the trouble of the tensions between these positionalities.

5.5.3 Magnet fishing as (un)knowing the socio-materiality of the park

As our (digital/techno-naturecultures) watery inquiry developed, Pete Crash's mum, who was part of our assemblage, informed me she was buying him a magnet and rope for his Christmas present and an emergent method became available. We were going to carry out a magnet fishing inquiry with the park; I purchased two more magnets and she would bring Pete Crash's one. This emergent opportunity was taken seriously as an attempt at the ethicality of affirmation (Truman, 2022) - a responding to what happens and being attentive to the processes that emerge through research. I discuss this event again, differently, in Chapter 6. It is not, however, without a multitude of its own ethical matters of concern, specifically related to extractivism and the geologies of media, which I also discuss in Chapter 6.

Through our inquiry with watery bodies and our entangling of physical and digital processes of watery exploration and submersion, our attentions, as I have mentioned, became increasingly concerned with the archives of materials, pollutants and potential unknown rusting metals and materialities with(in) these waters. Taking these stories and inquiries seriously – both within our assemblage as well as from Pete Crash's mum paying attention to these inquiries within their own family – this emergent method enabled us to further explore the figuration of water as archive. In the weeks leading up to our magnet fishing inquiry, guns,

knives and bombs began to increasingly feature in the stories told about the watery bodies. Pete Crash reminded everyone about the videos with Jake being asked by his local American police enforcement to support their search for dumped crime weapons. This imagining of discarded evidence began to infiltrate our walks and came to be more relevant as the park ranger (from whom I obtained permission to carry out this magnet fishing) warned me that bombs, from the Second World War, had been found in other places in the city. This possibility of the unknowable archive of watery bodies, such as the murky waters of the duckweed pond or the deep duck pond in the park, hosting bombs, guns and knives meant that we had to (for the safety of the group and the consent of the school) conduct a further risk assessment and agreed to carry out our magnet fishing in the shallower waters of the stream. We decided not to investigate in the unknowable, murky deeper waters and instead stick to a section of the stream that I had already visually checked over. Furthermore, this session took place when the water was shallow and clear, rather than after a storm. However, we still developed and practiced a protocol for if we found an artefact that we considered dangerous and required us to move away from the stream.

These socio-material potentialities of urban water bodies added a further affective nervous energy within the group as we imagined and discussed the session in the eco-room. Children imagined having to contact the police and bomb squad and what would happen if we found a gun. As it unfolded, during the magnet fishing event, which took place in March 2020, as we stood with our wellies in the water, with three very strong magnets dangling off the end of thick red ropes being dragged across the stony, pebbly stream bed, two police officers walked past us, our first encounter with the police during our walking research. Cinnamon informed them that we were going to call them if we found any weapons or bombs.

I will return to the magnet fishing event in Chapter 6, to discuss the matter that we did encounter through this emergent method. However, here I want to return to Neimanis' hydro-logic of water as 'archive' (Neimanis, 2013) and further to Neimanis' hydro-logic of water as 'communicator'. Both the materials found within these bodies of water and the materials witnessed through YouTube videos contribute to the figuration of water as archive and communicator, linking through the storytelling and speculations that can be made about

where these materials have come from, why are they there, what stories do they tell. Matter, such as metal and dumped debris, shopping trolleys and car parts, found by participants while out walking in Birmingham (for Pete Crash while walking with his mum) become lively matter and through digital practices of watching YouTube, are linked to the digital watery archives of matter being pulled from American bodies of water, further entangling with the global archive of magnet fishing videos. The materials, both imagined and witnessed by participants, also become part of a broader argument related to issues of water pollution and are associated with human practices of dumping and littering.

However, they also further relate to the entangling of multiple temporalities and situated socio-material histories of place. The streams and watery-bodies within our research acted as curators and archives of the absent-present. Although participants were excited about speculating with these waste materials, rusting metals and plastics and these materials were evoked through storytelling as well as sharing YouTube videos, these materials never actually *materialised* in our water bodies. Rusting car parts, fridges, go-karts, guns, bombs and knives haunted and animated our walks through both a curiosity of the unknown socio-material histories of these water bodies and a desire to find them as well as remove them from the water bodies. In these metal materialities, the watery body as curator/archive becomes both situated in multiple spacetimematterings, within Birmingham *and* elsewhere, as well as multiple pastpresents, in its story telling. While participants imagined guns within water bodies from YouTube videos and associated these with generalised notions of urban criminality and gun crimes, the speculations of guns in water streams in Birmingham also diffracts as a situated and specific place-story. As Loveless (2013) points out, 'in attuning to water we may attend to the pull of microbial time, industrial time and geologic time' (p.135, footnote 8).

Birmingham has a complex industrial past, including the production and fabrication of iron, steels and metals into a huge array of implements, tools, weapons and artefacts. Its vast waterways (Birmingham has hundreds of interconnecting canals) transported these materials; water was used within industrial manufacturing processes; the canal systems became archives of metals, mineral deposits, technologies and industrial waste. Birmingham, since the late 17th

century, until the mid 20th century, was also one of the largest manufacturing industries for gun and ammunitions; the city had a 'Gun Quarter' and produced guns used during the Jacobite rebellion Ireland, by slave traders within the Atlantic Slave Trade, during the Napoleonic Wars, the Crimean War, the American Civil War, during World War One and supplying Commonwealth police forces, such as in Kenya and Egypt up until the 1950s (White and Trudgeon, 1983). Chamberlain, an Imperialist who supported military campaigns and Highbury Park are entangled in this history.

As speculative stories of guns being pulled from these watery bodies within our research continue to be told by participants (the gun will also figure in Chapter 6 in different ways) these stories entangle with the colonial, imperial and industrial past-present socio-material histories of this place and this city. While this was not explored further with participants during this research, it is still worth discussing as ways in which Nxumalo's (2019) prescensing place-stories shift the kinds of dominant framings about place that are offered - as 'mute sites for children's learning and discovery' (p. 160). It also further opens up other place-stories that relate to the multiple spacetimematterings within this water; thinking with water time and water as archive, curating speculative technologies and metals attunes us to other times, for example the water bodies flowing through Birmingham utilised in the manufacturing of technologies such as guns, ammunitions, steel and iron. We further return to the entangling of water time with geologic time through the event of magnet fishing again in section 6.1, where we encounter magnetite.

5.6 Conclusion

In this chapter, water becomes part of our emergent relational research process as we learn with water (Pacini-Ketchabaw and Clark, 2016) and inquire with (wet) 'weather-places' (Vannini et al., 2012: 364). I have considered how we weathered our walks and how our bodies came to dwell in places in the park as 'weather-places' (ibid). For Cullen (2020), following Neimanis and Walker (2014), weathering 'inter-implicates' bodies, materials, places and the weather in processes of becoming (p. 865). Neimanis and Walker further argue that we are 'weather-bodies', not masters of weather, nor simply 'in' it, but as weather-bodies, we are

‘thick with climatic intra-actions … Together we are weathering the world’ (Neimanis and Walker, 2014: 558). Rooney, Blaise and Royds (2021) argue for ‘weathering-with pedagogies’ that examine the ‘with’ not the ‘what’ of child-weather relations, so that pedagogies might move away from matters of fact and towards matters of concern and an ethics of care (following Latour, 2004; and Puig de la Bellacasa, 2017).

Our emergent research processes encouraged us to follow matters that concern us and to try out and experiment with methods that open up relations between child, water, rubbish, duckweed, rusty metals and other materials (Nxumalo and Rubin, 2018). This meant weathering-with, immersing, going underwater and dwelling in watery places. In doing so, this research became attentive to what is already ongoing with place, including the socio-material histories of Birmingham’s industrial past as well as digital places. Rather than romanticising or making innocent relations between children and nature as pure or pristine, instead this chapter has considered the messy, impure, contaminated and complex relations between children and water (Berry et al., 2020; Hadfield-Hill and Zara, 2019a; Horton and Kraftl, 2018), telling ‘waste stories’ (Nxumalo and Rumin, 2018) that have included online digital waste stories from other bodies of water elsewhere. Participants’ research inquiries engaged with learning with water and weathering in embodied performances and digital practices that demand consideration of our bodies and selves in relation with the more-than-human and a global ‘hydro-commons’ (following Neimanis, 2013 and Do Nascimento, 2019). The digital practices of participants, through YouTube and other online platforms, extend relations between and breakdown the binaries of the physical/digital and the local/global in generative ways that foster awareness and concern for that which is not individual or human. Thus, in meandering ways, this research might begin to propose other ways of learning-with situated, messy and polluted places, entangling the physical and the digital.

A key contribution within this chapter has been the figuration of digital archives of watery bodies, curated by others elsewhere, but entangling us in spacetimemattering with global watery bodies. These digital archives of water bodies are significant in highlighting the ongoingness of the waste and contamination at multiple scales. I have further considered the ‘touching’ technologies of digital footage as affording a proximity and relationality that

extends an ethics of care with the more-than-human (Puig de la Bellacasa, 2017). Through bringing into proximity the digital encounters with other watery body archives, through watching and storying YouTubers and magnet fishing, we could be seen to be cultivating another form of both 'waste stories' (Nxumalo and Rubin, 2018) and 'lively digital place stories' (Land et al., 2020).

As Horton and Kraftl (2018) have highlighted, children's everyday socio-material geographies are narrated in ways that can be 'troubling, un-idyllic, anxiety-ridden, anxiety inducing, noxious, nightmarish or brimful of ethical ambiguities, politicised tensions and social exclusions' (p. 930). Often, the materialities that children encounter in their everyday lives are 'characteristically murky, massy, out-of-sight, elusive and in-process' (ibid: 929). This attention to murky, massy and processual materialities is particularly relevant in the encounters described within this chapter, as we considered wet and watery relations. To this awareness of the murky, massy materialities of the everyday, I bring the murky, massy and troubling materialities of the digital archive through the YouTube videos of magnet fishing.

This chapter has drawn on work from feminist new materialist and posthuman feminisms (Neimanis, 2013; Pacini-Ketchabaw and Clark, 2016; Berry et al., 2020; Hadfield-Hill and Zara, 2019; Horton and Kraftl, 2018; Nxumalo and Rubin, 2018), which provide conceptual tools in order to argue beyond water as water play (as in, learning about it as a distinct '*resource to be managed'* (Pacini-Ketchabaw and Clark, 2016: 99)). Furthermore, this chapter has employed Astrida Neimanis' (2013) 'hydro-logics' to help to 'draw us deeper into water'. Including thinking beyond its 'fluidity' (ibid: 33) and instead paying attention to everyday relations to water in order to become response-able (ibid: 39) (to) water bodies. These hydro-logics as well as other conceptual tools such as weathering and weather walks (Rooney, 2018) help extend pedagogies of children's learning towards the transcorporeal (Alaimo, 2016a) rather than maintaining focus on the developmental child (Do Nascimento, 2019; Rooney, Blaise and Royds, 2021) or, equally, focus on the 'individualised, charismatic, companionable' more-than-human that is often discussed within posthuman research (Horton and Kraftl, 2018: 929).

Relational ontologies that recognise the impurity and complexity of staying with the trouble of common worlds (Berry et al., 2020) also emphasise pedagogies of care and concern in order

to cultivate more ecologically responsible learning possibilities and relations with water (Pacini-Ketchabaw and Clark, 2016). While there were tensions within this research, some of our watery encounters (as well as our digital and technological practices and creative processes) do contribute to literatures that are extending ways of thinking differently about relations to water and weather. In the next chapter, I discuss relations with earth(l)y, geological, arboreal materialities in ways which also trouble (and perpetuate) extractivist and resource-based logics of relation and learning with the world.

6 ENCOUNTERS WITH MINERALS, TREE ROOTS AND BRICKS

This chapter attends to some (small), ruinous, crumbling, eroding, decomposing and weathering materialities – minerals, tree roots, soils and bricks. As such, we begin to move 'behind the scenes' underground and toward earth(l)y encounters. As with the previous chapters, it will weave narratives and moments together with stories of place, temporalities and learning which are provocative in unsettling, romanticised notions about children, place and natures (Nxumalo, 2019; Pacini-Ketchabaw, 2013). In this chapter, as in the previous analysis chapters, digital technology is not 'good' or 'bad' and neither 'nature' or the child is not simplistically 'pure', 'innocent' or romanticised. In the stories in this chapter, I move to consider some of the tensions inherent with relations between human and the more-than-human and draw out some of the troubling processes and relations between child and materialities. Magnetic rocks are extracted from riverbeds. Tree planting becomes a destructive event of cutting roots, splicing through soils and worms. Bricks temporarily become companions before being smashed apart. I will consider how learning with digital practices such as Minecraft relate with encounters with streams, trees, walls and the geologic. I will discuss how performing 'real-life' Minecraft reproduces the dominant Anglo-Western notion of nature as resource and how the extractivist logics that are evident in the popular video game (following Brazelton, 2020) become articulated in children's worldly encounters with materialities. However, alongside and entangled with these non-innocent, destructive (Taylor and Pacini-Ketchabaw, 2015) and extractivist events, this chapter also considers ways in which learning with and corresponding with these everyday materialities might open possibilities for other ways of relating with the more-than-human. As such, the tensions highlighted here are not introduced to be resolved but rather to stay with the trouble of the complexities of learning with digital technologies and the more-than-human.

In some ways, this chapter continues discussions that have already begun in the previous chapters, including extending the concepts of weathering and multiple temporalities and

bringing the digital into relation with these encounters. However, through focusing on particular socio-material assemblages of child-magnetite, child-tree-roots and child-brick, it will fold in further ideas of the anthropomorphic (following Rautio, 2013), odd-kin (following Haraway, 2016), the geosocial and the geologic (following Clark and Yusoff, 2017; and Cullen, 2020). I attend to these assemblages specifically because they continue arguments made in Chapter 5 related to going underwater, which considered the archive of matter held within bodies of water. In this chapter, our inquiries move underground, towards the geologic, attending to the minerals, soils, roots, stones, clay, sands and earth(l)y materials and the complexities of magnet fishing in relation to extractivist logics (discussed in 6.1). They continue to relate our embodied encounters with digital practices and performances (from YouTube and Minecraft gaming). This chapter comes last in this thesis as we go further 'behind the scenes', moving from the canopy, through the underwater to the underground and towards the crumbling, the soily, the mineral and the eroding. I consider the extractivist logics that emerge with some of these encounters, such as magnet fishing and performing Minecraft. This chapter therefore holds our learning with processes in tensions with the ongoing and persistent framing of earth, mineral, tree root, stones as resource. I discuss these tensions not to necessarily resolve them but to address ways in which environmental educations may and should attend to these logics within their practices.

Maintaining our modality of walking as research-creation, this chapter attends to these assemblages as they emerged through a thinking-making-doing of walking inquiry. Hennessey and Rooney (2021) justify their foregrounding of relations between specific bodies (for them the child-weather-pumpkin assemblage, within their 'collaboratory' research) so that they can attend to 'the different stories of place, time, liveliness and decay that they drew to (their) attention' (p. 3). Paying attention to specific and situated relations is, common world theorists argue, important for staying with the trouble of messy human-nonhuman relations. These assembled actants are foregrounded in this chapter, yet they serve also as starting points from which to open out discussions of wider socio-material relations. In previous chapters, our '*going behind the scenes'* research has taken our encounters into canopies and underwater as well as into the digital worlds of YouTube; this chapter extends *underground* to think more

with children relating to earth(l)y matter and the ongoing tensions inherent in these encounters.

Firstly, therefore, I will discuss the idea of the geosocial formation of humans and the geologic, through returning again to the magnet fishing event (section 6.1) that has been introduced in Chapters 4 and 5, to this time discuss the tensions inherent within our extraction of magnetite from the stream in the park. Section 6.2 will continue the discussion of the tensions in the magnet fishing event through into a discussion of the violence of tree planting, focusing on the severing of tree roots. This event also situates our research assemblage in relation to 'forest-time' (Pacini-Ketchabaw, 2013) and the multiple temporalities of living and dying of the more-than-human. The next three sections will take three different routes from child-brick encounters. Hence, in section 6.3, I will discuss the relation between a child and a brick named 'Bricky' to consider how the anthropomorphising of this brick became a way to relate and 'yield agency' (following Rautio, 2013) to 'Bricky' and to consider bricks as imperfect, improbable and not really geosocial 'odd-kin' (following Haraway, 2016). In section 6.4, I will continue with the child and the brick and consider processes of weathering and weathered bodies in order to include the child as an interrupting force within a brick's becoming and unbecoming (Cullen, 2020; Hadfield-Hill and Zara, 2019). In extending this storying of Bricky and including other materialities such as upended tree roots, stones, feathers and 'gems', I will discuss in section 6.5. how the digital gaming phenomenon of Minecraft becomes affective in the park, highlighting again the non-innocent digital/material extractivist logics of both the game and contemporary Anglo-Western learning, which again relates with discussions of magnet fishing. I will then conclude this chapter in section 6.6.

6.1 Magnetite extraction and birds' navigation

> *Magnets on thick red ropes are thrown into the water with a thunkkkkk, bodies and arms pull the rope along, dragging the magnet through the riverbed, much like the GoPro camera had been dragged underwater in previous walking sessions. Sodden ropes are pulled out, magnets dripping and dangling. To our surprise and wonderment, small fragments of grey, glistening, sharp-edged rocks are attached to the flat grey underside*

of the magnet. Children squeal and shriek as they dredge the magnet along the small section of riverbed for these seemingly magnetic rocks, pulling them off the strong magnet and dropping them in a yellow container on the riverbank. This unexpected matter surprises us and makes us pay attention, why were these rocks sticking to this magnet, why here, where had they come from? We move to investigate the duck pond with the fishing nets. Nets dip into the water and are pulled towards us. No duckweed or algae entangles the poles in this water body, although the water clouds over as the mushy leaves and sediment are disturbed, releasing a putrid smell. Children turn the nets inside out and the haul splats onto the tarmac ground. Sodden, slippery and slimy willow leaves congeal together in a pile. Strawberry and Cinnamon pick out slick and stuck together feathers from the mallard ducks. The magnetic rocks and duck feathers accompany us back to the eco-room in the yellow container.

In previous chapters I have discussed the emerging event of magnet fishing, highlighting how it relates with digital knowledges and practices of YouTubers as well as how speculative stories about underwater archives of metals, go-karts, cars and other machinic technologies have entangled with walking research-creation and website sessions. In this section, I return to the encounter, with our magnets in the watery bodies of the park, which took place in March, towards the end of our walking research, to discuss the materials that emerged and how this shifted our learning with the more-than-human and the digital.

Due to the (understandable) health and safety concerns of the school, participants' expectations of the kinds of materials that we might pull out of the river with the strong magnets shifted significantly. The potential of pulling out a large piece of metal, a knife, a gun,

Moment 38: Magnetite rocks attract to neodymium magnets

a bomb (all things raised by the park ranger and headteacher) was considered by the school as too much of a risk for the children and so, as I have described previously, we stuck to the shallow part of the stream on a day without heavy waterflow (see Moment 38). Conversations with participants when discussing why we would not be able to fish in deeper waters included thinking about what might be present in (specifically urban) water bodies and the bombs that were accidently dropped during the second world war. This meant that, despite the ongoing and extensive storytelling and speculating with the various metals we might encounter (guns, car parts, ships), we agreed it was unlikely we would pick up anything with our magnets and Holly suggested bringing nets along as an extra method for inquiry.

Despite the anticipation and desire from participants to conduct magnet fishing to remove rusting metals and human discarded waste from water bodies (as articulated in Chapter 4), this emergent relation between magnet and magnetite, child and mineral shifted our research towards new possibilities. Back in the classroom, we sat with these rocks and feathers, running the feathers over our skin and holding and moving the jagged rocks in our palms. The rocks pierced against our skin, creating small indentations when pressed hard. We touch geologic and biological matter. Detached and extracted, they have dried out, they no longer smell or drip with wetness. We queried where these rocks might have come from, we felt them in one hand, a smooth soft pebble from outside the eco-room in the other. I had been talking with my brother, a geologist, prior to our session and shared with the participants the questions he asked me about what kinds of textures and shapes and sizes the rocks were, where it was located, was it close to a railroad, how deep was the water. All these queries, investigations, building a story of the rock in a Western, rational scientific approach to geology, considering a mineral's geographical and physical properties. We deduced that it had not travelled far downstream as had not been eroded and smoothed by the weathering processes of water flow and hitting and grinding off other rocks and materials, it could have been part of the disused nearby railway track (as I mentioned in Chapter 3); it might have been put in the riverbed by humans to shape the course of the stream.

We talked about the work of a geologist, reading clues in the land and the underground and through rocks and minerals to place these materials in earthly context. Tyler shared how he watched a programme where some stones release poisonous gases if placed on a fire. Cinnamon described the pebbles '*like cream going down your face to make it soft*' whereas the magnetic rocks were '*sharp and spikey*'. We learn with Wikipedia, my brother, touching, nature programmes and magnetic rocks and consider this rock to be magnetite. We learn that magnetite is a mineral found in Igneous, metamorphic and sedimentary rocks and is the most commonly mined ore of iron. It can become magnetised as a permanent magnet and then used as a compass (called a lodestone); it was how magnetism was first discovered by humans. As we move away from the more dominant, curriculum-like geologic learning that would normally frame primary school learning about the properties of rocks as inert and as resource, we begin to open up relational learning with geologic as lively, vibrant matter (Bennett, 2010; Springgay, Truman and MacLean, 2020) in ways which situate humans in already ongoing common world relations with the more-than-human.

We learn with these tiny pieces of magnetite in our hands that magnetite is present as biomagnetite within many species including migrating birds such as homing pigeons, trout, salmon, newts, spiny lobsters, sea turtles (Gould, 2015), coral reef fish larvae (Bottesch et al., 2016), molluscs and bacteria. We learn it is also found within human brains. We learn that, for most species, the magnetite participates in the magnetoreception of migrating, movement and navigation, in relation to the earth's magnetic fields (Wall Kimmerer, 2020). Tyler considers '*when the birds have magnetite in their beaks, they could also attract to other birds and fly into each other or attract to metal*'. Chris replies '*If it's two birds wouldn't they repel*?' Cinnamon thinks about migration and shares about mosquitos and '*how they travel from cold to hot places like Pakistan*', she knows this because her family are from Pakistan and she's been bitten by mosquitoes when visiting family. She makes multispecies relations between mosquitos, birds, magnetite and human migration. We think about navigation and how bats navigate at night; Cinnamon shares '*I know about how bats find their way in the dark, if noise takes a long time to come back, then it's the right direction'*. Situated on the eco-room floor, with magnetite rocks and female mallard feathers, we contemplate how this rock is lively

with(in) animals and birds intra-acting in relation with their movement and migration around the earth. For some, this relates to their own stories of migration and movement and journeying. This brings us into relation with the biologic and geologic, with biomagnetite, lively and vibrant in organisms affecting where, when and how we move, reproduce, feed and sustain life.

Encountering magnetite in our magnet fishing event opened up new geologic and biological relations between children, matter and birds and other species. Gould (2015) highlights how migrating birds use 'calibration strategies' to orient themselves and do not rely on smells or airborne signifiers. Baltazar-Soares and Eizaguirre (2017) document the two 'extremely accurate geographically' (p. 604) oceanic migrations of European eels, as innate rather than learned and aided by magneto-sensing as a 'magnetic map'. Brothers and Lohmann (2018) further consider the migration of loggerhead sea turtles back to their nesting beaches as facilitated through 'geomagnetic imprinting' related to the earth's magnetic fields, such that turtles nesting on beaches with similar magnetic fields should be genetically similar. Mouritsen and Ritz (2005) argue that, for migrating birds, both light-mediated mechanisms and magnetite-mediated navigation supports their flight directions; adding that the magnetic sense(s) remain the 'least researched major sense of the animal kingdom' (p. 411). Gieré (2016) highlights that biomagnetite is naturally occurring in the human brain as a process of evolution; it is also occurring due to external processes of air pollution from the combustion particles of diesel exhaust (ibid). Banaclocha et al. (2010) distinguish between the geological (external) magnetite and the role of nanoparticles of (internal) magnetite in the brain's mechanisms of perception, long-term memory plasticity and learning. Kirschvink et al. (2001) elaborate that magnetoreception is one of the first sensory systems to evolve, with

> biophysical mechanisms for magnetoreceptive transduction in the nervous system have evolved as ancestral traits, common to all animals, and not as separate entities between groups' (p. 463).

They further argue that magnetoreception may have been 'one of the first sensory systems to evolve' given that 'chain structures' have been found in 4.0-billion-year-old 'carbonate blebs' of a meteorite (p.465).

Why is it relevant to consider magnet fishing as an event that was productive in how we learn with environments and place? Firstly, the emergent process of this event and method took this research into new and unexpected relations with the more-than-human. By taking seriously the inquiry and attention that participants paid to repeatedly submerging themselves and the GoPro with(in) water, to filming underwater, to speculating about the rusted materials, to the YouTube videos, to the footage filmed in unknowable waters and the desire to try magnet fishing, the process opened up multiple questions, possibilities and new unknowns. While we did not end up fishing for car parts, the thinking with these rusted metals and technologies related our bodies of water with other bodies of water in elsewhere places. This, as I have already discussed, situates us within a global hydrocommons and the concerns that extend beyond our place to other situated places elsewhere. In terms of expanding relations and thinking towards materialities and response-abilities, our stories and speculations about the cars and knives and guns submerged underwater gave opportunity to consider water bodies differently, to stay with the tension and trouble of (digital) water bodies as archive and curator of polluting human matter.

Secondly, staying with the tension of extractivist logics (Nxumalo, 2020) that are persistent and present within our learning, perhaps there are multiple ways to think and work with this extractivism. Within this tension, there remains the dominant human-centric treatment of earth-as-resource (Taylor et al., 2012). There is a second tension inherent with the use of the neodymium magnet, related to the production, use and life-cycle of the 'rare-earth' magnet. Gallagher (2020) pushes us to think beyond the 'use' of media towards the 'geology' and 'physicality' of media. Demanding we extend awareness of media (or artefacts) to the socio-material and ecological impacts of extraction, production and life-cycle of minerals, for both humans and more-than-humans. Thinking with the geology of the magnet therefore opens up uneven relations between our learning processes and those humans and more-than-humans

involved in its production as well as their environmental toxicity (Schlör et al., 2017). The magnet fishing functions, therefore, in multiple and inescapably extractivist ways, continuing human-centric practices, that disregard (or don't acknowledge) their environmental and social impact, and further deny the vitality of the mineral itself, thus in some ways continue the conceptualisation of materiality as 'the passive stuff of the world there to be exploited' (Alaimo, 2016a: 49). This further highlights the child (and further, myself and by extension humans) as geological agents (following Hadfield-Hill and Zara, 2019), which I return to in section 6.4. In our use of the magnet to attract magnetic matter in order to extract, remove, dislocate or otherwise affect the matter, we are enacting a difference that matters in the riverbed ecology.

However, with regard to learning with the geologic, and if we consider difference as generative and concerned with making 'connections and commitments' (Barad, 2014: 184), then perhaps we might consider the magnet and magnetite relation as affecting difference in our geological learning *with* minerals and matter. Rather than learning about magnetite as a resource for human use by focusing on the chemical composition, the processes of turning it into an iron ore, or its application within, for example, the steel production industry, instead, paying attention to the biomagnetite that is common within all living matter (from bacteria to humans) as well as geological matter, we come to know (bio)magnetite differently. This didn't' require the act of magnet fishing but this thinking did emerge from the act. Understanding the transcorporeal subject as entangled with the material, we can acknowledge our own 'permeability, vulnerability and bodily nature' (Alaimo, 2016a: 50) in relation to biomagnetite. Transcorporeality further also entangles the human with the extractivist 'rare-earth' mining processes and the geologies of media, again recognising the relation between mining, damaging (human and more-than-human) extraction, production and consumption practices.

Biomagnetite affects the transcorporeal subject, our relations to movement, migration and therefore becomes more than a fossil fuel resource, more than inert matter for extraction and mining, more than its application for human use; it becomes always already part of us and the more-than-human, a geosocial relation. Through the process of magnet fishing and its practice

of extracting, or attracting, thought otherwise, we might learn as entangled with the more-than-human. We can acknowledge the ongoing tensions and stay with the trouble of these events in order to also learn to think differently in relation to the geologic.

Thirdly, and relatedly, this event and the learning that emerged from touching with the magnetite articulates the relation between the biological and the geological (Grosz et al., 2017). Clark and Yusoff (2017) consider 'geosocial formations' as the process and outcome of earth-science and social science encounters:

> thinking the becomings of earth and society together might help us to probe the richly layered formations we have inherited for the overlooked, marginalised or as unactualized geosocial possibilities murmuring within them (ibid: 6).

It is understood that the geologic is as multiple, multi-scalar, multi-temporal and functioning in different states, as is the social and the biological. Through the touching of and learning with this mineral, perhaps we might be able to recognise both the vitality of the magnetite, in participating in the geological processes of migration, movement and birth cycles (for salmon returning upstream, eels, sea turtles, birds and newts (Wall Kimmerer, 2020)) all returning to reproduce where they were born. By extension, we come to learn with stories of human migration, movement, difference from marginalised children and diasporic families. This further relates to other stories from within our assemblage of newly arrived families claiming asylum and children moving through systems of foster care and adoption.

There are multiple possibilities happening within this magnet fishing event; speculating with these possibilities enables us to consider children's relations to and learning with both the biological and the geological differently. Understanding metallic rocks as vibrant and animate (Bennett, 2010) is productive in our experimenting with magnet fishing. In these events, rocks attract and stick together with magnets, sparking inquiry into the minerals and compositions of the rocks that both acknowledges their vitality (Springgay and Truman, 2017), and leads to entanglements of bird flight, migration, movement, relations and navigation through

understanding of the mineral deposits in birds' beaks. This rethinking of bird (and the human) as co-composed with similar mineral compositions as rocks and as minerals as potential affective collaborators in bird flight and as agential forces pulling and pushing with other forces, recognises life as pre-individual (Yusoff, 2015) and opens up more-than-human pedagogical approaches as a geologic 'lithic ecomateriality', as Springgay and Truman argue (2017). In the section that follows, I will discuss further tensions between the human and more-than-human while learning with the geologic and arboreal.

6.2 Roots and trunks: non-innocent cuttings and tree kissing

> *The metal blade of the spade cuts into the turf and pushes down through soil, hitting into stones. The park rangers pull out small trees kept in black plastic bags, to protect their roots from sunlight, and show us the small root balls tangled at the base. We dig holes into turf ground, pushing the weight of our bodies onto the spade edge, our bodies sinking down into earthy ground with the spade, feeling it resisting against hard stone, shifting to one side and pulling up with earth laden on the blade. Clumped grass and soil spill out of the sliced earth, mounding up on the spade before falling to one side, leaving a small deep hole. The next mound of earth removed contains more soil, stones, white mycelium fungi and rocks; fleshy pink worms, cut in half and wriggling and white grubs and larvae tumble out of the clump. Bodies dig deeper, excavating more soil, more stones, some larger rocks; more severed worms, larvae, grubs more woodlice. Leo exclaims 'everywhere's a stone'. Cinnamon, digging a second hole, shouts to the park ranger that she's 'found a root again', pointing up and wagging her finger disapprovingly at one of the mature oak trees next to where we are planting, who she thinks the roots belong to. She acknowledges that the mature oak's roots are tangling and interfering with the hole in the earth where she desires new roots and new trees to be planted. She dramatically lifts her spade above her head before plunging it fast down to make the cut through the thick root, 'I'm always a rooty girl' she states.*

In this section, I shall pick up on the tensions held within what is often considered an altruistic and benevolent act: tree planting. I do so, to extend the complexities of these tensions of learning with materialities and the geologic to tensions of learning with the arboreal. I discuss these tensions not to criticise or draw attention to 'bad behaviours' or any wrongdoing on the part of the participants within this research; I am not interested in the developmental or

individualistic interpretations of these events but rather discuss some of these inherent tensions to highlight how learning with the more-than-human is a continual staying with the trouble of the destructive possibilities of human relations with the more-than-human. I will also follow co-shapings (Pacini-Ketchabaw, 2013) of natureculture relations that demand forest pedagogies pay attention to the frictions of place, the digital and the material. I relate this event to another within the research that highlight our complex relations with learning with trees: tree kissing. I discuss these events as imperfect and non-romanticised or idealised processes of learning with techno-naturecultures. As will become clear within this chapter these tensions are also inherent in how children perform Minecraft and learn with bricks.

Tree planting emerged from an offer extended from the park ranger who invited us plant some new 'whips' in an open area of the park marked out by branches laid down in a large semi-circle shape. It became an event that opened possibility for other ways of paying attention to trees, not as an act of altruism or heroism but how this further entangled us in non-innocent affective relations with multispecies materialities. In our tree planting we perform a different version of going '*behind the scenes'* from going underwater or into tree canopies, by cutting through turf and earth and tree roots and into soil and stones and grubs and worms (see Moment 39).

Moment 39: Cinammon cutting through tree roots

Cinnamon's cutting and slicing is a somewhat violent relation with the more-than-human; she cuts and 'edits' through this underground ecosystem of tree roots, the act of cutting like the cutting of video footage, editing together new stories and relations. Pacini-Ketchabaw (2013) considers 'child-forest co-shapings' that are significant for both child and forest; these

encounters are not one-way but instead these frictions of 'bodies rubbing up against each other' (p.361) affect the relational and entangled past-present-futures of common worlds. Cinnamon's slicing of the tree root is one such child-forest co-shaping that matters both in her learning with trees but also in the affects for the mature oak's future growth, the new growth of the 'whip' tree and the lives of all the more-than-humans entangled in these ecologies. We are learning with multiple tree-times, cutting into the earth to plant young tree 'whips' and their fragile, delicate roots, entangling them with the mature trees and their thick, lateral roots spreading out through shallow underground, horizontally meters away from their trunks. These tree planting events relate to how Pacini-Ketchabaw and Kummen highlight 'the entanglement of children's lifeworlds with mycological time, forest time(s), termite time, metallic time, moss time and crow time' (2016: 433; see also Loveless, 2013 for water time and ice time). We dig up worms and slugs and larvae with the soil and stones as we plant these tree whips; in other walks we dig out woodlice and larvae and spiders from the rotting soft deadwood from the veteran oak branches.

We entangle with more-than-humans living and dying in multiple temporalities, rhythms and materialities. This is 'embodied time', time which extends beyond human time to recognise the diverse temporalities 'such as the generations of living beings, ecological times, synchronicities, intervals, patterns and rhythms' (ibid: 433, following Rose, 2012). We are each tangled, muddied, fingers in roots, hands reaching down under into holes cut out of the earth, pulling out soils and stones and worms, our movements scooping and digging down to cut into and pull out (of) the earth. Cinnamon's cutting through the root of the mature oak tree - a root that has sustained and fed the tree through complex relations with mycorrhizal networks of fungi and minerals for likely over a hundred years, that was obstructing her planting the roots of the new whip tree - cuts through diverse temporalities of living beings.

In touching new whips, we remember the living-dying of other trees in the park, such as the veteran oak we witnessed cracking during one of our first walks. The fallen limbs of the tree remain in place as lively 'dead-wood'. During our walks we visit this oak, sit with it, touch its innards. We become entangled with its living-dying decaying and rotting beams, touching soft

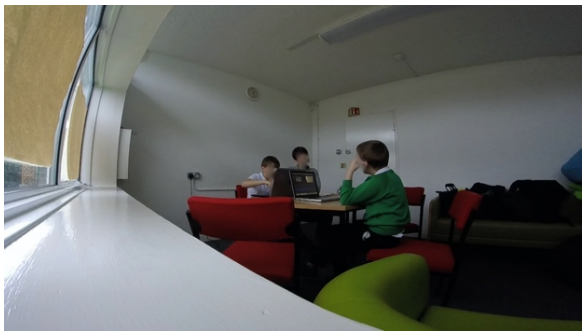
rich brown inner wood, crumble wood between our fingers, find spiders, woodlice, white mycelium threads of fungi and bugs living in its rotting wood. We also remember the roots of the fallen beech tree in the beech copse that children pull themselves over in other weeks. '*This tree's had a battering'*, Dino exclaimed on first encounter; it's thin and flattened root base exposed vertically up out of the ground, hardened woody root stumps sticking out in all directions, thick with clumps of old soil and now covered with brackets of fruiting bodies of fungi, growing out of the beech root columns. Our attention to forest-time and tree-time through planting, as well as our witnessing of the complexities of the other living more-than-human worlds ongoing in the woods, is in tension with witnessing the dying-living of trees and the human severing and splicing of the tree roots. Paying attention to liveliness as living-dying ongoingness and thinking with tree-time further encourages us to think outside of clock-time (Pacini-Ketchabaw and Kummen, 2016) and thus further out of human-centered time as linear progress.

Our encounters with trees throughout this research encourage us to think beyond an individualistic and developmental framework, in often incomplete and insufficient ways, but nevertheless in ways which open possibilities for other kinds of learning with natures away from a romanticised 'nature connection' discourse where trees are often employed for their affordances for climbing, den-building and development of children's individual physicality and gross motor skills. Gannon argues that, particularly in education for older young people (i.e. not early years), recognising the more-than-human demands that researchers look beyond

> taken-for-granted rational, cognitive, curriculum contexts to attend to surprising configurations where bodies, things, affect, desire, matter, imagination, and pedagogy collide to form new assemblages and possibilities (Gannon, 2016: 128).

I think about this collision of configurations and forming of new assemblages and possibilities often during this research process. Surprising new configurations form in ongoing and multiple ways, diffracting off one another, affecting us to think differently and for new possibilities for

learning and relating with the world to form. One such diffractive possibility takes place when I re-turn (Barad, 2014) to the footage of website sessions. I pay attention to Leo watching back a video he filmed using the GoPro on a selfie-stick and narrating along: '*I kissed a tree yeay! I kissed another tree yeay! The camera is in love with trees.'*



Moment 40:

Leo watching back video *of* Leo making the GoPro kiss the tree

Leo made the camera kiss many trees during his filming; as I have discussed in Chapter 4, he also makes the camera smell flowers and eat grass. In this rewatching of both the footage of him watching his footage and of the footage itself, I recognise new possibilities of learning between more-than-human actants, and particularly trees and children, that don't involve spades severing tree roots and worms. The GoPro also becomes an actant with extended sensory capacities, to affect, to touch, to kiss, to smell and participate in these encounters. In many encounters, Leo and other participants also involve an imagined YouTube audience, in noticing and responding to the more-than-human, to see and smell and sense other becomings. These relations involve children, walking and paying attention with GoPros, noticing, touching, responding, corresponding and creatively producing content and video work, kissing trees, imagining cameras in love with trees and enacting and extending care towards trees. I now move to discuss other relations of corresponding, care, touching and destructing, through relations with bricks.

6.3 Introducing 'Bricky'

Crazy, Max Ranger and Batman are reaching out their gloved hands to touch bricks forming a tall, red clay coloured wall in the south-east of the park. Woollen gloves run across flaky crumbling texture, with corse woollen fibres pulling off red dust, the dust sticking and accompanying woollen gloves as they bump along bricks. A loose brick at the bottom of the wall disturbed by Crazy and his poking stick, it wobbles around in its place in the wall, pieces of yellow-brown cement once solidly attached to the clay brick are crumbling off and breaking into smaller pieces. 'Brick!' Crazy announces and goes to pick up a brick, lying at the bottom of the wall in the grass. He picks it up with his black woollen gloved hands; it breaks in two before he can lift it fully off the ground. Both chunks are picked up for examination. Inside, stones, smooth pebbles and rich ochre-red sandy material are newly exposed, the outer surfaces of the brick are greyer and pitted with black mould and moss. He walks away from the wall cradling the brick and introduces it to his teacher and classmates, 'I'm going to call him Bricky' he states, 'Come and meet my new friend'.

This section brings other materials to the forefront of the research assemblage to consider other ways children learn with the more-than-human. During one of our walks with the Beech School, Max Ranger wanted to show us the wall. Our encounter with the wall was an embodied, sensory and material encounter. As we touched the wall, we touched the soft/hard sandy weathered composite bricks with moss and mould and spiders and insects. Gloved hands felt out the textures and matter; in touching the wall, the wall touches us back (Puig de la Bellacasa, 2017), staying with us, crumbled off in fine particles, attaching to bodies and clothing. Though we didn't know it at the time, this wall was the only remaining part of the walled garden from the oldest of the three former estates in the park. The site of the house dates back to the 1700s (Pisolkar, 2018) and this wall (of which only this one linear section remains) once enclosed a formal rose and kitchen garden. The former owners of the estate sold the property during the 1890s and the majority of the house was pulled down (before being eventually fully demolished in the 1960s); the free-standing wall remains as the only physical structure dating back to the 1700s.

A small chunk of one of the bricks that had fallen out of the wall became part of our assemblage over the next few walking sessions as Crazy picked up the chunk and began to

introduce it to the group as Bricky, holding Bricky up close to the camera and cradling Bricky in his hands and arms (see Moment 41). Over the following hours and subsequent three weeks of walking, Bricky became a companion of the group. In this section, I want to discuss this companionship and its anthropomorphizing. In Bricky's first walk with us, he is introduced to everyone, including the GoPro camera; accompanies Crazy as we walk around the park; is thrown into a hole by Max Ranger; pulled out by Crazy exclaiming '*Bricky is still alive'*; '*drowns*' in the boggy muddy water; is '*saved*' by Aviary who reaches his hand in the unknown water pulling Bricky out; is repeatedly thrown in and out of a section of dammed-up stream water; and is finally '*buried*' back in the hole and covered in grass and sticks for the week, until next time. Two weeks later, Bricky is '*recovered*' from the hole and again cuddled, Bricky had '*survived*'; during this walk Bricky is then smashed apart by Crazy and a stick, disintegrating and turning into dust; is dropped onto hard soil to shatter and eventually discarded as a deconstructed brick - stones, pebbles, dust, clay and sand spilling out across the soil.

Moment 41: meeting Bricky

I will discuss the weathering of Bricky and Crazy in the following section, but here I want to consider this brick as 'Bricky' and why it might matter in relation to our learning with materialities. Pauliina Rautio (2013) argues that humans anthropomorphise as a 'species-specific' practice of relating to environments and of articulating 'interspecies co-existence' (p. 446). Anthropocentrism, when considered in terms of a hierarchical and human-dominant perspective is often considered negative and something for humans to move away from or

grow out of, particularly within environmental education wishing to decentre the child (Malone, 2016). However, Rautio argues that anthropocentrism - when considered as the default biophysical condition of being human - is just how we are in our species-specific relation to the world (Rautio, 2013). Particularly for children, Rautio argues, following Bennett (2010), this 'aesthetic-affective openness' is an openness to the potential agency of non-humans and a 'sensuous enchantment' of the more-than-human forces (ibid: 395). For Rautio, to anthropomorphise more-than-human entities is our way of relating to the more-than-human. Tim Ingold does this in his narrative of the 'birth' of the stone:

> I am the resurrection of life's old bones, born into another time. I am the flesh of my mother, the gestating earth; and of the seed of my father, the ancient sea. I was delivered in a quarry. It was not an easy birth; they had to hack me out (Ingold, 2021: 135).

Rautio argues this conceptualisation of our surroundings as if human helps to open relations between entities and 'yields' agency to the nonhuman (Rautio, 2013: 450). Decentring oneself through giving other entities agency by anthropomorphising them is to 'exist in communication with the world' (ibid). Ingold's writing from the perspective of a stone does not attribute human-like agency and feeling to the stone:

> When humans reach out to touch me, I do not touch them back (…) Let humans touch me and sit on me all they like; none of this will make me more like them (Ingold, 2021: 139).

It is important to recognise here that this conceptualisation of 'communication with the world' is one that stems from a Western epistemological perspective and that Indigenous knowledges and epistemologies of relation and reciprocity with the world have longer, expansive and significant histories and have been continuously practiced across Indigenous communities in nuanced and diverse ways for far longer than Western notions of agential nonhumans have been theorised. The scholarship and practice of Indigenous peoples is not to

be appropriated by Western scholars and poorly attributed to young people's relating to a brick. However, as the Anglo-Western academic world begins to acknowledge the need to differently consider human relationship with the world, it is through material-discursive and socio-material approaches that different relations might be conceptualised. It is therefore possible to consider Bricky, who experiences drowning, living, being saved, being buried and ultimately being crushed is extending agency to materials and Crazy, an intra-active way of children relating and communicating with the world. Rautio argues that paying attention to the ways in which children 'make themselves available to their material surroundings - such as humanising everything around them' (Rautio, 2013: 454) is to recognise that we are already always nature and that we express this through our species-specific anthropomorphising. Furthermore, Rautio and Winston (2015) consider play as an intra-active knowing and being and an entanglement of the 'congregational agency of beings and things, material and immaterial' (p. 20). Blaise and Ryan (2019) further describe Lenz-Taguchi's (2010) example of materialities coming 'alive' whereby an intra-active pedagogy

> is employed by shifting the focus from interpersonal interactions between the teacher and the boys and how this supports learning, to the multiple intra-active processes taking place in-between children and the materials and children's meaning making (Blaise and Ryan, 2019: 90).

In child-matter relations, through play, intra-action sustains an openness to children's environments, allowing for the agential potential of the more-than-human and the material to intra-act, to respond and to affect. As I will extend in the following section, Bricky affects this relation through sticking with and crumbling off onto Crazy and his friends; Bricky stains clothes and deposits sandy residues on hands and gloves.

In this story, Bricky and Crazy could instead become, for a time, 'odd-kin', or 'queer kin' following Haraway (2016). I am unsure about whether this thinking of a brick as queer kin would misinterpret and conflate the term as Haraway intended it to be used. However, I am reminded that Haraway wants us to re-imagine, to speculate and to think differently with the

theoretical tools she is creating, so I am going to take the brick and the child as queer kin and see where we end up. I am not interested in this as an answer but instead speculating with this proposal and what it could instead mean for learning with this child-brick relation. Haraway uses the notion of queer kin in order to make kin mean something 'more than entities tied by ancestry or genealogy' (Haraway, 2016: 103). As such, kin becomes 'making kind' with assemblages of 'critters', as Haraway terms a whole mix of living things and things of this earth. A reason for this making of kin outside of genealogy, Haraway argues, is because it matters to whom we are responsible. Merrick (2017) highlights that, for Haraway, kin are co-actors and through practices of queer kinship, humans and non-humans co-construct naturecultures. What kind of response-abilities does kinship forming outside of genealogies create and what does that then do in terms of living and learning within troubled times or, as Haraway puts it 'staying with the trouble'?

Affrica Taylor (2013) uses Haraway's 'queer kin' concept in common worlds pedagogical thinking, as a tool for thinking with the various uneven, complex and odd relations built across species that don't rely on dynamics of domination and mastery (e.g. with 'pets') or romanticised, minimized or anthropomorphized dynamics between innocent child and animal (ibid: 82). Here, Taylor differs from Rautio in her positioning of anthropomorphism but perhaps Bricky can be both anthropomorphised (as Rautio argues is our species-specific way of extending communication with the world, rather than dominance over) and temporary odd kin. Jane Bennett states:

> 'a touch of anthropomorphism, (then), can catalyse a sensibility that finds a world filled not with ontologically distinct categories of being (subjects and objects) but with variously composed materialities that form confederations' (Bennett, 2010: 99).

Haraway talks of queer kin relations that are durable and mutual (notably between herself and her dog), and therefore arguably the child-brick relation is not a kin relation in that Bricky does not demand kin with the child, but equally, in extending (temporary and imperfect) care towards Bricky, is the child becoming attentive to others in ways which also extend beyond

the geological material towards other more-than-humans? As Taylor argues, Haraway uses 'queer kin' 'liberally and consistently' as a term to describe 'boundary crossing significant relationships including relations that produce hybrid forms (like cyborgs), the relations that humans have with technologies … and companion species relations' (Taylor, 2013: 82). I wonder if we can make kinship with geological minerals and materials in ways that matter regarding their implication within understandings of extraction use of the material for construction and relation to our polluting and dumping of materials. And if we can, what does it look like and what does it do? Extending this kinship idea to further include the liveliness and vitality of bricks (as I do in section 6.4, following Cullen, 2020 but also Springgay and Truman, 2017) further matters in terms of reconsidering the ways in which we understand the geological relation and learn with bricks, stones and geologic matter. This matters as a speculative alternative to the Minecraft relation to minerals and matter as resource to be mined and quarried (that I shall discuss in section 6.5). Minecraft and its extractivist framing of resources and minerals figured prominently in the children's performances of live 'gaming' (Dezuanni et al., 2015) and can be seen in the processes of the latter destruction of Bricky to extract stones. I want to hold in tension these different ways of relating, recognising that staying with the trouble of this child-brick relation requires considering their relation as all-at-once anthropomorphic, extractivist and possible odd-kin, all and nothing, all at once.

As I discuss further in the following section, Bricky experiences violence and is crushed, shattered and deformed; the destructive tendencies performed through the smashing and dissecting of the brick to its component materials. In this, it further speaks to Taylor and Pacini-Ketchabaw's (2015; 2017) discussion of the non-innocent relations between child and ant, or child and kangaroo (see also Hadfield-Hill and Zara, 2019b) and the co-shaping (Pacini-Ketchabaw, 2013) of both the child and the brick. This reckoning with death and destruction is a confrontation with the extractivist ways in which humans are often taught to engage with environments, taking apart and pulling out what is desired, wanted and 'needed'. The children drown and bury Bricky, but they also rescue and save and return to Bricky. This is, following Taylor, arguably a human-centred situating of the child as saviour but also, following Rautio,

is it an opportunity to consider learning and communication with the world and the more-than-human?

6.4 Weathering Bricky

> *Bricky is dropped on the hard, compacted soil under the large oak tree. Crazy stands over, legs with a wide stance, long stick in hand. He pulls the stick back in the air and smashes it down with force onto the brick. Crazy is smashing Bricky to get a stone out. He comes to show me the extracted stone. Bricky smears all down Crazy's wet camouflage coat, streaks of brown and red sand and clay darken the light camo print. Bricky is crumbling, dissolving, disintegrating and soaking into sodden black woollen gloves.*

I want to continue storying with Bricky to return to and extend the relation to the geosocial formation and weathering of bricks briefly introduced in 6.3. Beth Cullen (2020) considers the 'constellations' of weathering bricks, detailing how weathering and weather systems are involved in producing and transforming materials. Bricks become 'just a moment in the circulation and assembling of matter' (ibid: 865), weathering from sediment to clay, clay to brick and brick to sediment (ibid; 867). Ingold, discussing stone, considers its surface as a 'veil' in that inside and outside are not separate, inside the massy composition of 'materials drawn from earth' and outside is the atmosphere: 'mass and atmosphere are woven together in weathering' (Ingold, 2021: 137). Paying attention to the weathering processes and as well as 'meteorological mobilities' involved, Cullen argues, acknowledge the liveliness and agential potential of the brick as transformative, always in flow and movement. Attention towards the geologic situates the human within the continually changing earth systems so that nothing is stable or linear (Clark and Yusoff, 2017). Springgay and Truman (2017) differently consider the vitality of rocks through Deleuze and Guattari's concept of 'pure immanence', as matter-movement which means that:

> rather than thinking about rocks as lively because of human imbued characteristics such as a soul, rocks are animate because matter-movement exists in all things (Springgay and Truman, 2017: 857).

Thus, the energy of rocks and thus bricks, is comprised of the energy of the minerals, metals, composite materials, such as sand, clay, stones; the energy and vitality bricks, stones, rocks, comes from inside of the rock. Thus, following Bennett (2010), for Springgay and Truman, stone's vitality is through the component atoms which are in constant 'quivering' movement. This, they argue 'unhinges the concept of affect from the human' (Springgay and Truman, 2017: 858), whereby affect is created through encounters (ibid). It further destablises the idea of rocks, bricks or stones as being solid, stable, inert. In fact, Springgay and Truman, (ibid) further argue that stones are only 'inert when considered anthropocentrically' (p, 857), due to the speed and scale at which this vitality is continuing, thus being imperceptible on a human-scale. Therefore, while children may anthropomorphise Bricky in a species-specific way of coming to know the world, the brick's vitality exists separately from this human-centric approach, as already internal, ongoing in quivering energy of matter-movement and is affective in the kinds of encounters and learning *with* stones and bricks and rocks.

Kind et al. (2014) consider what happens when we see materials as events, not as lifeless objects (p.1) and argue for 'experimentation' that also includes materials in the 'flow of experience' so that humans are therefore not separate from the world (ibid: 3). Considering movement, rhythms and intensities of flows as what makes the possibilities of life and that 'materials are always in the midst of becoming something else' (ibid), then bricks become agential in relation with children not (only) as the anthropomorphised Bricky, or through internal vitality of matter-movement of the minerals, atoms and metals within the stones, sands and composite of the brick, but also through the event of the brick weathering, eroding, crumbling, dissolving, rubbing off and soaking into clothes, bodies and the earth. As Cullen argues, bricks become and unbecome, through relation of weathering, earth and human entanglement and energies and are in constant processes of decaying, crumbling, as a 'thing of the earth' (p. 874). Paying attention to the different tempos of weathering and decay (following Hennessey and Rooney, 2021) opens us up to more than human-time, to being in relation with the processes of other vital materialities and thus shifts away from solely thinking with human-time. This brings us into relations with stones, minerals and bricks in new ways. As I have discussed in Chapter 5, we not only learn with weathering through weathering-places

and weather wanderings, but we also here learn with weathering materialities. Yet it is not only through attention to weathering relations and processes that the brick matters in this event.

Hadfield-Hill and Zara (2019) consider children as 'geological agents', arguing that children are capable of 'geomorphic changes', that they are themselves co-constituted with 'fossil-fuel genealogies' (Nxumalo, 2017, in Hadfield-Hill and Zara, 2019: 5) and that, thirdly, they are geological subjects related to other geological forces (ibid). I have already touched on this geological relation through our recognition of the biomagnetite found within humans and other animals, biological and geological matter (discussed in section 6.2). Here, considering children and geological agents in relation to bricks highlights how they are capable of 'geomorphic changes' (ibid), affecting and affected by geological matter in their embodied intra-actions. This further relates to the section below where participants perform Minecraft. By troubling these relations in terms of how we understand and relate with bricks, stones, rocks and minerals, our learning with the world as in flow, vibrant, lively and relational brings into question the dominant earth as resource narrative.

The crumbling process of weathering is temporality sped up through intra-action between Crazy and the brick, smashing and violently breaking apart, thus the brick's temporary, or impermanent existence, as a brick, is affected and accelerated through humans as 'agents of weathering' (Ingold, 2021: 138) and as 'geological agents' (Hadfield-Hill and Zara, 2019) as well as the ongoing weathering with the stick, the glove, the rain, the sun, the wind and the earth. This speaks also to the multiple temporalities that Kind et al. (2014) recognise as ongoing in relation to the material. That children can at once both extend relation and agency to the geological and the material and yet accelerate temporal erosive and destructive processes is inherent in the non-innocent relations of naturecultures.

6.5 Performing Minecraft

In this section, I develop the geologic relations and considerations of bricks, minerals and stones as vibrant and lively, to trouble the digital practices of Minecraft. Participants sometimes performed playing Minecraft in 'real life', using their fists or sticks as hammers and pickaxes to break stones out of exposed tree roots (see Moment 42), or to break up, strength-test and extract 'gems', stones and minerals from the earth. A large oak tree, a small tree stump and the compacted soil beneath the tree became a 'quarry' and a 'workshop' for one group, where participants would hammer on the bark and the soil and search the ground for clues of treasure, often collecting them in the 'workshop' (see Moment 43). In this final articulation of digital (gaming) practices entangling with place and the material, yet again the extractivist, resource-based conception of the earth and of geology is evident. Gems and minerals become objects of 'value' in the Minecraft 'workshop'. Quarrying and hammering the ground, and as described above, smashing apart bricks and earth all became part of real-life Minecraft, crafting and shaping these 'things of the earth' (Cullen, 2020).

Moment 42: Dino and Leo performing Minecraft hammering their fists on dried stony-soil. Dino calls '*Guys, can somebody pass me a pickaxe?*'

Minecraft, the digital computer game, is the best-selling video game of all time. It is a 'non-linear', 'sandbox' game (Sharp, 2017) with no 'right' way to play; players extract or 'mine' raw materials, make tools and equipment to construct buildings and worlds from their extracted materials to 'build and survive in their world' (Short, 2012 in Sharp, 2017). Short highlights how in 'survival' mode, players are placed 'on a world … consisting of biomes containing plains,

mountains, caves, desert and bodies of water' and are attacked by 'mobs' while trying to create a shelter to survive, whereas in 'creative' mode, players just 'build' worlds (Short, 2012: 55). 'Resources' available include wood, cobblestone, stone, charcoal, water and gravel; 'ores' include coal ore, coal, iron ore and gold ore (Sharp, 2017: 15). Sharp highlights how ores within Minecraft are 'an important resource as they allow players to make tools and armour' (ibid: 15).

Much of the educational literature concerning Minecraft highlights its application for learning in schools (including in spatial geometry, planning, language, geology, informatics, chemistry, physics, geography) (Short, 2012; Sharp, 2017; Nebel et al., 2016), as well as its accessibility for diverse learning and social needs (Nebel et al., 2016; Dezuanni et al., 2015). Short considers educational versions of the game as teaching Harding's 'Tragedy of the Commons' as when too many players 'inhabit the same areas' and use the same resources, they become depleted (Short, 2012: 56). In this framing, the ecology and biomes are considered as resources for human extraction and use. As Nebel et al. highlight, when discussing the 'benefits' of Minecraft in relation to ecology education

> (t)he player can use this system to create artificial crop farms and optimize this system for his or her benefit; thus, he or she participates in changing the environment (Nebel et al., 2016: 359).

I want to consider our relation to 'real-life' Minecraft more in relation to Brazelton (2020) who critiques Minecraft as 'a vastly impactful digital text of settler colonialism' (p. 491). Minecraft, in its digital formation and in our encounter with it as 'real-life', performed in the park, positions the player, (or in our research, the child participant) in an extractive and human-centred relation to the more-than-human world. Brazelton further highlights, the 'Anglo-Western imagery' of the game and the 'transplantation of European neo-colonies which resemble and seek to recreate feudal/industrialising European life' (Brazelton, 2020: 493). Jones (2021) highlights that

> critical scholars are acutely sensitive to tropes of conquest, yet exploration, subjugation and mastery are at the heart of many games, though without meaningfully depicting the material implications of such activity (p 69).

He further argues that games studies 'has made surprisingly little use of postcolonial approaches' (ibid). Huuhka, (2020) reiterates the 'inherent colonialism' of the game, with the objective to 'expand, own, and possess' (p. 232). Which, while gaming, entangle with 'immersive pleasure', thus 'strengthening and enforcing harmful, capitalist, and anthropocentric power structures' (ibid: 233).

I would argue that the embodied, 'real-life' performing of Minecraft within our research walks also articulates the pervasiveness of the narratives of destructive and hegemonic neo-colonial and capitalist industries, of fossil fuel mining, of finite and precious mineral quarrying within our Anglo-Western educational and gaming discourses and thus matters for our relations and learning with the world. Jones (2020) argues that games, through their entangling of the physical and virtual embodiment, help to consider 'participants' relationships with their everyday surroundings outside those games' (p. 80). I would agree that through the real-life Minecrafting that some participants performed while in the park, one articulation of children's relations to materials such as bricks, stones, soils and the earth can be considered. Children were both performing Minecraft and its extractivist language of mining and quarrying *and*, following Rautio, existing in communication with the world through anthropomorphising Bricky, *and* experimenting with weathering bricks and materialities in ways that relate an ongoing and emerging vitality and liveliness of the more-than-human (following Kind and Pacini-Ketchabaw, 2014). Furthermore, relating biomagnetite to migration, movement and reproduction acknowledged the vitality of the more-than-human. However, this was in ongoing tension with the underlying extractivist logics of considering earth as resource, inherent in most of these encounters. These tensions are multiple, already and ongoing. Brazelton argues that it is

> critical, then, for cultural geographers committed to projects of decolonialization to consider terrains and sites of exploration not contained on traditional maps' and further that 'anti-colonial cultural geographers may begin to interpret virtual spaces as a valid, if not necessary, site of criticism and creation (Brazelton, 2020: 495).

While we have not begun to address the terrains and digital spaces in relation to decolonialization, I have begun to highlight some of the underlying logics that I see surface within our encounters that reproduce and reinforce extractivist thinking and further reinforce learning about minerals, rock and stones, for example as an inert resource. This further links into the troubling of events such as tree planting whereby considering actions from a relational and entangled approach, opens up possibility to consider the impacts of violent actions. I would argue that there should be a necessary commitment within environmental education research (and pedagogy), as well as geographies of children and young people and the interdisciplinary studies of childhood to acknowledge these processes and stay with these tensions. While this research did not set out to explicitly pay attention to the relation between digital gaming and online knowledges of children, and their relation to ongoing extractivist logics, these concerns manifest in all encounters and all relations. These relations matter for environmental educations and learning with children and techno-naturecultures.

6.6 Conclusion

In this chapter we have moved underground and towards the geologic and earth(l)y minerals, soils, tree roots, stones and sandy bricks. I have introduced further moments and encounters from our research-creation walking research to specifically draw attention to the ongoing tensions and underlying persistence of certain human-centric and troubling logics (Common Worlds Research Collective, 2020; Haraway, 2016). These have included magnet fishing as at once an extractivist event, pulling magnetite minerals out of streams, *and* also entangling children with the more-than-human through shared biosocial commonalities of migration and movement. It has included tree planting as both violent *and* opening up the co-shapings of children and the multiple temporalities of forest-time (Pacini-Ketchabaw, 2013). It has

considered anthropomorphising Bricky as both a 'species-specific' (Rautio, 2013a) way of relating with the world as lively and animate *and* considered stones as 'matter-movement', vibrant internally through the quivering of atoms (Springgay and Truman, 2017) *and* exposed the destructive forces of children as interruptive forces and geological agents (Hadfield-Hill and Zara, 2019). It has presented performing Minecraft as perpetuating extractivist, neo-colonial understanding of earth as resource of value as extracted 'gems' and objects (Brazelton, 2020).

I have therefore extended our processes of learning *with* natures to include learning with the multiple temporalities of forest-time, learning with the geologic and with the digital practices of games such as Minecraft in relation with the geologic. The tensions of our emergent magnet fishing method are productive in demanding I pay attention to unlearning (Alaimo, 2016). Through thinking-making-doing with magnet fishing I come to learn with it as an event of extractivist logics. While paying attention to the affirming of inquiries and curiosities in terms of the process of our underwater inquiries, I desired, as did the children, to collaboratively experiment with these magnets and waters. Collectively we were curious about what matter these waters archived and where this inquiry might take us. However, through further learning with magnetite, including its wider entangling as a rare-earth mineral within global systems of mining, extraction and unequally (environmentally and socio-culturally) destructive practices of production, I return to reconsider the ethical processes entangled with this inquiry. As Gallagher (2020) proposes, paying attention to the geologies of media demands consideration beyond its *uses* towards the production and life-cycle of medias (in which I include neodymium magnets but could also include the production and geologies of YouTube softwares as well as GoPros).

This attention to the geologic further extends to thinking critically with the processes of tree planting and Minecraft gaming. Thinking beyond the human-scale, or the altruistic intent of the tree planting and attending to the other, multi-scalar, multi-temporal and multispecies relations within the tree planting encounter opens this up to wider multispecies vulnerabilities and tensions. While of course tree planting is broadly understood as a necessary and

productive act and I am not critiquing the action per se, I am highlighting the messy and non-innocent relations that affect other more-than-human vitalities and lifeworlds (following a common worlds approach). Equally, and differently, through paying attention to the inherent and underlying logics within performing Minecrafting, it is possible to open out our learning in relation to the dominant and persistent extractivist logics and treatment of earth as resource.

7 CONCLUSION

This research has been concerned with opening up possibilities for other ways of learning within environmental educations. It has taken as its point of departure the dominant ongoing discourse of 'nature connection', which has become heavily influential, specifically in environmental education and learning outside and within research aiming to measure, quantify and explain both the disconnection *and* the benefits of reconnection. As I argued in introducing this research, I consider this nature connection discourse (and frequently how it is employed) to be somewhat reductive, in both the kinds of interactions taking place; of the kinds of natures that are imagined; *and* of the implications of the separation of nature from culture and technologies both for how we learn and for how we might relate with the world.

In Chapter 1, I stated that this research would experiment with various processual, conceptual, and practical proposals for learning with urban woodland ecologies, technologies, place, materialities, bodies, affect and more-than-humans. Proposals within this research have included, firstly, working with the processual modality of research-creation as an approach to knowledge generation that is more than language and emerges through walking, filming, moving and creating. Secondly, the conceptual proposal of learning *with* technologies, place and the more-than-human, that has opened up possibilities for the 'withness' of the technologies and the digital touching of footage. Finally, the practical proposal of opening possibilities for emergent methods, encounters and inquiries, such as working with the magnet, learning with bricks and tree planting, thus facilitating inquiry which is open-ended, attentive to materialities and collaborative. Furthermore, inquiry which takes seriously the entanglement of the techno-naturecultures in children's practices. These proposals will broadly structure this conclusion.

In my introduction (section 1.3), I also highlighted a variety of 'other' possible ways of approaching and practicing environmental educations, through learning *with.* These included: other than adult-led, other than outcomes-based, other than white, middle-class, able-bodied, neuro-typical children, other than (solely) child-centred, other than against (digital)

technologies, other than based on extractivist, thinking towards materialities; other than science-based and curriculum-based teaching; and other than learning *about* nature or learning *in* nature but instead learning *with* materialities and nature(s). I will also respond to some of these provocations in this conclusion. I do this through separating out various 'learning *with*' sections, that will address some of the 'other than' phrases above. I acknowledge separating technologies from materialities is somewhat arbitrary but do so below in order to make distinct points. This is not (following Pacini-Ketchabaw et al., 2016) to make grandiose claims of findings or universal recommendations, but rather to articulate the kinds of processes and inquiries that have been productive in our situated research encounters and that, therefore, might be productive for further research and practitioners.

7.1 Learning *with* research-creation processes

Natalie Loveless asks us to think about what research-creation projects *do,* that not-research-creation projects do not or cannot (Feminist Media Studio, 2021). In terms of processes, a research-creation modality enabled four key differences in my research approach: firstly, working with the processual *thinking-making-doing* modality, this research has encouraged a **thinking beyond outcomes-based learning and research,** and has pushed against the need to qualify, quantify, validate, evidence, and prove learning objectives or individual child development progression through the project. Instead, by approaching this work as processual (Pahl and Pool, 2021), without focus on an end set of 'results' to validate, this research became open to experimental, imperfect, speculative and emergent methods and research-creation (Sweet, Nurminen and Koro-Ljungberg, 2020). These methods have resulted in more questions than answers and many tensions which I have discussed throughout. This attends to both post-qualitative approaches to researching (St Pierre, 2016) and to Manning's understanding of research-creation as a 'technique' rather than a method as methods '*stop process and potential in its tracks'* (Sweet, Nurjinen and Koro-Ljungberg, 2020).

Secondly, and relatedly, taking **seriously the inquiries that emerged while walking, filming and doing**, has entangled the hydrologic, the geologic, the arboreal, pedologic as well as the

embodied, affective and more-than-human. As Springgay and Truman argue 'walking activates the creation of concepts. To walk is to 'move-with thought' (Springgay and Truman, 2019: 131). Our walking activated speculative story telling about rusting metals and technologies which shifted our thinking and enabled us to 'lean closer' (Berry et al., 2020), paying more attention to, for example, the entangling of stories from online videos and digital content with our embodied and affective becoming while walking.

Research-creation has, thirdly, enabled this project to **shift the power relations of researcher/participants** and also between teacher / adult and student / child. Rather than working with an adult-led, outcomes-based and hierarchical relation, this was a collaborative, co-produced project, with a 'focus on what was to come, the incomplete and the ongoing' (Pahl and Pool, 2021: 4). Knowledge production, therefore, emerged in processes, movements, atmospheres, performances, stories, proposals, walking, filming, and gestures, including, but also more than, language. Sustaining this collaborative and processual approach facilitated the taking seriously of children's emergent inquiries with place and techno-naturecultures, in ways that research focused on developmental and representational approaches to children and natures often does not. These included the proposals to 'go behind the scenes', to 'wonder how the park came alive' and to inquire with 'the woods full of wonder'. These proposals propelled our inquiry, opening a curiosity (Georgis and Matthews, 2021), through active participation (Boyd, 2017) with the world and, thus, a 'moving along with' the world in real-time (Ingold, 2021: 7).

Fourthly, through walking as research-creation and through walking with difference, it has further **queered both the dominant trope of the 'walker'** (Truman and Springgay, 2019) and the **dominant 'purpose' of walking** in school as linear, with the purpose of progressing towards better health, wellbeing, and mobility, constricted within ideas of linear and chronological time (Springgay and Truman, 2019a; 2019b). Through collaborating with diverse young people, from underrepresented backgrounds, many with disabilities, the research disrupted the 'normative' child within research and centres the experiences and knowledges of those often marginalised from contributing to research. This matters in opening possibilities

of inclusive learning approaches, that not only acknowledge the diversity of learners but also the diversity of processes of learning, including affective, embodied, multisensory, material, speculative and creative ways that learning with natures come to matter. Opening walking to be more than for health and wellbeing opened up possibilities for learning with performed, affective and embodied ways in which the digital entangled with watery bodies, weathering-places and the geologic, arboreal and pedologic.

7.2 Learning *with* (digital) technologies

I began this research from a position that there exist multiple non-adultist and non-outcomes based processual ways in which children learn with technologies. Specifically, children's learning with digital platforms, such as YouTube, and interaction with other digital technologies, such as phones, iPads, cameras, gaming softwares as well as broader conceptions of technologies, such as the magnets, are often dismissed as being counter-productive and damaging to children's health and wellbeing as well as to their 'connection' to nature (Helms et al., 2019). Technologies are rarely, if ever, within these discourses, considered as companions and collaborators. Children's digital practices and knowledges from gaming and platforms like YouTube are rarely acknowledged for their productive entanglement with learning, materialities and nature(s). Furthermore, the ongoing everyday 'waste' of technologies such as rusting car parts, fridges, go-karts, plastics and metals are rarely engaged with outside of individualised discourses of recycling and (not) dropping litter. Paying attention to how (digital) technologies, online platforms, processual learning and unsettling materialities do, in fact, always (and already) entangle with children's learning, I will now further discuss learning with technologies. I recognise this a somewhat artificial separation from the below discussion on materialities, but I will address some l provocations and contributions here and attend to materialities more broadly below.

Firstly, this research has **extended approaches to the *withness* of learning with GoPro** as collaborator (following Kind, 2013), in relational 'writing' assemblages (Wargo, 2018), as an extension of the body and as companion (following Land et al., 2020). As I outlined in Chapter

2, there is little research attending to the relations between children and digital technologies, particularly focusing on learning with natures. While some research has begun to consider performing *with* GoPros (Wargo, 2018) and 'GoProing' (Clement, 2019) as particular assemblages that recognise the affective forces of the GoPro in shifting practices of walking, filming and creating, this research is still limited and generally does not address learning with natures. This research extends these ideas of 'withness'. The GoPro becomes a lively collaborator in experimentation with walking, inquiring, sensing, smelling, tasting and creating (Land et al. 2019; Kind, 2013). Technologies are thus not 'outside' of the world (Postqualitative Research, 2021). Differently from Wargo's attention to literacies, this work highlights, therefore how 'emergent technologies amplify the relational contours' (Wargo, 2018: 503) of learning with natures.

Secondly, and relatedly, **learning with GoPros also became learning *with* YouTube; a 'becoming YouTube'**. While existing research generally concerns the socio-cultural uses and digital literacies of children's *use* of YouTube (Tan, 2013; Neumann and Herodotou, 2020), there is limited research attending to the socio-material practices and performances with *becoming* YouTube(rs). This project further extends research digital technologies and platforms, to consider the lively performing with YouTube in affective assemblages of performances, narratives, vocabularies, embodied movements and proposals or invitations such as 'liking' and 'subscribing' and 'commenting down below'. In this sense, this research extends Neumann and Herodotou's (2020) acknowledgement of children's use of YouTube by differently (and inversely) acknowledging how children (in assemblage with GoPros and the more-than-human) were 'researching, creating, curating, sharing (and) showcasing' (p. 75) encounters by *becoming* YouTube.

A third contribution to literature concerning learning with technologies and the more-than-human, specifically with regards to becoming YouTube, differs from the above contribution. Participants as research-creators further **proposed research inquiries which entangled embodied learning with online video archives**, desiring to perform or practice events watched online. By this I am referring to the magnet fishing inquiry that emerged through

ongoing speculative storytelling of water bodies from online YouTube content (this also relates to performing Minecraft). This becomes *inquiring* with the practices of YouTubers and speculating with their digital archives in relation to the possibilities of watery bodies in our situated place. We become mutually concerned, vulnerable and response-able to both the digital 'waste stories' (Nxumalo and Rubin, 2018) as well as our situated waste stories in the park, entangling through spacetimematterings (Barad, 2010) in (digital) touching relation (as I will discuss in 7.3) with other places elsewhere.

Gillen and Kucirkova's (2018) notion of 'percolation' is useful here in considering how learning with online content percolates with learning in urban woodlands and parks (see also Horton and Kraftl, 2018 for percolating matter). As stories from YouTube videos *percolate*, trickle or filter through our research assemblage and entangle with our embodied learning, informal, at-home digital practices become productive. This extends my argument to learning being non-outcomes-based and open-ended – through opening up possibilities for learning with technologies and digital platforms to *percolate* with our research-creation, inquiries come to include the event of magnet fishing and come into relation with biomagnetite and other minerals, as well as diffract into speculative learning with metals, waste materials and polluted water bodies. Incorporating learning with (digital) technologies, shifts research related to technologies and online platforms away from 'digital literacies' and *uses* towards embodied, multisensory, more-than-human relational performances that entangle multiple online, digital, situated and global places. Rather than 'removing' (digital) technologies from outdoor learning, acknowledgement of how both digital technologies (such as GoPros) and practices (such as YouTube) *and* material technologies (such as car parts and rusting fridges) are already always part of learning as *techno-naturecultures* opens possibilities for then inquiring with the tensions inherent within this entanglement.

7.3 Learning *with* materialities

In terms of inquiring with learning as other than outcomes-focused, this research pushed learning with water, soils, trees, videos, beyond and away from curriculum-based, human-

centric learning towards embodied, sensory and processual learning through thinking, walking and doing in relation with materialities. I will now highlight four contributions to literatures concerning the hydro-logic and the geologic.

Firstly, this research contributes the figuration of the watery bodies of videos on YouTube as another, different consideration of water as archive (Neimanis, 2013; Berry et al., 2020). While others have powerfully articulated the unknowability of water as elusive, massy, murky and toxic (Horton and Kraftl, 2018; Berry et al., 2020), **through our learning with digital archives**, we learn with both the water bodies in the park and online as polluted, contaminated and full with rusting waste technologies. Learning with these digital archives alongside and entangled with the embodied learning with water in the park contributes to encountering water not only through embodied touching, but also through digital touching (Puig de la Bellacasa, 2017) of video footage and YouTube archives. Puig de la Bellacasa quotes Paterson (2006) arguing that through digital touching technologies 'others and things can be located far away but become "co-present"' (Paterson, 2006, in Puig de la Bellacasa, 2017, emphasis in original). This research has therefore, extended conceptualisation of digital touching technologies as extending matters of concerns and care to the digital touching of children responding and performing with digital water archives as they become 'co-present'.

Secondly, and relatedly, this shifts learning **towards an embodied, entangled and performed encounter with water as complex**. As Berry et al. (2020) argue, practitioners and educators commonly frame children's encounters with water as pure, magical, inspiring and beautiful. However, as they articulate, this decision to pursue narratives of purity 'has a tendency to clean up the less desirable place-stores we choose to forget' (p. 282). In our inquiries, we further trouble this dominant narrative of purity and beauty in both our 'going behind the scenes' through digital archives and walking with polluted bodies of water. Regarding learning *about* water, this is often restricted within curriculum to learning about measuring, transferring and containing and understanding water's properties (ibid) therefore omitting the ongoing complexities of pollution and contamination. Rather than ignoring these in pursuit of continuing narratives of innocent wonder and beauty (of both water and the child), we stay

with these troubles through walking with water, storying and magnet fishing. The framing of the child as innocent is also troubled through our extractivist event of magnet fishing. As Berry et al. (ibid) argue, referencing Isabelle Stengers, in understanding that the art of paying attention is to attend to what is already here, 'in leaning closer, it becomes visible that what is here may be past the point of a return to cleanliness; *already* it is contaminated' (ibid: 282, emphasis in original). Our 'leaning closer' incorporates the complexities of both digital archives and embodied encounters.

Through magnet fishing, we, thirdly, shift away from learning about geology as being focused on taxonomy, classification and properties. Instead, extractivist logics sit in tension with children **learning with magnetite as vital, lively and as affecting migration,** movement and reproduction for more-than-humans. This extends literatures concerning the relational entanglement of the human and the geologic, opening learning with geosocial formations (following Clark and Yusoff, 2017) that 'might help us to probe the richly layered formations we have inherited for the overlooked, marginalised or as unactualized geosocial possibilities murmuring within them' (ibid: 6). We come, through biomagnetite, to relate human experiences of migration and movement with those of the more-than-human, acknowledging our mutual vulnerabilities in these processes (Taylor and Pacini-Ketchabaw, 2015).

A fourth consideration for shifting learning towards being relational learning *with,* concerns various **approaches of corresponding and weathering *with* materialities** (Rooney, 2019). Children both become geological agents, 'tiny earth movers' (Hadfield-Hill and Zara, 2019) and 'agents of weathering' (Ingold, 2021: 138), accelerating and affecting the becoming and unbecoming (Cullen, 2020) of bricks. By anthropomorphising 'Bricky' as 'species-specific' (Rautio, 2013), and as ways of coming into relation with the world, children also learn with bricks. This making ourselves 'available' to the lively materiality of the world through intra-active processes of materialities 'coming alive' (Blaise and Ryan, 2019) shifts ways of learning with matter away from extractivist learning about matter as inert resource. By recognising the ways in which children come into relation with the world through their engagement with materialities we can pay more attention to the underlying tensions and persistent logics that

sustain relations with the more-than-human, which are not addressed in human-centric curriculum learning. For example, these corresponding practices were held in tension within this research, as I have highlighted how making Bricky 'alive', as well as weathering with bricks as vital and lively becomings, was performed alongside enacted 'real-life' Minecrafting, which again sustain the extractivist, colonial and human-centric mastery and logics of capitalism (Brazelton, 2020). There is little research regarding this framing of Minecraft in relation to children's learning with the more-than-human and the geologic. This matters in terms of understanding the broader ways in which, again, digital practices 'percolate' (Gillen and Kucirkova, 2018) with learning in ways that reinforce our relations to geological materials as resources, inert and for extraction. By witnessing this performing of Minecraft, we can, again lean in closer (Berry et al., 2020) to the extractivist logics, in order to then disrupt these within practices of learning with geological matter as lively.

7.4 Ongoing tensions and limitations of the research

There were some productive tensions that emerged through this research project, which I shall now discuss, as well as a short discussion of the limitations of the project. The tensions of learning *with* the more-than-human have woven through this research as I have questioned the persistent ways in which children (and myself, and the other adults within this research) continue to think and act in human-centric and extractivist relation with the earth as resource. This tension has troubled me throughout the project and, while not trying to resolve it, I want to consider how this research relates to Gallagher's (2020) argument for extending research beyond the *use* of media, towards acknowledging the geologies of media. Taking media to include digital technologies but also pushing this to include technologies such as neodymium magnets (as I discussed in section 6.1) and machine technologies such as cars, fridges, go-karts, guns, we should further consider how perhaps speculating with the rusting of metals in waters brings us to witness their enduring presence within bodies of water, even as they rust and degrade, or to witness their spilling out as oil slicks running down streets.

Acknowledging the tensions of learning with technologies whose geologies (following Gallagher, 2020) are entangled in unequal extra-sectional socio-material (Horton and Kraftl, 2018) global processes of production, consumption and after-life (such as the neodymium magnet), shifts this emergent methodology towards consideration of the ethical processes inherent within the production, consumption and degradation of these technologies. And further to the response-abilities of the research assemblage in discussing, troubling and confronting these processes. As this work has evolved, I have become more uneasy about only paying attention to magnet fishing as an emergent method and instead agree with Gallagher that future research should be concerned with the implications, ethics and consequences of working with neodymium magnets, or other digital technologies, including the GoPro, which all embody complex and unsettling production, consumption and after life processes. As Gallagher (2020) argues 'the reduction of 'human-technology relations to human practices (…) no longer seems tenable' at the 'exclusion of non-human actants' (p. 376). While this practice opened our learning to biomagnetite and its more-than-human entanglings, it also opened our learning to the persistence of extractivist logics.

As this project evolved, I became more interested in the entanglement of technologies with learning and how these technologies are, once you pay attention, always, already everywhere at different scales, forms, stages of life, rust, decay, erosion, spillage and in different affective and liminal states, as the ongoing waste of the world (Kraftl, 2020; Nxumalo and Rubin, 2018). Children's learning inquiries continued to pay attention with these different technologies in dynamic, speculative and surprising ways. There was much still to inquire with regarding these relations, and further research that extends the scope of these material entanglements in relation to techno-naturecultures is necessary. It was therefore a limitation that we did not manage to continue this project for the full year that had been intended, as Covid-19 stopped our research early.

This early stopping further preventing the project from being completed in a collaborative way, continuing with the co-analysis of footage and editing. As I have discussed, only one group from this research were able to collaborate in this video analysis; as a processual

method of co-analysis, I would like to extend this experimentation in future research projects as an productive approach to research-creation.

Towards the end of our time together, we had begun walking close to Highbury Hall and stories had begun about ruins and ghosts and figures associated with the hall. We had discussed visiting the hall and had begun thinking with the stone walls and dislodged ornate stones from the former gardens and rockeries. Slowly, Chamberlain, his former home, his landscaped formal gardens, speaking platform and the socio-material histories of this park were beginning to entangle with our inquiries. While this project could not continue these lines of flight, further research could extend these inquiries with technologies and place, staying with the trouble of these complex relations and further attending to the situated place and histories.

7.5 Proposals for learning *with*

I will finish by returning to the proposals which have threaded through this research, by means of proposing ways that future research might open possibilities for different ways of learning in *relation* with the more-than-human world. Approaching the woods being 'full of wonder' animates the more-than-human woodland and opens up possibilities for new and emergent relations. It suggests that we pay attention to what might surprise us or what we find curious and follow these inquiries. This is not to return to the romanticism of enchanting, pure woodlands, full of wonder and delight. Instead, this wonder opens up speculative relations regarding the unknown, and unknowable, (extending into canopies, underwater and underground) that become unsettling, complex, affective and vulnerable (Nxumalo and Rubin, 2018; Berry et al., 2020). This desire to approach this research and this woodland full with/of curiosity (both within themselves and with(in) the woodlands) establishes research as beginning from a curiosity Georgis and Matthews (2021). Thus, there were no foreclosed answers or learning outcomes; instead, by being open to relations with the socio-materialities of place, technologies and bodies, learning processes become inquiries with being curious and paying attention to affective goings on. As such, the second proposal of 'going behind the

scenes' enlivens the goings on with multiple layers, temporalities and materialities of the park, while also entangling the digital with the embodied in ways which open up to the vitality of the more-than-human and digital entanglements with the human.

Returning to the three phrases 'go behind the scenes', 'come to life' and 'wood full of wonders' that were proposed at the beginning of this project, opens processes which encourage us think otherwise about both the relations and the tensions inherent in relations to these places. Attention to the more-than-human shifts focus away from solely human-centred, developmentalist, neo-liberal and extractivist approaches to education and learning *in* nature and more towards the relational, curious, unknown and speculative ways of encountering and learning *with* digital technologies, materialities and natures.

8 LIST OF REFERENCES

Adams, S., Savahl, S., and Casas, F. (2016) 'The relationship between children's perceptions of the natural environment and their subjective well-being', *Children's Geographies,* 14 (6), pp. 641 - 655. doi: https://doi.org/10.1080/14733285.2016.1157571

Admin (2008) *Pulhamite? What's that?* Available at: https://highburyparkfriends.org.uk/wp/74_pulhamite-whats-that/ (Accessed on 16 July 2022)

Ahmed, S. (2008) 'Open Forum Imaginary Prohibitions: Some Preliminary Remarks on the Founding Gestures of the `New Materialism'', *European Journal of Women's Studies,* 15 (1), pp. 23 - 39. doi: https://doi.org/10.1177%2F1350506807084854

Ahmed, S. (2014) *The Cultural Politics of Emotion.* 2nd edition. Edinburgh: Edinburgh University Press.

Aitken, S. (2018) 'Children's Geographies: Tracing the Evolution and Involution of a Concept', *Geographical Review,* 108 (1), pp. 3-23. doi: https://doi.org/10.1111/gere.12289

Alaimo, S. (2010) *Bodily Natures: Science, Environment, and the Material Self.* Indiana: Indiana University Press.

Alaimo, S. (2016) *Exposed: Environmental Politics and Pleasures in Posthuman Times.* Minneapolis: University of Minnesota Press.

Alaimo, S. (2016a) 'Material Feminism in the Anthropocene' in Åsberg, C., and Braidotti, R. (eds) *A Feminist Companion to the Posthumanities.* Cham: Springer International Publishing, pp. 45 - 54.

Alaimo, S., and Hekman, S. (2008) 'Introduction: Emerging Models of Materiality in Feminist Theory', in Alaimo, S. and Hekman, S. (eds.) *Material Feminisms*. Bloomington and Indianapolis: University of Indiana Press, pp. 1 – 19.

Aneurin Smith, T., and Dunkley, R. (2018) 'Technology-nonhuman-child assemblages: reconceptualising rural childhood roaming', *Children's Geographies*, 16 (3), pp. 304 - 318. doi: https://doi.org/10.1080/14733285.2017.1407406

Änggård, E. (2015) 'Digital cameras: agents in research with children', *Children's Geographies*, 13 (1), pp. 1 - 13. doi: https://doi.org/10.1080/14733285.2013.827871

Arbuthnott, K., and Sutter, G. (2019) 'Songwriting for nature: increasing nature connection and well-being through musical creativity', *Environmental Education Research*, 25(9), pp. 1300 – 1318. doi: https://doi.org/10.1080/13504622.2019.1608425

Arnott, L., Palaiologou, I., and Gray, C. (2018) 'EDITORIAL: Digital devices, internet-enabled toys and digital games: The changing nature of young children's learning ecologies, experiences and pedagogies', *British Journal of Educational Technology,* 49 (5), pp. 803 - 806. doi: https://doi.org/10.1111/bjet.12676

Ballard, P. (1986) ''Rus in Urbe': Joseph Chamberlain's Gardens at Highbury, Moor Green Birmingham, 1879 – 1914', *History,* 14 (1), pp. 61 - 76. Available at: https://www.jstor.org/stable/1586818 (Accessed on 11 Jan 2022)

Baltazar-Soares, M., and Eizaguirre, C. (2017) 'Animal Navigation: The Eel's Magnetic Guide to the Gulf Stream', *Current Biology,* 27, pp. 592 - 12. doi: http://doi.org/10.1016/j.cub.2017.04.042

Banaclocha, M., Bókkon, I., and Banaclocha, H. (2010) 'Long-term memory in brain magnetite', *Medical Hypothesis*, 74 (2), pp. 254 - 7. doi: https://doi.org/10.1016/j.mehy.2009.09.024

Barad, K. (2003) 'Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter, *Signs,* 28 (3), pp. 801 - 831. Available at: https://www.jstor.org/stable/10.1086/345321 (Accessed on: 21 November 2018)

Barad, K. (2007) *Meeting the Universe Halfway: Quantum physics and the entanglement of matter and meaning.* Croydon: Duke University Press.

Barad, K. (2010) 'Quantum Entanglements and Hauntological Relations of Inheritance: Dis/continuities, SpaceTime Enfoldings, and Justice-to-Come', *Derrida Today*, 3 2, pp. 240 - 268. doi: https://doi.org/10.3366/drt.2010.0206

Barad, K. (2014) 'Diffracting Diffraction: Cutting Together-Apart', *Parallax*, 20 (3), pp. 168 - 187. doi: https://doi.org/10.1080/13534645.2014.927623

Barad, K. (2017) 'Troubling time/s and ecologies of nothingness: re-turning, re-membering, and facing the incalculable', *New Formations*, 92, pp. 56 - 86. doi: https://doi.org/10.3898/NEWF:92.05.2017

Beery, T., and Lekies, K. (2019) 'Childhood collecting in nature: quality experience in important places', *Children's Geographies,* 17 (1), pp. 118 - 131. doi: https://doi.org/10.1080/14733285.2018.1463431

Bennett, L. (2016) 'Thinking like a Brick: Posthumanism and Building Materials', in in Taylor, C. A., and Hughes, C. (eds) *Posthuman Research Practices in Education.* Hampshire: Palgrave Macmillan, pp. 58 – 74.

Bennett, J. (2010) *Vibrant Matter: a political ecology of things.* Durham: Duke University Press.

Berry, A., Vintimilla, C. D., and Pacini-Ketchabaw, V. (2020) 'Interrupting Purity in Andean Early Childhood Education: Documenting the Impurities of a River', *Equity & Excellence in Education*, 53 (3), pp. 276 - 287. doi: https://doi.org/10.1080/10665684.2020.1785974

Birmingham City Council (2019) *Deprivation in Birmingham: Analysis of the 2019 Indices of Deprivation.* Available at: https://www.birmingham.gov.uk/downloads/file/2533/index_of_deprivation_2019 (Accessed on 27 July 2022)

Birmingham City Council (2022) *Our Future Nature City Plan.* Available at: https://www.birmingham.gov.uk/downloads/file/21805/city_of_nature_plan_-_february_2022 (Accessed on 22 July 2022)

Blackwell, S. (2015) *Impacts of Long Term Forest School Programmes on Children's Resilience, Confidence and Wellbeing.* Available at: https://getchildrenoutdoors.files.wordpress.com/2015/06/impacts-of-long-term-forest-schools-programmes-on-childrens-resilience-confidence-and-wellbeing.pdf (Accessed on 27 July 2022)

Blaise, M., Banerjee, B., Pacini-Ketchabaw, V., and Taylor, A. (2013) 'Researching the Naturecultures of Postcolonial Childhoods', *Global Studies of Childhood*, 3 (4), pp. 350 - 354. doi: http://doi.org/10.2304/gsch.2013.3.4.350

Blaise, M., Rooney, T., and Pollitt, J. (2019) 'Weather Wanderings', *Journal of Public Pedagogies*, 4, pp. 165 – 170. Available at: http://www.publicpedagogies.org/wp-content/uploads/2019/11/16-Blaise.pdf (Accessed 09 July 2022)

Blaise, M., and Ryan, S. (2020) 'Engaging with Critical Theories and the Early Childhood Curriculum' in Mueller, J. and File, N. (eds.) *Curriculum in Early Childhood Education: Re-Examined, Reclaimed, Renewed.* Second edition. Oxon: Routledge, pp. 80 - 95.

Blazek, M., Smith, F., Lemešová, M., and Hricová, P. (2015) 'Ethics of care across professional and everyday positionalities: The (un)expected impacts of participatory video with young female carers in Slovakia', *Geoforum*, 61, pp. 45 - 55. doi: http://dx.doi.org/10.1016/j.geoforum.2015.02.017

Bottesch, M., Gerlach, G., Halbach, M., Bally, A., Kingsford, M., and Mouritsen, H. (2016) 'A magnetic compass that might help coral reef fish larvae return to their natal reef', *Current Biology,* 26, pp. 1247 - 1271. doi: https://doi.org/10.1016/j.mehy.2009.09.024

Boucher, K. (2019) 'Responding to Reggio Emilia: Researching with Materials to Cultivate an Ecology of Practice in Early Childhood Education', *Journal of Childhood Studies,* 44 (5), pp. 44 - 53. doi: https://doi.org/10.18357/jcs00019331

Boyd, C. (2017) *Non-representational Geographies of Therapeutic Art Making: Thinking Through Practice.* Cham: Palgrave Macmillan.

Bozalek, V., Mitchell, V., Dison, A., and Alperstein, M. (2016) 'A diffractive reading of dialogical feedback through the political ethics of care', *Teaching in Higher Education*, 21 (7), pp. 825 - 838. doi: https://doi.org/10.1080/13562517.2016.1183612

Bozalek, V., and Zembylas, M. (2017) 'Diffraction or reflection? Sketching the contours of two methodologies in educational research', *International Journal of Qualitative Studies in Education*, 30 (2), pp. 111 - 127. doi: https://doi.org/10.1080/09518398.2016.1201166

Braidotti, R. (2008) 'Affirmation, Pain and Empowerment', *Asian Journal of Women's Studies*, 14 (3), pp. 7 - 36. doi: https://doi.org/10.1080/12259276.2008.11666049

Braidotti, R. (2013) *The Posthuman.* Cambridge: Polity Press

Brazelton, B. (2020) 'On the 10-year anniversary of minecraft: two interventions in extractive colonialism', *cultural geographies*, 27 (3), pp. 491 - 497. doi: https://doi.org/10.1177%2F1474474019890319

Brinkmann, S. (2014) 'Doing without data', *Qualitative Inquiry,* 20 (6), pp. 720 - 725. doi: https://doi.org/10.1177%2F1077800414530254

Brothers, J., and Lohmann, K. (2018) 'Evidence that Magnetic Navigation and Geomagnetic Imprinting Shape Spatial Genetic Variation in Sea Turtles', *Current Biology,* 28, pp. 1325 - 1329. doi: https://doi.org/10.1016/j.cub.2018.03.022

Brown, K. (2017) 'The haptic pleasures of ground-feel: The role of textured terrain in motivating regular exercise', *Health & Place,* 46, pp. 307 - 314. doi: https://doi.org/10.1016/j.healthplace.2016.08.012

Burbank, B., McGregor, D., and Wild, M. (2018) ''My special, my special thing, and my camera!' Using GoPro as a complementary research tool to investigate young children's museum experiences', *Museum & Society*, 16 (3), pp. 311 - 333. doi: http://doi.org/10.29311/mas.v16i3.2792

Burroughs, B. (2017) 'YouTube Kids: The App Economy and Mobile Parenting', *Social Media + Society,* pp. 1 - 8. doi: https://doi.org/10.1177%2F2056305117707189

Buser, M. (2014) 'Thinking through non-representational and affective atmospheres in planning theory and practice', *Planning Theory,* 13 (3), pp. §227 - 243. doi: https://doi.org/10.1177/1473095213491744

Buser, M., Payne, T., Edizel, Ö., and Dudley, L. (2020) 'Blue space as caring space – water and the cultivation of care in social and environmental practice', *Social & Cultural Geography*, 21 (8), pp. 1039 - 1059. doi: https://doi.org/10.1080/14649365.2018.1534263

Caton, L. (2019) 'Video Data Sensing: Working Post Qualitatively in Classroom Based Video Inquiry', *Video Journal of Education and Pedagogy,* 4, pp. 1 - 22. doi: https://doi.org/10.1163/23644583-00401001

Cele, S. (2015): 'Childhood in a neoliberal utopia: planning rhetoric and parental conceptions in contemporary Stockholm' *Geografiska Annaler: Series B, Human Geography* 97 (3), pp. 233–247. doi: https://doi.org/10.1111/geob.12078

Chadderton, C. (2013) 'Towards a research framework for race in education: critical race theory and Judith Butler', *International Journal of Qualitative Studies in Education*, 26 (1), pp. 39 - 55. doi: https://doi.org/10.1080/09518398.2011.650001

Chawla, L., and Heft, H. (2002) 'Children's competence and the ecology of communities: A functional approach to the evaluation of participation', *Journal of Environmental Psychology, 22* (1-2), pp.201–216. https://doi.org/10.1006/jevp.2002.0244

Chawla, L. (2018) 'Nature-based learning for student achievement and ecological citizenship', *Curriculum and Teaching Dialogue*, 20 (1), pp. 25 – 39. Available at: https://www.proquest.com/scholarly-journals/nature-based-learning-student-achievement/docview/2097606192/se-2 (Accessed on 01 August 2022).

Chawla, L. (2020) 'Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss', *People and Nature,* 2, pp. 619 – 642. doi: https://doi.org/10.1002/pan3.10128

Chamberlain Highbury Trust (no date) *Restoring the Chamberlain's Highbury.* Available at: https://chamberlainhighburytrust.co.uk/wp-content/uploads/2018/02/restoring-the-chamberlains_-highbury.pdf (Accessed on 16 July 2022).

Chamberlain Highbury Trust (2021) *CHT Highbury Landscape History 1878-Present and Restoration Proposals*. Available at: https://chamberlainhighburytrust.co.uk/wp-content/uploads/2021/02/cht-report-highbury-landscape-history-and-restoration-proposals-website-version-3.pdf (Accessed on 11 January 2022).

Chang, D. (2020) 'Encounters with suchness: contemplative wonder in environmental education', *Environmental Education Research*, 26 (1), pp. 1 - 13. doi: https://doi.org/10.1080/13504622.2020.1717448

Cheng, J., and Monroe, M. (2012) 'Connection to Nature: Children's Affective Attitude Toward Nature', *Environment and Behavior,* 44 (1), pp. 31 - 49. doi: https://doi.org/10.1177/0013916510385082

Children and Nature Network (2022) *Children and Nature Network* Available at: https://www.childrenandnature.org/ (Accessed 01 August 2022).

Children and Nature Network (2022a) *Nature helps children recover from Adverse Childhood Experiences* Available at: https://www.childrenandnature.org/resources/nature-helps-children-recover-from-adverse-childhood-experiences/ (Accessed 05 August 2022).

Clark, N. and Yusoff, K. (2017) 'Geosocial Formations and the Anthropocene', *Theory, Culture & Society* 34 (2-3), pp. 3 - 23. doi: https://doi.org/10.1177%2F0263276416688946
Connection to Nature (2022) Available at: https://www.rspb.org.uk/our-work/conservation/projects/connection-to-nature/ (Accessed on 16 July 2022).

Cleary, A., Fielding, K., Murray, Z., and Roiko, A. (2020) 'Predictors of Nature Connection Among Urban Residents: Assessing the Role of Childhood and Adult Nature Experiences', *Environment and Behavior*, 52 (6), pp. 579 - 610. doi: https://doi.org/10.1177/0013916518811431

Clement, S. (2019) 'GoProing: Becoming Participant-Researcher', in Hodgins, B. (ed.) *Feminist research for 21st century childhoods: Common worlds methods.* London: Bloomsbury Academic, pp. 149 – 158

Climate Emergency Declaration (2022) *Climate emergency declarations in 2,248 jurisdictions and local governments cover 1 billion citizens.* Available at: https://climateemergencydeclaration.org/climate-emergency-declarations-cover-15-million-citizens/ (Accessed on 5 August 2022).

Cole, M. (2022) *The life and legacy of Joseph Chamberlain.* Available at: https://www.birmingham.ac.uk/research/perspective/the-life-and-legacy-of-joseph-chamberlain.aspx (Accessed on 05 August 2022).

Common Worlds Research Collective (2020) 'Learning to become *with* the world: Education for future survival'. Background paper for *UNESCO Futures of Education* report. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000374032 (Accessed 09 July 2022).

Cree, J., and McCree. M. (2012) 'A Brief History of the Roots of Forest School in the UK', *Horizons,* 60, 32 – 34. Available at: https://www.outdoor-learning-research.org/Portals/0/Research%20Documents/Horizons%20Archive/H60.History.of.FS.pt1.pdf?ver=2014-06-23-151226-000 (Accessed 27 July 2022).

Crenshaw, K. (1991) 'Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color', in *Stanford Law Review*, 43 (6), pp. 1241 – 1299. doi: https://doi.org/10.2307/1229039

Crinall, S., and Somerville, M. (2020) 'Informal environmental learning: the sustaining nature of daily child/water/dirt relations', *Environmental Education Research*, 26 (9-10), pp. 1313 - 1324. doi: https://doi.org/10.1080/13504622.2019.1577953

Cudworth, D. (2020) 'Promoting an emotional connection to nature and other animals via forest school: disrupting the spaces of neoliberal performativity', *International Journal of*

Sociology and Social Policy, 41 (3-4), pp. 506 - 521. doi: https://doi.org/10.1108/IJSSP-09-2019-0188

Cudworth, D., and Lumber, R. (2021) 'The importance of Forest School and the pathways to nature connection', *Journal of Outdoor and Environmental Education*, 24, pp. 71 - 85. doi: https://doi.org/10.1007/s42322-021-00074-x

Cullen, B. (2020) 'Constellations of weathering: following the meteorological mobilities of Bangla bricks', *Mobilities*, 15 (6), pp. 862 – 879. doi: https://doi.org/10.1080/17450101.2020.1759929

Curti, G. H., Aitken, S. C. and Bosco, F. D. (2016) 'A doubly articulated cartography of children and media as affective networks-at-play', *Children's Geographies*, 14 (2), pp. 175 - 189. doi: https://doi.org/10.1080/14733285.2015.1127325

DEFRA (2018) *A Green Future: Our 25 Year Plan to Improve the Environment*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf (Accessed 22 July 2022).

Deleuze, G., and Guattari, F. (1987) *A Thousand Plateaus.* Translated by B. Massumi. Minneapolis: University of Minnesota Press.

Dezuanni, M., O'Mara, J., and Beavis, C. (2015) ''Redstone is like electricity': Children's performative representations in and around *Minecraft'*, *E-Learning and Digital Media,* 12 (2), pp. 147 - 163. doi: https://doi.org/10.1177%2F2042753014568176

Dickinson, E. (2013) 'The Misdiagnosis: Rethinking "Nature-deficit Disorder"', *Environmental Communication: A Journal of Nature and Culture*, 7 (3), pp. 315 - 335. doi: https://doi.org/10.1080/17524032.2013.802704

Ding, K. (2014) 'The Rare Earth Magnet Industry and Rare Earth Price in China', *EPJ Web of Conferences,* 75, pp. 1 - 3. doi: http://doi.org/10.1051/epjconf/20147504005

Djohari, N., Brown, A., and Stolk, P. (2018) 'The comfort of the river: understanding the affective geographies of angling waterscapes in young people's coping practices', *Children's Geographies*, 16 (4), pp. 356 - 367. doi: https://doi.org/10.1080/14733285.2017.1341971

Djohari, N., Pyndiah, G., and Amone, A. (2018) 'Rethinking 'safe spaces' in children's geographies', *Children's Geographies,* 16 (4), pp. 351 - 355. doi: https://doi.org/10.1080/14733285.2015.1127325

Dodd, J. D. (2020) 'Experiencing and embodying anxiety in spaces of academia and social research', *Gender, Place & Culture,* 28 (4), pp. 475 - 496. doi: https://doi.org/10.1080/0966369X.2020.1727862

Do Nascimento, A. (2019) '"Rain, Rain, Go Away!" Engaging Rain Pedagogies in Practices With Children: From Water Politics to Environmental Education', *Journal of Childhood Studies,* 44 (3), pp. 42 - 55. doi: https://doi.org/10.18357/jcs00019173

Dombroski, K. (2018) 'Thinking with, dissenting within: care-full critique for more-than-human worlds', *Journal of Cultural Economy*, 11 (3), pp. 261 - 264. doi: https://doi.org/10.1080/17530350.2018.1427614

Drew, J., and MacAlpine, K-A. (2020) 'Witnessing the Ruins: Speculative Soties of Caring for the Particular and the Peculiar', *Journal of Childhood Studies,* 45 (2), pp. 27 - 39. doi: https://doi.org/10.18357/jcs452202019737

Dubovi, I., and Tabak, I. (2020) 'An empirical analysis of knowledge co-construction in YouTube comments', *Computers & Education,* 156, pp. 1 - 16. doi: https://doi.org/10.1016/j.compedu.2020.103939

Duhn, I. (2012) 'Places for Pedagogies, Pedagogies for Places', *Contemporary Issues in Early Childhood,* 13 (2), pp. 99 – 107. doi: http://doi.org/10.2304/ciec.2012.13.2.99

Duhn, I., and Galvez, S. (2020) 'Doing curious research to cultivate tentacular becomings', *Environmental Education Research*, 26 (5), pp. 731 – 741. doi: https://doi.org/10.1080/13504622.2020.1748176

Dunkley, R., and Aneurin Smith, T. (2019) 'By-standing memories of curious observations: children's storied landscapes of ecological encounter', *cultural geographies,* 26 (1), pp. 89 - 107. doi: https://doi.org/10.1177/1474474018792652

Eaton, E., and Day, N. (2020) 'Petro-pedagogy: fossil fuel interests and the obstruction of climate justice in public education', *Environmental Education Research,* 26 (4), pp. 457 - 473. doi: https://doi.org/10.1080/13504622.2019.1650164

Ebron, P., and Tsing, A. (2017) 'Feminism and the Anthropocene: Assessing the Field through Recent Books', *Feminist Studies,* 43 (3), pp. 658 - 683. Available at: https://www.jstor.org/stable/10.15767/feministstudies.43.3.0658 (Accessed 17 Dec 2018).

Edwards, R. C., and Larson, B. M. H. (2020) 'When screens replace backyards: strategies to connect digital-media-oriented young people to nature', *Environmental Education Research*, 26 (7), pp. 950 - 968. doi: https://doi.org/10.1080/13504622.2020.1776844

Ergler, C., Kearns, R., Witten, K., and Porter, G. (2016) 'Digital methodologies and practices in children's geographies', *Children's Geographies*, 14 (2), pp. 129 - 140. doi: https://doi.org/10.1080/14733285.2015.1129394

Evans, B. (2008) 'Geographies of Youth/Young People', *Geography Compass,* 2 (5), pp. 1659 – 16680. doi: https://doi.org/10.1111/j.1749-8198.2008.00147.x

Feminist Media Studio (2021) *How to Make Art at the End of the World: Show and Share with Natalie Loveless* (21 April 2021) Available at: https://vimeo.com/539868801 (Accessed 03 08 2022).

de Freitas, E. (2017) 'The temporal fabric of research methods: Posthuman social science and the digital data deluge', *Research in Education,* 98 (1), pp. 27 - 43. doi: https://doi.org/10.1177%2F0034523717723386

Fox, N. J., and Alldred, P. (2015) 'New materialist social inquiry: designs, methods and the research-assemblage', *International Journal of Social Research Methodology*, 18 (4), pp. 399 - 414. doi https://doi.org/10.1080/13645579.2014.921458

Frigerio, A., Benozzo, A., Holmes, R., and Runswick-Cole, K. (2018) 'The Doing and Undoing of the "Autistic Child": Cutting Together and Apart Interview-Based Empirical Materials', *Qualitative Inquiry*, 24 (6), pp. 390 - 402. doi: https://doi-org.ezproxye.bham.ac.uk/10.1177%2F1077800417735132

Frumkin, H., Bratman, G., Breslow, S., Cochran, B., Kahn Jr, P., Lawler, J., Levin, P., Tandon, P., Varanasi, U., Wolf, K., and Wood, S. (2017) 'Nature Contact and Human Health: A Research Agenda', *Environmental Health Perspectives*, 125 (7), pp. 1 - 18. doi: https://doi.org/10.1289/EHP1663

Full principles and criteria for good practice (no date). Available at: https://forestschoolassociation.org/full-principles-and-criteria-for-good-practice/ (Accessed on 27 July 2022).

Gallagher, M. (2016) 'Sound as affect: Difference, power and spatiality', *Emotion, Space and Society*, 20, pp. 42 - 48. doi: https://doi.org/10.1016/j.emospa.2016.02.004

Gallagher, M. (2020) 'Childhood and the geology of media', *Discourse: Studies in the Cultural Politics of Education*, 41 (3), pp. 372 - 390. doi: https://doi.org/10.1080/01596306.2019.1620481

Gallagher, M., Kanngieser, A., and Prior, J. (2017) 'Listening geographies: Landscape, affect and geotechnologies', *Progress in Human Geography,* 41 (5), pp. 618 - 637. doi: https://doi.org/10.1177%2F0309132516652952

Gallagher, M., Prior, J., Needham, M., and Holmes, R. (2017a) 'Listening differently: A pedagogy for expanded listening', *British Educational Research Journal,* 43 (6), pp. 1246 - 1265. doi: https://doi.org/10.1002/berj.3306

Gannon, S. (2016) ''Local Girl Befriends Vicious Bear': Unleashing Educational Aspiration through a Pedagogy of Material-Semiotic Entanglement' in Taylor, A., and Hughes, C. (eds) *Posthuman Research Practices in Education.* Hampshire: Palgrave Macmillan, pp.128 – 148.

Georgis, D., and Matthews, S. (2021) 'The trouble with research-creation: failure, play and the possibility of knowledge in aesthetic encounters', *International Journal of Qualitative Studies in Education*, (ahead of print) pp. 1 – 13. doi: https://doi.org/10.1080/09518398.2021.1888164

Gershon, W. S. (2011) 'Embodied Knowledge: Sound as Educational Systems', *Journal of Curriculum Theorizing*, 27 (2), pp. 66 - 81. Available at: https://journal.jctonline.org/index.php/jct/article/view/348 (Accessed on 26 July 2022)

Gershon, W. S., and Appelbaum, P. (2018) 'Resounding Education: Sonic Instigations, Reverberating Foundations', *Educational Studies*, 54 (4), pp. 357 - 366. doi: https://doi.org/10.1080/00131946.2018.1473870

Gibson, H., and Venkateswar, S. (2015) 'Anthropological Engagement with the Anthropocene: A Critical Review', *Environment and Society: Advances in Research,* 6, pp. 5 - 27. doi: https://doi.org/10.3167/ares.2015.060102

Gieré, R. (2016) 'Magnetite in the human body: Biogenic vs. anthropogenic', *PNAS*, 113 (43), pp. 11986 - 11987. doi: https://doi.org/10.1073/pnas.1613349113

Gillen, J., and Kurcirkova, N. (2018) 'Percolating spaces: Creative ways of using digital technologies to connect young children's school and home lives', *British Journal of Educational Technology,* 49 (5), pp. 834 - 846. doi: https://doi/org/10.1111/bjet.12666

Giorza, T. M. (2018) *Making kin and taking care: Intra-active learning with time, space and matter in a Johannesburg preschool.* PhD Thesis. University of Cape Town. Available at: https://open.uct.ac.za/handle/11427/29666 (Accessed on 17 July 2022).

Goodley, D. and Runswick-Cole, K. (2013) 'The body as disability and possability: theorizing the 'leaking, lacking and excessive' bodies of disabled children', *Scandinavian Journal of Disability,* 15 (1), pp. 1 - 19. doi: http://doi.org/10.1080/15017419.2011.640410

Goodman, J. (2017) 'Experimenting with Sound and Silence: sonorous bodies, sonic selves, acoustic topographies, and auditory histories of schooling', *Paedagogica Historica*, 53 (5), pp. 528 - 541. doi: https://doi.org/10.1080/00309230.2017.1335334

Goodenough, A., Waite, S., and Wright, N. (2021) 'Place as partner: material and affective intra-play between young people and trees', *Children's Geographies,* 19 (2), pp. 225 - 240. doi: https://doi.org/10.1080/14733285.2020.1783435

Gould, J. (2015) 'Animal Navigation: Birds Have Magnetic Maps', *Current Biology,* 25, pp. 827 - 844. doi: http://doi.org/10.1016/j.cub.2015.08.041

Green, C. (2016) 'Sensory Tours as a Method for Engaging Children as Active Researchers: Exploring the Use of Wearable Cameras in Early Childhood Research', *International Journal of Early Childhood,* 48, pp. 277 - 294. doi: https://doi.org/10.1007/s13158-016-0173-1

Green, C. J. (2018) 'Young children's spatial autonomy in their home environment and a forest setting', *Journal of Pedagogy,* 9 (1), pp. 65 - 85. doi: https://doi.org/10.2478/jped-2018-0004

Greenhow, C., and Lewin, C. (2016) 'Social media and education: reconceptualizing the boundaries of formal and informal learning', *Learning, Media and Technology*, 41 (1), pp. 6 - 30. doi: https://doi.org/10.1080/17439884.2015.1064954

Grosz, E., Yusoff, K., and Clark, N. (2017) 'An Interview with Elizabeth Grosz: Geopower, Inhumanism and the Biopolitical', *Theory, Culture & Society*, 43 (2-3), pp. 129 - 146. doi: https://doi.org/10.1177%2F0263276417689899

Gunnarsson, K., and Hohti, R. (2018) 'Editorial: Why affirmative critique?' *Reconceptualizing Educational Research Methodology*, 9 (1), pp. 1 - 5. doi: https://doi.org/10.7577/rerm.2697

Hackett, A., Pahl, K., and Pool, S. (2017) 'In amongst the glitter and the squashed blueberries: crafting a collaborative lens for children's literacy pedagogy in a community setting', *Pedagogies: An International Journal*, 12 (1), pp. 58 - 73. doi: https://doi.org/10.1080/1554480X.2017.1283994

Hackett, A., and Caton, L. (2018) *Rethinking visual ontologies when dealing with large video data sets.* Available at: https://digiliteymethodscorner.wordpress.com/2018/12/07/rethinking-visual-ontologies-when-dealing-with-large-video-data-sets/ (Accessed 28 July 2022).

Hackett, A., and Rautio, P. (2019) 'Answering the world: young children's running and rolling as more-than-human multimodal meaning making', *International Journal of Qualitative Studies in Education,* 32 (8), pp. 1019 - 1031. doi: https://doi.org/10.1080/09518398.2019.1635282

Hackett, A., and Somerville, M. (2017) 'Posthuman literacies: Young children moving in time, place and more-than-human worlds', *Journal of Early Childhood Literacy,* 17 (3), pp. 374 - 391. doi: https://doi.org/10.1177%2F1468798417704031

Hackett, A., Procter, L., and Seymour, J. (2015) 'Introduction: Spatial Perspectives and Childhood Studies', in Hackett, A., Procter, L., and Seymour, J. (eds) *Children's spatialities: embodiment, emotion and agency.* Hampshire: Palgrave Macmillan, pp. 1 - 20.

Hadfield-Hill, S., and Zara, C. (2019), 'Children and young people as geological agents? Time, scale and multispecies vulnerabilities in the new epoch', *Discourse*, 41 (3), pp. 407 - 426. doi: https://doi.org/10.1080/01596306.2019.1644821

Hadfield-Hill, S., and Zara, C. (2019a), 'Children and young people living through the monsoon: watery entanglements and fluid inequalities', *Children's Geographies*, 17 (6), pp. 732 - 747. doi: https://doi.org/10.1080/14733285.2019.1648758

Hadfield-Hill, S., and Zara, C. (2019b) 'Complicating childhood-nature relations: Negotiated, spiritual and destructive encounters', *Geoforum*, 98, pp. 66 - 74. doi: https://doi.org/10.1016/j.geoforum.2018.09.036

Hand, K. et al. (2018) 'Restricted home ranges reduce children's opportunities to connect to nature: Demographic, environmental and parental influences', *Landscape and Urban Planning,* 172, pp. 69 -77. doi: https://doi.org/10.1016/j.landurbplan.2017.12.004

Haraway, D. (1988) 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective', *Feminist Studies,* 14 (3), 575 - 599. Available at: https://www.jstor.org/stable/3178066 (Accessed on 16 July 2022).

Haraway, D. (1991) *Simians, Cyborgs, and Women: The Reinvention of Nature.* London: Free Association Books.

Haraway, D. (2004) *The Haraway Reader.* London: Routledge.

Haraway, D. (2008) 'Otherworldy Conversations, Terran Topics, Local Terms', in Alaimo, S. and Hekman, S. (eds.) *Material Feminisms*. Bloomington and Indianapolis: University of Indiana Press, pp. 157 – 187.

Haraway, D. (2008) *When Species Meet.* Minneapolis: University of Minnesota Press.

Haraway, D. (2016) *Situated with the Trouble: Making Kin in the Chthulucene.* London: Duke University Press.

Harker, C. (2005) 'Playing and affective time-spaces', *Children's Geographies,* 3 (1), pp. 47 - 62. doi: https://doi.org/10.1080/14733280500037182

Harris, F. (2017) 'Outdoor learning spaces: The case of forest school', *Area,* 50, pp. 222 – 231. doi: https://doi.org/10.1111/area.12360

Harris, F. (2017a) 'The nature of learning at forest school: practitioners' perspectives', *Education 3-13*, 45 (2), pp. 272-291. doi: https://doi.org/10.1080/03004279.2015.1078833

Harris, F. (2021) 'Developing a relationship with nature and place: the potential role of forest school', *Environmental Education Research,* 27 (8), pp. 1214 - 1228. doi: https://doi.org/10.1080/13504622.2021.1896679

Harwood, D., and Collier, D. (2017) 'The matter of the stick: Storying/(re)storying children's literacies in the forest', *Journal of Early Childhood Literacy*, 17 (3), pp. 336 - 352. doi: https://doi.org/10.1177%2F1468798417712340

Hecht, G. (2018) 'Interscalar Vehicles for an African Anthropocene: On Waste, Temporality and Violence', *Cultural Anthropology,* 33 (1), pp. 109 - 141. doi: https://doi.org/10.14506/ca33.1.05

Heft, H. (1988) 'Affordances of Children's Environments: A Functional Approach to Environmental Description', *Children's Environments Quarterly,* 5 (3), pp. 29 - 37. Available at: https://www.jstor.org/stable/41514683 (Accessed 1 July 2022).

Helms, K., Ferreira, P., Brown, B., and Lampinen, A. (2019) 'Away and (Dis)connection: Reconsidering the Use of Digital Technologies in Light of Long-Term Outdoor Activities', *Proceedings of the ACM on Human-Computer Interaction,* 3 (230), pp. 1 - 20. doi: https://doi.org/10.1145/3361111

Hennessy, S. M., and Rooney, T. (2021) 'Watching change: attuning to the tempo of decay with pumpkin, weather and young children', *Children's Geographies*, pp. 1 - 14. doi: https://doi.org/10.1080/14733285.2021.2007217

Hickey-Moody, A., and Palmer, H., and Sayers, E. (2016) 'Diffractive pedagogies: dancing across new materialist imaginaries', *Gender and Education*, 28 (2), pp. 213 – 229. doi: https://doi.org/10.1080/09540253.2016.1140723

Highbury Park Friends (no date) *Historic Landscapes of Highbury Park.* Available at: https://highburyparkfriends.org.uk/text/history/HLA%20brochure%20draft%203D.pdf (Accessed on 31 January 2022).

Highbury Park Friends (2022) *History* Available at: https://highburyparkfriends.org.uk/wp/about-highbury-park/history/ (Accessed on 16 July 2022).

Hill, C. (2017) 'More-than-reflective practice: Becoming a diffractive practitioner', *Teacher Learning and Professional Development*, 2 (1), pp. 1 - 17. Available at: https://journals.sfu.ca/tlpd/index.php/tlpd/article/view/28/pdf (Accessed on 09 July 2022).

Historic England (2022) *Highbury Hall* Available at: https://historicengland.org.uk/listing/the-list/list-entry/1001203?section=official-listing (Accessed on 16 July 2022).

Hodgins, B. (2019) 'Caring: Method as Affect, Obligation and Action' in Hodgins, B. (ed.) *Feminist research for 21st century childhoods: Common worlds methods.* London: Bloomsbury Academic, pp. 171 - 178.

Hohti, R. (2016) 'Classroom matters: Research with children as entanglement. PhD Thesis. University of Helsinki. Available at: https://core.ac.uk/download/pdf/33740908.pdf (Accesssed on 09 July 2022).

Hohti, R. (2018) 'Siiri and the "Bag Lady": Analysing the Material Entanglements of Special Needs', *Reconceptualizing Educational Research Methodology*, 9 (1), pp. 6 - 166. doi: https://doi.org/10.7577/rerm.2698

Hohti, R., and Tammi, T. (2019) 'The greenhouse effect: Multispecies childhood and non-innocent relations of care', *Childhood*, 26 (2), pp. 169 - 185. doi: https://doi.org/10.1177%2F0907568219826263

Holloway, S., & Valentine, G. (2000) 'Spatiality and the New Social Studies of Childhood' *Sociology* 34 (4), pp. 763-783. doi: https://doi.org/10.1177%2FS0038038500000468

Holloway, S., & Pimlott-Wilson, H. (2014) 'Enriching Children, Institutionalizing Childhood? Geographies of Play, Extracurricular Activities, and Parenting in England' *Annals of the Association of American Geographers,* 104 (3), pp. 613-627. doi: https://doi.org/10.1080/00045608.2013.846167

Holloway, S. L., Holt, L., and Mills, S. (2019) 'Questions of agency: Capacity, subjectivity, spatiality and temporality', *Progress in Human Geography,* 43 (3), pp. 1 - 20. doi: https://doi.org/10.1177%2F0309132518757654

Hordyk, S. R., Dulude, M., and Shem, M. (2015) 'When nature nurtures children: nature as a containing and holding space', *Children's Geographies,* 13 (5), pp. 571-588. doi: https://doi.org/10.1080/14733285.2014.923814

Horton, J., and Kraftl, P. (2006) 'What else? some more ways of thinking and doing 'Children's Geographies'', *Children's Geographies*, 4 (01), pp. 69-95. doi: https://doi.org/10.1080/14733280600577459

Horton, J., Christensen, P., Kraftl, P., and Hadfield-Hill, S. (2014) ''Walking... just walking': how children and young people's everyday pedestrian practices matter', *Social and Cultural Geography*, 15 (1), pp. 94 - 115. doi: https://doi.org/10.1080/14649365.2013.864782

Horton, J., and Kraftl, P. (2018) 'Rats, assorted shit and 'racist groundwater': Towards extra-sectional understandings of childhoods and social-material processes', *Environment and Planning D: Society and Space* 36 (5), pp. 926 - 948. doi: https://doi.org/10.1177%2F0263775817747278

Hughes, J., Richardson, M., and Lumber, R. (2018) 'Evaluating connection to nature and the relationship with conservation behaviour in children', *Journal for Nature Connection*, 45, pp. 11 - 19. doi: https://doi.org/10.1016/j.jnc.2018.07.004

Hughes, J., Rogerson, M., Barton, J., and Bragg, R. (2019) 'Age and connection to nature: when is engagement critical?', *Frontiers in Ecology and the Environment,* 17 (5), pp. 265 - 269. doi: https://doi.org/10.1002/fee.2035

Hultin, L. (2019) 'On becoming a sociomaterial researcher: Exploring epistemological practices grounded in a relational, performative ontology', *Information and Organization,* 29 (2), pp. 91 - 104. doi: https://doi.org/10.1016/j.infoandorg.2019.04.004

Huuhka, M. (2020) 'Journeys in Intensity: Human and Nonhuman Co-Agency, Neuropower, and Counterplay in *Minecraft',* in Karkulehto, S., Koistinen, A-K., and Varis, E. (eds) *Reconfiguring Human, Nonhuman and Posthuman in Literature and Culture.* Oxon: Routledge, pp. 218 – 235.

Ingold, T. (2000) *The Perception of the Environment: Essays on livelihood, dwelling and skill.* London: Routledge.

Ingold, T. (2006) 'Rethinking the animate, re-animating thought', *Ethnos,* 71 (1), pp. 9 – 20. doi: https://doi.org/10.1080/00141840600603111

Ingold, T. (2011) *Being Alive: Essays on Movement, Knowledge and Description.* Oxon: Routledge.

Ingold, T. (2012) 'Towards an Ecology of Materials', *Annual Review of Anthropology,* 41, pp. 427 - 422. Available at: https://www.jstor.org/stable/23270720 (Accessed on 31 July 2019).

Ingold, T. (2021) *Correspondence.* Cambridge: Polity Press.

Ingold, T., and Vergunst, J. L. (2008) 'Introduction', in Ingold, T., and Vergunst, J. L. (eds) *Ways of walking: ethnography and practice on foot.* Surrey: Ashgate Publishing Ltd, pp. 1 – 20.

Jackson, A. Y., and Mazzei, L. (2013) 'Plugging One Text Into Another: Thinking With Theory in Qualitative Research', *Qualitative Inquiry,* 19 (4), pp. 261 - 271. doi: https://doi.org/10.1177%2F1077800412471510

Jarvis, C., Kraftl, P., and Dickie, J. (2017) '(Re)Connecting spatial literacy with children's geographies: GPS, Google Earth and children's everyday lives', *Geoforum,* 81, pp. 22 - 31. doi: https://doi.org/10.1016/j.geoforum.2017.02.006

Jones, P. I. (2020) *Bodies, technologies and methods.* Oxon: Routledge.

Jones, P. I., and Osborne, T. (2020) 'Analysing virtual landscapes using postmemory', *Social & Cultural Geography*, 21 (2), pp. 186 - 206. doi: https://doi.org/10.1080/14649365.2018.1474378

Kemp, N., and Pagden, A. (2018) 'The place of forest school within English primary schools: senior leader perspectives', *Education 3-13,* pp. 1 – 13. doi: https://doi.org/10.1080/03004279.2018.1499791

Kind, S. (2013) 'Lively entanglements: the doings, movements and enactments of photography', *Global Studies of Childhood.* 3 (4), pp. 427 - 441. doi: http://doi.org/10.2304/gsch.2013.3.4.427

Kind, S., Pacini-Ketchabaw, V., Kocher, L., Wapenaar, K., and Kim, B. (2014) *Material Encounters: Capilano University Studio Art Gallery March 1 – 19 2014.* Available at: http://commonworlds.net/newsite/wp-content/uploads/2015/03/MaterialEncounterscatalogue.pdf (Accessed on 17 July 2022).

Kirby, V. (2008) 'Natural Convers(at)ions: or, what if Culture was really Nature all along?', in Alaimo, S. and Hekman, S. (eds) *Material Feminisms*. Bloomington: Indiana University Press, pp. 214 - 236.

Kirby, V. (2017) 'Matter out of Place: 'New Materialism' in Review', in Kirby, V. (ed.) *What If Culture Was Nature All Along*. Edinburgh: Edinburgh University Press, pp. 1 - 25.

Kirschvink, J., Walker, M., and Diebel, C. (2001) 'Magnetite-based magnetoreception', *Current Opinion in Neurobiology,* 11, pp. 462 - 467. doi: http://doi.org/10.1016/S0959-4388(00)00235-X

Knight, L. M. (2019) 'Playing: Inefficiently Mapping Human and Inhuman Play in Urban Commonplaces' in Hodgins, B. (ed.) *Feminist research for 21st century childhoods: Common worlds methods.* London: Bloomsbury Academic, pp. 139 - 148.

Knight, S. (2013) 'The Impact of Forest School on Education for Sustainable Development in the Early Years in England' in Knight, S. (ed) *International Perspectives on Forest School: Natural Spaces to Play and Learn.* London: SAGE Publications Ltd, pp. 1-11.

Koro-Ljungberg, M. (2012) 'Researchers of the World, Create!', *Qualitative Inquiry,* 18 (9), pp. 808 - 818. doi: https://doi.org/10.1177%2F1077800412453014

Koro-Ljungberg, M. (2017) 'Soulbodies lived', *Reconceptualizing Educational Research Methodology,* 8 (2), pp. 13 - 27. doi: https://doi.org/10.7577/rerm.2020

Koro-Ljungberg, M., and MacLure, M. (2013) 'Provocations, Re-Un-Visions, Death, and Other Possibilities of "Data"', *Cultural Studies ↔ Critical Methodologies,* 13 (4), pp. 219 - 222. doi: https://doi.org/10.1177%2F1532708613487861

Kraftl, P. (2013) 'Beyond 'voice', beyond 'agency', beyond 'politics'? Hybrid childhoods and some critical reflections on children's emotional geographies', *Emotion, Space and Society,* 9, pp. 13 - 23. http://doi.org/10.1016/j.emospa.2013.01.004

Kraftl, P. (2014) *Geographies of Alternative Education.* Bristol: Bristol University Press.

Kraftl, P. (2015) 'Alter-Childhoods: Biopolitics and Childhoods in Alternative Education Spaces' *Annals of the Association of American Geographers*, 105 (1), pp. 219 – 237. doi: https://doi.org/10.1080/00045608.2014.962969

Kraftl, P. (2016) 'The force of habit: channelling young bodies at alternative education spaces', *Critical Studies in Education*, 57 (1), pp. 116 - 130. doi: https://doi.org/10.1080/17508487.2016.1102753

Kraftl, P. (2018) 'A double-bind? Taking new materialisms elsewhere in studies of education and childhood', *Research In Education,* 101 (1), pp. 30 - 38. doi: https://doi.org/10.1177%2F0034523718791880

Kraftl, P. (2020) *After Childhood: Re-thinking Environment, Materiality and Media in Children's Lives.* Oxon: Routledge

Kraftl, P., Bolt, G., and Van Kempen, R. (2019) 'Hyper-diversity in/ and geographies of childhood and youth', *Social & Cultural Geography*, 20 (9), pp. 1189 - 1197. doi: https://doi.org/10.1080/14649365.2018.1491619

Kraftl, P., and Horton, J. (2008) 'Spaces of every-night life: for geographies of sleep, sleeping and sleepiness', *Progress in Human Geography,* 32 (4), pp. 509 - 524. doi: https://doi.org/10.1177/0309132507088117

Kraftl, P., Taylor, A., and Pacini-Ketchabaw, V. (2020) 'Introduction to Symposium: childhood studies in the Anthropocene', *Discourse: Studies in the Cultural Politics of Education,* 41 (3), pp. 333 - 339. doi: https://doi.org/10.1080/01596306.2020.1779448

Kullman, K. (2012) 'Experiments with moving children and digital cameras', *Children's Geographies,* 10 (1), pp. 1 - 16 doi: https://doi.org/10.1080/14733285.2011.638174

Kullman, K. (2014) 'Children, urban care, and everyday pavements', *Environment and Planning A*, 46, pp. 2864 - 2880. doi: https://doi.org/10.1068/a46260

Laaksoharju, T., and Rappe, E. (2017) 'Trees as affordances for connectedness to place – a framework to facilitate children's relationship with nature', *Urban Forestry & Urban Greening,* 28, pp. 150 - 159. doi: https://doi.org/10.1016/j.ufug.2017.10.004

Lambert, L. (2019) 'Becoming teacher, becoming researcher: reconsidering data analysis in post-qualitative practitioner research', *PRACTICE*, 1 (2), pp. 151 – 168. doi: https://doi.org/10.1080/25783858.2019.1659633

Lambert, L. (2021) 'Diffraction as an otherwise practice of exploring new teachers' entanglements in time and space', *Professional Development in Education*, 47 (2-3), pp. 421 - 435. doi: https://doi.org/10.1080/19415257.2021.1884587

Land, N., and Danis, I. (2016) 'Movement/ing Provocations in Early Childhood Education', *Journal of Childhood Studies* 41 (3), pp. 26 - 37. Available at: https://journals.uvic.ca/index.php/jcs/article/download/16304/6952 (Accessed on 09 July 2022).

Land, N., Hamm, C., Yazbeck, S-L., Danis, I., Brown, M., and Nelson, N. (2020) 'Facetiming common worlds: exchanging digital place stories and crafting pedagogical contact zones', *Children's Geographies*, 18 (1), pp. 30 - 43. doi: https://doi.org/10.1080/14733285.2019.1574339

Land, N., Hamm, C., Yazbeck, S-L., Brown, M., Danis, I., and Nelson, N. (2020a) 'Doing pedagogical intentions with *Facetiming Common Worlds* (and Donna Haraway)', *Global Studies of Childhood,* 10 (2), pp. 131 - 144. doi: https://doi.org/10.1177%2F2043610618817318

Land, N., and Todorovic, S. (2021) 'Getting to know movement differently: Nurturing communicative, relational, and collective movement pedagogies with toddlers', *Journal of Early Childhood Research,* 19 (2), pp. 239 - 252. doi: https://doi.org/10.1177%2F1476718X20969839

Land, N., and Vidotto, D. (2021) 'Tracing, interrogating, and re-imagining how physical development matters in Canadian early childhood studies', *Sport, Education and Society*, 26 (6), pp. 606 - 618. doi: https://doi.org/10.1080/13573322.2020.1771551

Land, N., Vintimilla, C., Pacini-Ketchabaw, V., and Angus, L. (2022) 'Propositions towards educating pedagogists: Decentering the child', *Contemporary Issues in Early Childhood,* 23 (2), pp. 109 - 121. doi: https://doi.org/10.1177%2F1463949120953522

Larsen, S., Lobo, M., and Maddrell, A. (2020) 'Refreshing methods: reflections and provocations', *Social & Cultural Geography,* 21 (9), pp. 1328 - 1337. doi: https://doi.org/10.1080/14649365.2019.1697461

Latimer, J., and Miele, M. (2013) 'Naturecultures? Science, Affect and the Non-human', *Theory, Culture & Society,* 30 (7/8), pp. 5 - 31. doi: https://doi.org/10.1177/0263276413502088

Latour, B. (1996) 'On actor-network theory: A few clarification', *Soziale Welt,* 47, pp. 369 - 381. Available at: http://www.jstor.org/stable/40878163 (Accessed on 19 July 2022).

Latour, B. (2004) 'Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern', *Critical Inquiry,* 30 (2), pp. 225 – 248. Available at: https://www.jstor.org/stable/10.1086/421123 (Accessed on 27 July 2022).

Latour, B. (2005) *Reassembling the Social: An Introduction to Actor-Network-Theory.* Oxford: Oxford University Press.

Latour, B. (2014) 'Another way to compose the common world', *HAU: Journal of Ethnographic Theory*, 4 (1), pp. 301 - 307. doi: https://doi.org/10.14318/hau4.1.016

Latour, B., Stengers, I., Tsing, A., and Bubandt, N. (2018) 'Anthropologists are Talking – About Capitalism, Ecology, and Apocalypse', *Ethnos,* 83 (3), pp. 587 - 606. doi: https://doi.org/10.1080/00141844.2018.1457703

Leander, K. and Hollett, T. (2017) 'The embodied rhythms of learning: From learning across settings to learners crossing settings', *International Journal of Educational Research,* 84, pp. 100 - 110. doi: https://doi.org/10.1016/j.ijer.2016.11.007

Lenz Taguchi, H. and Palmer, A. (2013) 'A more 'livable' school?
A diffractive analysis of the performative enactments of girls' ill-/well-being with(in) school environments', *Gender and Education*, 25 (6), pp. 671 – 687. doi: https://doi.org/10.1080/09540253.2013.829909

Liefländer, A., Fröhlich, G., Bogner, F., and Schultz, P. W. (2013) 'Promoting connectedness with nature through environmental education', *Environmental Education Research*, 19(3), pp. 370 – 384. doi: https://doi.org/10.1080/13504622.2012.697545

Linzmayer, C. D., and Halpenny, E. A. (2014) ''I might know when I'm an adult': making sense of children's relationships with nature', *Children's Geographies*, 12 (4), pp. 412-428. doi: https://doi.org/10.1080/14733285.2013.821262

Lloro-Bidart, T. (2017) 'A feminist posthumanist political ecology of education for theorizing human-animal relations/relationships', *Environmental Education Research*, 23 (1), pp. 111-130. doi: https://doi.org/10.1080/13504622.2015.1135419

Lorimer, H. (2005) 'Cultural geography: the busyness of being 'more-than-representational', *Progress in Human Geography* 29 (1), pp. 83 - 94. doi: https://doi.org/10.1191/0309132505ph553pr

Louv, R. (2008) *Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder.* (2nd edition) Chapel Hill: Algonquin Books.

Loveless, N. (2013) 'The Materiality of Duration: Between ice time and water time', *Performance Research*, 18 (6), pp. 129 - 136. doi: https://doi.org/10.1080/13528165.2013.908068

Loveless, N. (2015) 'Towards a Manifesto on Research-Creation, *Canadian Art Review,* 40 (1), pp. 52 - 54. Available at: https://www.jstor.org/stable/24327427 (Accessed on: 6 September 2021).

Lumber, R., Richardson, M., and Sheffield, D. (2017) 'Beyond knowing nature: Contact, emotional, compassion, meaning, and beauty are pathways to nature connection', *PLoS ONE,* 12 (5), pp. 1 – 24. doi: https://doi.org/10.1371/journal.pone.0177186

Lupton, D., and Watson, A. (2021) 'Towards more-than-human digital data studies: developing research-creation methods', *Qualitative Research,* 21 (4), pp. 463 - 480. doi: https://doi.org/10.1177%2F1468794120939235

Lutz, C. (2017) 'What Matters', *Cultural Anthropology,* 32 (2), pp. 181 - 191. doi: https://doi.org/10.14506/ca32.2.02

Malone, K. (2016) 'Theorizing a child–dog encounter in the slums of La Paz using post-humanistic approaches in order to disrupt universalisms in current 'child in nature' debates', *Children's Geographies*, 14 (4), pp. 390-407. doi: https://doi.org/10.1080/14733285.2015.1077369

MacLean, S. (2013) 'The whiteness of green: Racialization and environmental education', *The Canadian Geographer,* 57 (3), pp. 354 – 362. doi: https://doi.org/10.1111/cag.12025

MacLure, M. (2011) 'Qualitative Inquiry: Where Are the Ruins?' *Qualitative Inquiry,* 17 (10), pp. 997 – 1005. doi: https://doi.org/10.1177%2F1077800411423198

MacLure, M. (2010) 'The offence of theory', *Journal of Education Policy,* 25 (2), pp. 277 – 286. doi: https://doi.org/10.1080/02680930903462316

MacLure, M. (2013) 'The Wonder of Data', *Cultural Studies ↔ Critical Methodologies,* 13 (4), pp. 228 – 232. doi: https://doi.org/10.1177%2F1532708613487863

MacLure, M. (2013a) 'Researching without representation? Language and materiality in post-qualitative methodology', *International Journal of Qualitative Studies in Education*, 26 (6), pp. 658-667. doi: https://doi.org/10.1080/09518398.2013.788755

Malone, K. (2007) 'The bubble-wrap generation: children growing up in walled gardens' *Environmental Education Research*, 13 (4), pp. 513-527. doi: https://doi.org/10.1080/13504620701581612

Manning, E. (2016) 'Ten Propositions for Research-Creation' in Colin, N. and Sachsenmaier, S. (eds) *Collaboration in Performance Practice: Premises, Workings and Failures*. Hampshire: Palgrave Macmillan, pp. 133 – 141.

Manning, E., and Massumi, B. (2014) *Thought in the act: Passages in the ecology of experience*. Minneapolis: University of Minnesota Press.

Marsh, J. (2016) 'Unboxing' videos: co-construction of the child as cyberflâneur', *Discourse: Studies in the Cultural Politics of Education*, 37 (3), pp. 369-380. doi: https://doi.org/10.1080/01596306.2015.1041457

Massumi, B. (2015) *The Politics of Affect.* Cambridge: Polity Press.

Matthews, H., Limb, M., and Taylor, M. (1999) 'Young people's participation and representation in society', *Geoforum,* 30, pp. 135 – 144. doi: https://doi.org/10.1016/S0016-7185(98)00025-6

Mavoa, J., Carter, M., and Gibbs, M. (2018) 'Children and Minecraft: A survey of children's digital play', *New Media & Society,* 20 (9), pp. 3283 – 3303. doi: https://doi.org/10.1177%2F1461444817745320

Maynard, T. (2007) 'Encounters with Forest School and Foucault: a risky business?', *Education 3–13*, 35 (4), pp. 379-391. doi: https://doi.org/10.1080/03004270701602640

Mazzei, L. A., and Jackson, A. Y. (2017) 'Voice in the agentic assemblage', *Educational Philosophy and Theory*, 49 (11), pp. 1090 - 1098. doi: https://doi.org/10.1080/00131857.2016.1159176

McCormack, D. (2008) 'Thinking-Spaces for Research-Creation', *Inflexions,* 1, pp. 1 - 16. Available at: https://www.inflexions.org/n1_Thinking-Spaces-for-Research-Creation-by-Derek-P-McCormack.pdf (Accessed on 26 July 2022).

McCree, M., Cutting, R. and Sherwin, D. (2018) 'The Hare and the Tortoise go to Forest School: taking the scenic route to academic attainment via emotional wellbeing outdoors', *Early Child Development and Care*, 188 (7), pp. 980-996. doi: https://doi.org/10.1080/03004430.2018.1446430

McDougall, J., Readman, M., and Wilkinson, P. (2018) 'The uses of (digital) literacy', *Learning, Media and Technology*, 43 (3), pp. 263 - 279. doi: https://doi.org/10.1080/17439884.2018.1462206

McGlynn-Stewart, M., Maguire, N., Mogyorodi, E. (2020) 'Taking it Outside: Engaging in Active, Creative, Outdoor Play with Digital Technology', *Canadian Journal of Environmental Education,* 23 (2), pp. 31 - 45. Available at: https://cjee.lakeheadu.ca/article/view/1617 (Accessed on 22 July 2022).

McLean, S. (2013) 'The whiteness of green: Racialization and environmental education', *The Canadian Geographer,* 57 (3), pp. 354 - 362. doi: https://doi-org.ezproxye.bham.ac.uk/10.1111/cag.12025

Mcphie, J. (2018) 'I knock at the stone's front door: performative pedagogies beyond the human story', *Parallax*, 24 (3), pp. 306 - 323, https://doi.org/10.1080/13534645.2018.1496581

Merewether, J. (2019) 'New materialisms and children's outdoor environments: murmurative diffractions', *Children's Geographies*, 17 (1), pp. 105 - 117. https://doi.org/10.1080/14733285.2018.1471449

Merriam-Webster (2022) *Behind-the-scenes.* Available at: https://www.merriam-webster.com/dictionary/behind-the-scenes (Accessed 1 Feb 2022).

Merriam-Webster (2022a) *Archive* Available at: https://www.merriam-webster.com/dictionary/archive (Accessed 30 Jan 2022).

Merriam-Webster (2022b) *Curator* Available at: https://www.merriam-webster.com/dictionary/curator (Accessed 30 Jan 2022).

Merrick, H. (2017) 'Naturecultures and feminist materialism', in MacGregor, S. (ed) *Routledge Handbook of Gender and Environment.* Oxon: Routledge, pp. 101 – 114.

Meyers, E. I., Erickson, I., and Small, R. V. (2013) 'Digital literacy and informal learning environments: an introduction', *Learning, Media and Technology*, 38 (4), pp. 355 - 367. doi: https://doi.org/10.1080/17439884.2013.783597

Millei, Z., and Rautio, P. (2017) ''Overspills' of research with children: an argument for slow research', *Children's Geographies*, 15 (4), pp. 466 - 477. doi: https://doi.org/10.1080/14733285.2016.1277182

Milner, A., and Jumbe, S. (2020) 'Using the right words to address racial disparities in COVID-19', *The Lancet,* 5 (8), pp. E419 – E420. doi: https://doi.org/10.1016/S2468-2667(20)30162-6

Moses, K. (2022) *People's Place in Nature.* Available at: https://www.rewildingbritain.org.uk/explore-rewilding/what-is-rewilding/reconnecting-with-nature (Accessed on 16 July 2022).

Mouritsen, H., and Ritz, T. (2005) 'Magnetoreception and its use in bird navigation', *Current Opinion in Neurobiology,* 15, pp. 406 - 414. doi: https://doi.org/10.1016/j.conb.2005.06.003

Myrvang Brown, K.,Dilley, R. and Keith Marshall Macaulay Institute (2008) 'Using a Head-Mounted Video Camera to Understand Social Worlds and Experiences', *Sociological Research Online,* 13 (6), doi: https://doi.org/doi:10.5153/sro.1818

Mulcahy, D. (2012) 'Affective assemblages: body matters in the pedagogic practices of contemporary school classrooms', *Pedagogy, Culture & Society,* 20 (1), pp. 9 - 27. doi: https://doi.org/10.1080/14681366.2012.649413

Mullenbach, L, E., Andrejewski, R, G., and Mowen, A. J. (2019) 'Connecting children to nature through residential outdoor environmental education', *Environmental Education Research*, 25 (3), pp. 365 – 374. doi: https://doi.org/10.1080/13504622.2018.1458215

Müller, M. (2015) 'Assemblages and Actor-networks: Rethinking Socio-material Power, Politics and Space', *Geography Compass*, 9 (1), pp. 27 - 41. doi: https://doi.org/10.1111/gec3.12192

Murray, R., and O'Brien, L. (2005) *'Such enthusiasm – a joy to see': An evaluation of Forest School in England.* Available at: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.549.723&rep=rep1&type=pdf (Accessed on 27 July 2022).

Murris, K., and Borcherds, C. (2019) 'Childing: A Different Sense of Time' in Hodgins, B. (ed.) *Feminist research for 21st century childhoods: Common worlds methods.* London: Bloomsbury Academic, pp. 197 - 208.

Mycock, K. (2018) 'Playing with mud- becoming stuck, becoming free? ... The negotiation of gendered/class identities when learning outdoors', *Children's Geographies*, 17 (4), pp. 454 – 466. doi: https://doi.org/10.1080/14733285.2018.1546379

Nansen, B., Gibbs, L., MacDougall, C., Vetere, F., Ross N. J., and McKendrick, J. (2015) 'Children's interdependent mobility: compositions, collaborations and compromises' *Children's Geographies*, 13 (4), pp. 467-481. doi: https://doi.org/10.1080/14733285.2014.887813

NatureScot (2020) *Ecosystem Services – nature's benefits.* Available at: https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy-and-cop15/ecosystem-approach/ecosystem-services-natures-benefits (Accessed on 16 July 2022).

Navaro, Y. (2017) 'Diversifying Affect', *Cultural Anthropology,* 32 (2), pp. 209 - 214. doi: https://doi.org/10.14506/ca32.2.05

Nebel, S., Schneider, S., and Rey, G. D. (2016). 'Mining Learning and Crafting Scientific Experi ments: A Literature Review on the Use of Minecraft in Education and Research' *Educational Technology & Society*, 19 (2), pp. 355 - 366. Available at: https://www.jstor.org/stable/jeductechsoci.19.2.355 (Accessed 17 July 2022).

Neimanis, A. (2013) 'feminist subjectivity, watered', *Feminist Review,* 103, pp 23 - 41. Available at: https://www.jstor.org/stable/41819667 (Accessed on: 12 Jan 2021).

Neimanis, A. (2016) 'Posthuman Phenomenologies for Planetary Bodies of Water', in Åsberg, C., and Braidotti, R. (eds) *A Feminist Companion to the Posthumanities.* Cham: Springer International Publishing, pp. 55 – 66.

Neimanis, A., and Walker, R. L. (2014) '" Weathering": Climate Change and the "Thick Time" of Transcorporeality', *Hypatia,* 29 (3), pp. 558 - 575. Available at: https://www.jstor.org/stable/24542017 (Accessed on 02 Feb 2022)

Neimanis, A. (2017) *Bodies of Water: Posthuman Feminist Phenomenology*. London: Bloomsbury Publishing Plc.

Neimanis, A. (2019) 'The Weather Underwater: Blackness, White Feminism, and the Breathless Sea', *Australian Feminist Studies*, 34 (102), pp. 490 - 508. doi: https://doi.org/10.1080/08164649.2019.1697178

Neumann, M., and Herodotou, C. (2020) 'Young Children and YouTube: A global phenomenon', *Childhood Education*, 96 (4), pp. 72 - 77. doi: https://doi.org/10.1080/00094056.2020.1796459

Nordstrom, S. (2015) 'Not So Innocent Anymore: Making Recording Devices Matter in Qualitative Interviews', *Qualitative Inquiry,* 21 (4), pp. 388 - 401. doi: https://doi.org/10.1177%2F1077800414563804

Nordstrom, S. N. (2018) 'Antimethodology: Postqualitative Generative Conventions', *Qualitative Inquiry,* 24 (3), pp. 215 - 226. doi: https://doi.org/10.1177%2F1077800417704469

Nxumalo, F. (2016) 'Storying practices of witnessing: Refiguring quality in everyday pedagogical encounters', *Contemporary Issues in Early Childhood*, 17 (1), pp. 39 - 53. doi: https://doi.org/10.1177%2F1463949115627898

Nxumalo, F. (2017) 'Geotheorizing mountain–child relations within anthropogenic inheritances', *Children's Geographies*, 15 (5), pp. 558 - 569. doi: https://doi.org/10.1080/14733285.2017.1291909

Nxumalo, F. (2018) 'Stories for living on a damaged planet: Environmental education in a preschool classroom', *Journal of Early Classroom Research,* 16 (2), pp. 148 - 159. doi: https://doi.org/10.1177%2F1476718X17715499

Nxumalo, F. (2019) 'Presencing: Decolonial Attunements to Children's Place Relations', in Hodgins, B. (ed.) *Feminist research for 21st century childhoods: Common worlds methods.* London: Bloomsbury Academic, pp. 159 - 167.

Nxumalo, F., and Cedillo, S. (2017) 'Decolonizing place in early childhood studies: Thinking with Indigenous onto-epistemologies and Black feminist geographies', *Global Studies of Childhood,* 7 (2), pp. 99 - 112. doi: https://doi.org/10.1177%2F2043610617703831

Nxumalo, F., and Pacini-Ketchabaw, V. (2017) ''Staying with the trouble' in child-insect-educator common worlds', *Environmental Education Research*, 23 (10), pp. 1414 - 1426. doi: https://doi.org/10.1080/13504622.2017.1325447

Nxumalo, F., and Rubin, J. C. (2018) 'Encountering Waste Landscapes: More-Than-Human Place Literacies in Early Childhood Education', in Kuby, C. R., Spector, K., and Thiel, J. J. (eds) *Posthumanism and Literacy Education: Knowing/Becoming/Doing Literacies.* Oxon: Routledge, pp. 201 – 213.

O'Brien, L., and Murray, R. (2006) *A marvellous opportunity for children to learn: A participatory evaluation of Forest School in England and Wales.* Surrey: Forest Research. Available at: https://cdn.forestresearch.gov.uk/2022/02/fr0112forestschoolsreport.pdf (Accessed 28 July 2022).

Ofstead (2019) *School Report: Moor Green Primary Academy.* Available at: https://files.ofsted.gov.uk/v1/file/50058924 (Accessed on 26 July 2022).

Ofstead (2019a) *Uffculme School.* Available at: https://files.ofsted.gov.uk/v1/file/50092295 (Accessed 28 July 2022).

Ordinance Survey (2020) 'B13 8QG'. Available at: https://explore.osmaps.com/?lat=52.439817&lon=-1.911599&zoom=13.5206&overlays=&style=Standard&type=2d&placesCategory= (Accessed on 05 August 2022).

Ottersland Myhre, C., Myrvold, H. B., Joramo, U-W., and Thoresen, M. (2017) 'Stumbling into the 'kitchen island': Becoming through intra-actions with objects and theories', *Contemporary Issues in Early Childhood*, 18 (3), pp. 308 - 321. doi: https://doi.org/10.1177%2F1463949117731024

Outdoors Weekly (2019) *I went Diving Under A Bridge And Discovered Something Terrifying.* October 5 2019. Available at: https://youtu.be/58lnxRPLCFI (Accessed on 15 December 2020).

Pacini-Ketchabaw, V. (2012) 'Acting with the Clock: clocking practices in early childhood', *Contemporary Issues in Early Childhood,* 13 (2), pp. 154 - 160. doi: http://doi.org/10.2304/ciec.2012.13.2.154

Pacini-Ketchabaw, V. (2013) 'Frictions in Forest Pedagogies: common worlds in settler colonial spaces', *Global Studies of Childhood,* 3 (4), pp. 355 - 365. doi: http://doi.org/10.2304/gsch.2013.3.4.355

Pacini-Ketchabaw, V., Nxumalo, F., and Rowan, C. (2011) 'Nomadic Research Practices in Early Childhood: Interrupting Racisms and Colonialisms', *Reconceptualizing Educational Research Methodology*, *2* (1), pp. 19 - 33. doi: https://doi.org/10.7577/rerm.174

Pacini-Ketchabaw, V., Nxumalo, F., and Rowan, C. (2014) 'Researching Neoliberal and Neocolonial Assemblages in Early Childhood Education', *International Review of Qualitative Research,* 7 (1), pp. 39 - 57. Available at: https://www.jstor.org/stable/10.1525/irqr.2014.7.1.39 (Accessed on 17 December 2018).

Pacini-Ketchabaw, V., and Taylor, A. (2015) 'Introduction: Unsettling the Colonial Places and Spaces of Early Childhood Education in Settler Colonial Societies' in Pacini-Ketchabaw, V. and Taylor, A. (eds) *Unsettling the Colonial Places and Spaces of Early Childhood Education*. New York: Routledge, pp. 1 - 18.

Pacini-Ketchabaw, V., and Kummen, K. (2016) 'Shifting temporal frames in children's common worlds in the Anthropocene', *Contemporary Issues in Early Childhood,* 17 (4), pp. 431 - 441. doi: https://doi.org/10.1177%2F1463949116677930

Pacini-Ketchabaw, V., and Clark, V. (2016) 'Following watery relations in early childhood pedagogies', *Journal of Early Childhood Research,* 14 (1), pp. 98 - 111. doi: https://doi.org/10.1177%2F1476718X14529281

Pacini-Ketchabaw, V., Taylor, A., and Blaise, M. (2016) 'Decentring the Human in Multispecies Ethnographies' in Taylor, A., and Hughes, C. (eds) *Posthuman Research Practices in Education.* Hampshire: Palgrave Macmillan, pp. 149 – 167.

Pacini-Ketchabaw, V., and Blaise, M. (2021) 'Feminist ethicality in child-animal research: worlding through complex stories', *Children's Geographies*. doi: https://doi.org/10.1080/14733285.2021.1907311

Pahl, K., and Pool, S. (2021) 'Doing Research-Creation in School: Keeping an Eye on the Ball', *The International Journal of Art & Design Education,* 40 (3), pp. 655 - 667. doi: https://doi.org/10.1111/jade.12373

Palmer, S. (2006) Toxic Childhood: How the Modern World is Damaging Our Children and What We Can Do About It. London: Orion Books.

Parry, B. L., and Taylor, L. (2021) 'Emergent digital authoring: Playful tinkering with mode, media, and technology', *Theory Into Practice*, 60 (2), pp. 148 - 159. doi: https://doi.org/10.1080/00405841.2020.1857127

Paterson, M. (2006) 'Feel the presence: technologies of touch and distance', Environment and Planning D: Society and Space', 24, pp. 691 - 708. doi: https://doi.org/10.1068%2Fd394t

Paterson, M. (2009) 'Haptic geographies: ethnography, haptic knowledges and sensuous dispositions', *Progress in Human Geography,* 33 (6), pp. 766 - 788. doi: https://doi.org/10.1177%2F0309132509103155

Paterson, M. (2011) 'More-than visual approaches to architecture. Vision, touch, technique', *Social & Cultural Geography,* 12 (3), pp. 263 - 281. doi: https://doi.org/10.1080/14649365.2011.564733

Paterson, M. and Glass, M. (2020) 'Seeing, feeling, and showing 'bodies-in-place': exploring reflexivity and the multisensory body through videography', *Social & Cultural Geography*, 21 (1), pp. 1 - 24. doi: https://doi.org/10.1080/14649365.2018.1433866

Pearce, C., and MacLure, M. (2009) 'The wonder of method', *International Journal of Research & Method in Education*, 32 (3), pp. 249 – 265. doi: https://doi.org/10.1080/17437270903259733

Pedersen, H. and Pini, B. (2017) 'Educational epistemologies and methods in a more-than-human world', *Educational Philosophy and Theory,* 49 (11), pp. 1051 – 1054. doi: https://doi.org/10.1080/00131857.2016.1199925

Penvenne, J. M. (2013) 'Review' (Reviewed Work(s): Chocolate Islands: Cocoa, Slavery and Colonial Africa by Catherine Higgs), *The International Journal of African Historical Studies,* 46 (2), pp. 339 - 341. Available at: https://www.jstor.org/stable/24393397 (Accessed on 24 January, 2022).

Pergams, O., and Zaradic, P. (2006) 'Is love of nature in the US becoming love of electronic media? 16-year downtrend in national park visits explained by watching movies, playing video games, internet use, and oil prices'. *Journal of Environmental Management,* 80, pp. 387 - 393. doi: https://doi.org/10.1016/j.jenvman.2006.02.001

Pimlott-Wilson, H., and Coates, J. (2019) 'Rethinking learning? Challenging and accommodating neoliberal educational agenda in the integration of Forest School into mainstream educational settings', *The Geographical Journal,* 185, pp. 268 - 278. doi: https://doi.org/10.1111/geoj.12302

Pink, S. Mackley, K. L., and Moroșanu, R. (2014) 'Researching in atmospheres: video and the 'feel' of the mundane', *Visual Communication,* 14 (3), pp. 351 - 369. doi: https://doi.org/10.1177/1470357215579580

Pitt, H. (2018) 'Questioning care cultivated through connecting with more-than-human communities', *Social & Cultural Geography,* 19 (2), pp. 253 - 274. doi: https://doi.org/10.1080/14649365.2016.1275753

Pittaway, G. (2019) *Highbury Park: The History Within.* Available at: https://highburyparkfriends.org.uk/text/history/Highbury%20Park%20The%20History%20Within%20.pdf (Accessed on 11 January 2022).

Plowman, L. (2016) 'Rethinking context: Digital technologies and children's everyday lives', *Children's Geographies*, 14 (2), pp. 190 - 202. doi: https://doi.org/10.1080/14733285.2015.1127326

Population of Birmingham 2021/2022 (2022) Available at: https://populationdata.org.uk/population-of-birmingham/ (Accessed on 16 July 2022).

Postila, T. E. (2019) 'Water as method: Explorations of locally situated environmental issues together with preschool children', *Australian Journal of Environmental Education,* 35, pp. 222 - 229. doi: https://doi.org/10.1017/aee.2019.27

Postqualitative Research (2021) *Reanimating Video and Sound in Research Practices with Soern Finn Menning, Karin Murris and Jon Wargo.* (24 March 2021) Available at: https://www.youtube.com/watch?v=tMq8V9o1g6w (Accessed 06 April 2021).

Powell. K. (2016) 'Multimodal Mapmaking: Working Toward an Entangled Methodology of Place', *Anthropology & Education,* 47 (4), pp. 402 - 420. doi: https://doi.org/10.1111/aeq.12168

Prévot, P., Clayton, S., and Mathevet, R. (2018) 'The relationship of childhood upbringing and university degree program to environmental identity: experience in nature matters', *Environmental Education Research,* 24 (2), pp. 263-279. doi: https://doi.org/10.1080/13504622.2016.1249456

Prout, A. (2004) *The Future of Childhood.* London: Routledge.

Prout, A., and James, A. (eds) (1990) *Constructing and reconstructing childhood: contemporary issues in the sociological study of childhood.* London: Falmer Press.

Puig de la Bellacasa, M. (2017) *Matters of Care: Speculative Ethics in More Than Human Worlds*. Minneapolis: University of Minnesota Press.

Pyyry, N., and Tani, S. (2019) 'More-than-human playful politics in young people's practices of dwelling with the city', *Social & Cultural Geography*, 20 (9), pp. 1218 - 1232. doi: https://doi.org/10.1080/14649365.2017.1358823

Rautio, P. (2013) 'Being nature: interspecies articulation as a species-specific practice of relating to environment', *Environmental Education Research*, 19 (4), pp. 445 - 457. doi: https://doi.org/10.1080/13504622.2012.700698

Rautio, P. (2013a) 'Children who carry stones in their pockets: on autotelic material practices in everyday life', *Children's Geographies*, 11 (4), pp. 394 – 408. doi: https://doi.org/10.1080/14733285.2013.812278

Rautio, P. (2014) 'Mingling and imitating in producing spaces for knowing and being: Insights from a Finnish study of child-matter intra-action' *Childhood* 21 (4), pp. 461 - 474. doi: https://doi.org/10.1177%2F0907568213496653

Rautio, P. (2021) 'Post-Qualitative Inquiry: Four Balancing Acts in Crafting Alternative Stories to Live By', *Qualitative Inquiry,* 27 (2), pp. 228 - 230. doi: https://doi.org/10.1177%2F1077800420933297

Rautio, P., and Winston, J. (2015) 'Things and children in play – improvisation with language and matter', *Discourse: Studies in the Cultural Politics of Education*, 36 (1), 15 - 26. Doi: https://doi.org/10.1080/01596306.2013.830806

Rautio, P., Hohti, R., Leinonen, R-M., and Tammi, T. (2017) 'Reconfiguring urban environmental education with 'shitgull' and a 'shop'', *Environmental Education Research*, 23 (10), pp. 1379 - 1390. doi: https://doi.org/10.1080/13504622.2017.1325446

Renold, E., and Ivinson, G. (2019) 'Anticipating the more-than: Working with prehension in artful interventions with young people in a post-industrial community', *Futures,* 112, 1 - 14. doi: https://doi.org/10.1016/j.futures.2019.05.006

Richardson-Ngwenya, P. (2014) 'Performing a more-than- human material imagination during fieldwork: muddy boots, diarizing and putting vitalism on video', *cultural geographies,* 21 (2), pp. 293 - 299. doi: https://doi.org/10.1177%2F1474474012469004

Richardson, M., Hussain, Z., and Griffiths, M. (2018) 'Problematic smartphone use, nature connectedness, and anxiety', *Journal of Behavioural Addictions*, 7 (1), pp. 109 - 116. doi: https://doi.org/10.1556/2006.7.2018.10

Richardson, M., Hunt, A., Hinds, J., Bragg, R., Fido, D., Petronzi, D., Barbett, L., Clitherow, T., and White, M. (2019) 'A Measure of Nature Connectedness for Children and Adults: Validation, Performance, and Insights', *Sustainability*, 11 (2), pp. 1 - 16. doi: https://doi.org/10.3390/su11123250

Ridgers, N., Knowles, Z., and Sayers, J. (2012) 'Encouraging play in the natural environment: a child-focused case study of Forest School', *Children's Geographies*, 10 (1), pp. 49-65. doi: https://doi.org/10.1080/14733285.2011.638176

Riley, K. (2020) 'Posthumanist and Postcolonial Possibilities for Outdoor Experiential Education', *Journal of Experiential Education,* 43 (1), pp. 88 - 101. doi: https://doi.org/10.1177%2F1053825919881784

Rios, C., and Menezes, I. (2017) 'I saw a magical garden with flowers that people could not damage!': children's visions of nature and of learning about nature in and out of school', *Environmental Education Research*, 23 (10), pp. 1402-1413. doi: https://doi.org/10.1080/13504622.2017.1325450

Rooney, T. (2018) 'Weather worlding: learning with the elements in early childhood', *Environmental Education Research,* 24 (1), 1 - 12. doi: https://doi.org/10.1080/13504622.2016.1217398

Rooney, T. (2019) 'Weathering time: walking with young children in a changing climate', *Children's Geographies*, 17 (2), pp. 177 - 189. doi: https://doi.org/10.1080/14733285.2018.1474172

Rooney, T., Blaise, M., and Royds, F. (2021) 'With shadows, dust and mud: Activating weathering-with pedagogies in early childhood education', *Contemporary Issues in Early Childhood,* 22 (2), pp. 109 - 123. doi: https://doi.org/10.1177%2F1463949120939202

Rousell, D., and Cutter-Mackenzie-Knowles, A. (2019) 'A systematic review of climate change education: giving children and young people a 'voice' and a 'hand' in redressing climate change', *Children's Geographies,* 18 (2), pp. 191 - 208. doi: https://doi.org/10.1080/14733285.2019.1614532

Saripalli, V. (2021) 'Cadbury, Cocoa, and Colonialism in West Africa', *Brown Political Review* Available at: https://brownpoliticalreview.org/2021/01/cadburycocoacolonialism/ (Accessed on 16 July 2022).

Schlör, H., Zapp, P., Marx, J., Schreiber, A., Venghaus, S., and Hake, J. (2017) 'The social footprint of permanent magnet production based on rare earth elements – a social life cycle assessment scenario', *Energy Procedia,* 142, pp. 984 - 990. doi: https://doi.org/10.1016/j.egypro.2017.12.157

Sefton-Green, J., Nixon, H., and Erstad, O. (2009) 'Reviewing Approaches and Perspectives on "Digital Literacy"', *Pedagogies: An International Journal*, 4 (2), pp. 107 - 125. doi: https://doi.org/10.1080/15544800902741556

Shannon, D. B., and Truman, S. E. (2020) 'Problematizing Sound Methods Through Music Research-Creation: Oblique Curiosities', *International Journal of Qualitative Methods*, 19, pp. 1-12. doi: https://doi.org/10.1177/1609406920903224

Shannon, D. B. (2021) 'What do 'propositions' do for research-creation? Truth and modality in Whitehead and Wittgenstein', *Journal of New Materialist Research,* 2 (2), pp. 50 – 75. doi: https://doi.org/10.1344/jnmr.v2i2.35891

Sharp, L. (2017) 'The Geology of Minecraft', *Teaching Science,* 63 (1), pp. 14 - 17. Available at: https://www.thefreelibrary.com/The%20geology%20of%20Minecraft-a0489256229 (Accessed 01 August 2022).

Sheldrake, R., Amos, R., and Reiss, M. (2019) *Children and Nature: A research evaluation for The Wildlife Trusts.* Available at: https://www.wildlifetrusts.org/sites/default/files/2019-11/Children%20and%20Nature%20-%20UCL%20and%20The%20Wildlife%20Trusts%20Full%20Report.pdf (Accessed on 01 August 2022).

Shellar, M. (2015) 'Vital Methodologies: Live Methods, Mobile Art, and Research-Creation' in Vannini, P. (ed) *Non-representational methodologies: Re-envisioning research*. London: Routledge, pp. 130 – 145.

Shelton, S. A., and Melchior, S. (2020) 'Queer Temporalities, Spacetimematterings, and a Pedagogy of Vulnerability in Qualitative Inquiry', *Qualitative Inquiry,* 26 (1), pp. 51 - 59. doi: https://doi.org/10.1177%2F1077800419868507

Short, D. (2012) 'Teaching scientific concepts using a virtual world – Minecraft', *Teaching Science,* 58 (3), pp. 55 – 58. Available at: https://www.academia.edu/1891072/Teaching_Scientific_Concepts_Using_a_Virtual_World_Minecraft (Accessed on 01 August 2022).

Skår, M. (2010) 'Forest dear and forest fear: Dwellers' relationships to their neighbourhood forest', *Landscape and Urban Planning,* 98, pp. 110 -115. doi: https://doi.org/10.1016/j.landurbplan.2010.07.017

Skår, M., and Krogh, E. (2009) 'Changes in children's nature-based experiences near home: from spontaneous play to adult-controlled, planned and organised activities', *Children's Geographies*, 7 (3), pp. 339-354. doi: https://doi.org/10.1080/14733280903024506

Skar, S., Gundersen, V. and O'Brien, L. (2016) 'How to engage children with nature: why not just let them play?', *Children's Geographies*, 14 (5), pp. 527-540. doi: https://doi.org/10.1080/14733285.2015.1136734

Slater, A. (2018) *Moseley, 1838* Available at: https://andyunderscore.com/2018/01/20/moseley-1838/ (Accessed on 16 July 2022).

Slater, A. (2020) *Highbury Park: Terrestrial Invertebrate Survey.* Available at: https://highburyparkfriends.org.uk/text/history/Highbury%20Park%20The%20History%20Within%20.pdf (Accessed on 05 July 2022).

Smith, M. N., Dunhill, A., and Scott, G. W. (2018) 'Fostering children's relationship with nature: exploring the potential of Forest School', *Education 3-13*, 46 (5), pp. 525-534. doi: https://doi.org/10.1080/03004279.2017.1298644

Smith, T.A. and Dunkley, R. (2018) 'Technology-nonhuman-child assemblages: reconceptualising rural childhood roaming' *Children's Geographies*, *16*(3), pp.304-318.

Snaza, N., Sonu, D., Truman, S E., and Zaliwska, Z. (2016) 'Introduction: Re-attuning to the Materiality of Education', *Counterpoints,* 50, pp. xv - xxxiii. Available at: https://www.jstor.org/stable/45157524 (Accessed on: 22 October 2020).

Somerville, M., and Hickey, S. (2017) 'Between indigenous and non- indigenous: urban/nature/child pedagogies', *Environmental Education Research*, 23 (10), pp. 1427 - 1439. doi: https://doi.org/10.1080/13504622.2017.1325451

Somerville, M., and Powell, S. J. (2019) 'Thinking posthuman with mud: and children of the Anthropocene', *Educational Philosophy and Theory,* 51 (8), pp. 829 – 840. doi: https://doi.org/10.1080/00131857.2018.1516138

Somerville, M., Woods, A., Duhn, I., Rautio, P., Powell, S., McConnell-Imbriotis, A., and Galvez, S. (2021) 'Big data: and the micropolitics of entanglement in the Earth's becoming', *International Journal of Qualitative Studies in Education,* 34 (4), pp. 277 - 294. doi: https://doi.org/10.1080/09518398.2020.1753848

Springgay, S., and Truman, S. E. (2015) 'The Primacy of Movement in Research-Creation: New Materialist Approaches to Art Research and Pedagogy', in Laverty, M., and Lewis, T.

(eds) *Arts Teachings, Teaching's Art: Philosophical, Critical and Educational Musings.* Dordrecht: Springer Science+Business Media, pp. 151 – 164.

Springgay, S., and Truman, S. E. (2016) *Propositions for Research-Creation.* Available at: https://walkinglab.org/research-creation/ (Accessed on 27 July 2022).

Springgay, S., and Truman, S. E. (2017) '*Stone Walks:* inhuman animacies and queer archives of feeling', *Discourse: Studies in the Cultural Politics of Education*, 38 (6), pp. 851 - 863. doi: https://doi.org/10.1080/01596306.2016.1226777

Springgay, S., and Truman, S. E. (2017a) 'A Transmaterial Approach to Walking Methodologies: Embodiment, Affect, and a Sonic Art Performance', *Body & Society,* 23 (4), pp. 27 - 58. doi: https://doi.org/10.1177%2F1357034X17732626

Springgay, S., and Truman, S. E. (2018) 'On the Need for Methods Beyond Proceduralism: Speculative Middles, (In) Tensions, and Response-Ability in Research', *Qualitiative Inquiry,* 24 (3), pp. 203 - 214. doi: https://doi.org/10.1177%2F1077800417704464

Springgay, S., and Truman, S. E. (2019) *Walking Methodologies in a More-than-Human Worlds: WalkingLab.* Oxon: Routledge.

Springgay, S., and Truman, S. E. (2019a) 'Counterfuturisms and speculative temporalities: walking research-creation in school', *International Journal of Qualitative Studies in Education*, 32 (6), pp. 547 - 559. doi: https://doi.org/10.1080/09518398.2019.1597210

Springgay, S., and Truman, S. E. (2019b) 'Research-Creation Walking Methodologies and an Unsettling of Time', *International Review of Qualitative Research',* 12 (1), pp. 85 - 93. doi: https://doi.org/10.1525%2Firqr.2019.12.1.85

Springgay, S., Truman, A., and MacLean, S. (2020) 'Socially Engaged Art, Experimental Pedagogies, and Anarchiving as Research-Creation', *Qualitative Inquiry.* 26 (7), pp. 897 - 907. doi: https://doi.org/10.1177%2F1077800419884964

Springgay, S., and Zaliwska, Z. (2015) 'Diagrams and Cuts: A Materialist Approach to Research-Creation', *Cultural Studies ↔ Critical Methodologies,* 15 (2), pp. 136 – 144. doi: https://doi.org/10.1177%2F1532708614562881

Stewart, K. (2017) 'In the World that Affect Proposed', *Cultural Anthropology,* 32 (2), pp. 192 - 198. doi: https://doi.org/10.14506/ca32.2.03

St. Hilaire, E. (2018) 'Who Should Care About Responsible Conduct of Research in Research-Creation?', *Canadian Art Review,* 43 (1), pp. 25 - 38. Available at: https://www.jstor.org/stable/26454006. (Accessed on 6 September 2021)

St. Pierre, E. A. (2013) 'The Appearance of Data', *Cultural Studies ↔ Critical Methodologies,* 13 (4), pp. 223 - 227. doi: https://doi.org/10.1177%2F1532708613487862

St. Pierre, E. A. (2016) 'Untraining educational researchers', *Research in Education,* 96 (1), pp. 6 - 11. doi: https://doi.org/10.1177%2F0034523716664581

St. Pierre, E. A. (2016a) 'Rethinking the Empirical in the Posthuman' in Taylor, C. A., and Hughes, C. (eds) *Posthuman Research Practices in Education.* Hampshire: Palgrave Macmillan, pp. 25 – 36.

St. Pierre, E. A. (2018) 'Postmodernism is not dead', *Educational Philosophy and Theory*, 50 (14), pp. 1574 - 1575. doi: https://doi.org/10.1080/00131857.2018.1461362

St. Pierre, E. A. (2018a) 'Writing Post Qualitative Inquiry', *Qualitative Inquiry,* 24 (9), pp. 603 - 608. doi: https://doi.org/10.1177%2F1077800417734567

St. Pierre, E. A., and Jackson, A. (2014) 'Qualitative Data Analysis After Coding', *Qualitative Inquiry,* 20 (6), pp. 715 - 719. doi: https://doi.org/10.1177%2F1077800414532435

Street Hoover, K. (2021) 'Children in nature: exploring the relationship between childhood outdoor experience and environmental stewardship', *Environmental Education Research*, 27(6), pp. 894 - 910. doi: https://doi.org/10.1080/13504622.2020.1856790

Sturrock, S. (2021) 'Primary teachers' experiences of neo-liberal education reform in England: 'Nothing is ever good enough', *Research Papers in Education,* ahead of print, pp. 1-27. doi: https://doi.org/10.1080/02671522.2021.1941213

Styres, S., Haig-Brown, C., and Blimkie, M. (2013) 'Towards a Pedagogy of Land: The Urban Context', *Canadian Journal of Education,* 36 (2), pp. 34 - 67. Available at: https://journals.sfu.ca/cje/index.php/cje-rce/article/view/1293 (Accessed on: 25 July 2022).

Sumartojo, S., and Graves, M. (2021) 'Feeling through the screen: memory sites, affective entanglements, and digital materialities', *Social & Cultural Geography*, 22 (2), pp. 231 - 249. doi: https://doi.org10.1080/14649365.2018.1563711

Sweet, J. D., Nurminen, E., and Koro-Ljungberg, M. (2020) 'Becoming Research With Shadow Work: Combining Artful Inquiry With Research-Creation', *Qualitative Inquiry,* 26 (3-4), pp. 388 - 399. doi: https://doi.org/10.1177%2F1077800419857764

Talebpour, L. M., Busk, P.L., Heimlich, J. E., and Ardoin, N. M. (2020) 'Children's connection to nature as fostered through residential environmental education programs: Key variables explored through surveys and field journals', *Environmental Education Research*, 26 (1), pp. 95 - 114. doi: https://doi.org/10.1080/13504622.2019.1707778

Tan, E. (2013) 'Informal learning on YouTube: exploring digital literacy in independent online learning', *Learning, Media and Technology*, 38 (4), pp. 463 - 477. doi: https://doi.org/10.1080/17439884.2013.783594

Taylor, A. A. (2007) 'Review: Cadbury's Tires with Slave-Grown Cocoa' (Reviewed Work(s): Chocolate on Trial: Slavery, Politics and the Ethics of Business by Satre, L.) *The Journal of African History,* 48 (1), pp. 154 - 155. Available at: https://www.jstor.org/stable/4501024 (Accessed 24 January 2022)

Taylor, A. (2013) *Reconfiguring the Natures of Childhood*. Oxon: Routledge.

Taylor, A. (2019) *ECEBC 2019 04 11 Keynote Address v2 2*. June 15 2019. Available at: https://www.youtube.com/watch?v=G6IW1yyH_1k (Accessed on 17 March 2021)

Taylor, A. (2020) 'Downstream River Dialogues: An Educational Journey Toward a Planetary-Scaled Ecological Imagination', *ECNU Review of Education,* 3 (1), pp. 107 - 137. doi: https://doi.org/10.1177%2F2096531120905194

Taylor, A., Pacini-Ketchabaw, V., and Blaise, M. (2012) 'Children's Relations to the More-than-Human World', *Contemporary Issues in Early Childhood*, 13 (2), pp. 81 - 85. doi: http://doi.org/10.2304/ciec.2012.13.2.81

Taylor, A., and Giugni, M. (2012) 'Common Worlds: reconceptualising inclusion in early childhood communities', *Contemporary Issues in Early Childhood,* 13 (2), pp. 108 - 119. doi: http://doi.org/10.2304/ciec.2012.13.2.108

Taylor, C. A., and Ivinson, G. (2013) 'Material feminisms: new directions for education', *Gender and Education,* 25 (6), pp. 665 – 670. doi: https://doi.org/10.1080/09540253.2013.834617

Taylor, A., Blaise, M., and Giugni, M. (2013) 'Haraway's 'bag lady story-telling': relocating childhood and learning within a 'post-human landscape'', *Discourse: Studies in the Cultural Politics of Education*, 34 (1), pp. 48 - 62. doi: https://doi.org/10.1080/01596306.2012.698863

Taylor, A., and Pacini-Ketchabaw, V. (2015) 'Learning with children, ants, and worms in the Anthropocene: towards a common world pedagogy of multispecies vulnerability', *Pedagogy, Culture & Society*, 23 (4), pp. 507 - 529. doi: https://doi.org/10.1080/14681366.2015.1039050

Taylor, C. A., and Hughes, C. (2016) *Posthuman Research Practices in Education.* Hampshire: Palgrave Macmillan.

Taylor, A., and Pacini-Ketchabaw, V. (2017) 'Kids, raccoons, and roos: awkward encounters and mixed affects', *Children's Geographies*, 15 (2), pp. 131 - 145. doi: https://doi.org/10.1080/14733285.2016.1199849

TheSchoolRun (2022) *The parent's guide to the pupil premium.* Available at: https://www.theschoolrun.com/parents-guide-pupil-premium (Accessed on 16 July 2022)

Thrift, N. (2004) 'Summoning life' in Cloke, P., Crang, P., and Goodwin, M. (eds) *Envisioning Human Geographies.* (1st edition). Oxon: Routledge, pp. 81 – 103.

Thrift, N. (2007) *Non-representational theory: space, politics, affect.* Abingdon: Routledge.

Tillmann, S., Button, B., Coen, S. E., and Gilliland, J. A. (2019) 'Nature makes people happy, that's what it sort of means:' children's definitions and perceptions of nature in rural Northwestern Ontario, Children's Geographies, 17 (6), pp. 705-718. doi: https://doi.org/10.1080/14733285.2018.1550572

Trapasso, E., et al. (2018) 'Exploring Gender Differences within Forest Schools as a Physical Activity Intervention', *Children,* 5 (138), pp. 1 -18. doi: https://doi.org.10.3390/children5100138

Truman, S. E. (2019) 'Feminist New Materialisms', *SAGE Research Methods,* pp. 1 - 13. doi: https://dx.doi.org/10.4135/9781526421036808740

Truman, S. E. (2019a) 'SF! Haraway's Situated Feminisms and Speculative Fabulations in English Class' *Studies in Philosophy and Education*, 38, pp. 31 - 42. doi: https://doi.org/10.1007/s11217-018-9632-5

Truman, S. E. (2020) 'The Intimacies of Doing Research-Creation', in Loveless, N. (ed) *Knowings and knots: methodologies and ecologies in research-creation.* Alberta: University of Alberta Press, pp. 211 – 220.

Truman, S. E. (2022) *Feminist Speculations and the Practice of Research-Creation: Writing Pedagogies and Intertextual Affects.* Oxon: Routledge

Truman, S. E., and Springgay, S. (2019) 'Queer Walking Tours and the affective contours of place', *cultural geographies,* 26 (4), pp. 527 - 534. doi: https://doi.org/10.1177%2F1474474019842888

Tsevreni, I. (2011) 'Towards and environmental education without scientific knowledge: an attempt to create an action model based on children's experiences, emotions and perceptions about their environment', *Environmental Education Research,* 17 (1), pp. 53 - 67. doi: https://doi.org/10.1080/13504621003637029

Tsing, A. L. (2015) *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins.* Oxford: Princeton University Press.

Tuck, E., and McKenzie, M. (2014). *Place in Research: Theory, methodology, and methods*. New York: Routledge.

Ulmer, J. (2017) 'Writing Slow Ontology', *Qualitative Inquiry*, 23 (3), pp. 201 - 211. doi: https://doi.org/10.1177%2F1077800416643994

Ulmer, J. B. (2017a) 'Posthumanism as research methodology: inquiry in the Anthropocene', *International Journal of Qualitative Studies in Education*, 30 (9), pp. 832 - 848. doi: https://doi.org/10.1080/09518398.2017.1336806

Ulmer, J., and Koro-Ljungberg, M. (2015) 'Writing Visually Through (Methodological) Events and Cartography', *Qualitative Inquiry,* 21 (2), pp. 138 - 152. doi: https://doi.org/10.1177%2F1077800414542706

Valentine, G. (1996) 'Angels and Devils: moral landscapes of childhood' *Environment and Planning D: Society and Space,* 14, pp. 581 – 599. doi: https://doi.org/10.1068%2Fd140581

Valentine, G., & McKendrick, J. (1997) 'Children's Outdoor Play: Exploring Parental Concerns About Children's Safety and the Changing Nature of Childhood' *Geoforum* 28 (2), pp. 219-235. doi: https://doi.org/10.1016/S0016-7185(97)00010-9

Van der Tuin, I. (2011) ''New feminist materialisms', *Women's Studies International Forum,* 34 (4), pp. 271 - 277. doi: https://doi.org/10.1016/j.wsif.2011.04.002

Vannini, P. (2015) 'Non-representational ethnography: new ways of animating lifeworlds', *cultural geographies,* 22 (2), pp. 317 - 327. doi: https://doi.org/10.1177/1474474014555657

Vannini, P., Waskul, D., Gottschalk, S., and Ellis-Newstead, T. (2012) 'Making Sense of the Weather: Dwelling and Weathering on Canada's Rain Coast', *Space and Culture,* 15 (4), pp. 361 - 380. doi: https://doi.org/10.1177%2F1206331211412269

Vannini, P., and Taggart, J. (2014) 'Making Sense of Domestic Warmth: Affect, Involvement, and Thermoception in Off-grid Homes', *Body & Society,* 20 (1), pp. 61 - 84. doi: https://doi.org/10.1177/1357034X13499381

Vannini, P., and Stewart, L. M. (2017) 'The GoPro gaze', *cultural geographies,* 24 (1), pp. 149 - 155. doi: https://doi.org/10.1177%2F1474474016647369

Vannini, P., and Vannini, A. (2020) 'Attuning to wild atmospheres: Reflections on wildness as feeling', *Emotion, Space and Society,* 36, pp. 1 - 8. doi: https://doi.org/10.1016/j.emospa.2020.100711

Verstraete, P. (2017) 'Silence or the sound of limpid water: disability, power, and the educationalisation of silence', *Paedagogica Historica*, 53 (5), pp. 498 - 513. doi: https://doi.org/10.1080/00309230.2017.1296475

Vintimilla, C.D., Pacini-Ketchabaw, V., and Land, N. (2021) 'Manifesting living knowledges: A pedagogists' working manifesto', *Journal of Curriculum and Pedagogy*. doi: https://doi.org/10.1080/15505170.2021.1955051

Waite, S., Bølling, M., and Bentsen, P. (2016) 'Comparing apples and pears?: a conceptual framework for understanding forms of outdoor learning through comparison of English

Forest Schools and Danish *udeskole*', *Environmental Education Research*, 22 (6), pp. 868-892. doi: https://doi.org/10.1080/13504622.2015.1075193

Wall Kimmerer, R. (2020) *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants.* Paperback edition. London: Penguin Books Ltd.

Walking Lab (no date) *About* Available at: https://walkinglab.org/about/ (Accessed on 16 July 2022).

Wargo, J. (2017) 'Rhythmic rituals and emergent listening: Intra-activity, sonic sounds and digital composing with young children', *Journal of Early Childhood Literacy,* 17 (3), pp. 392 - 408. doi: https://doi.org/10.1177%2F1468798417712573

Wargo, J. M. (2018) 'Writing *with* Wearables? Young Children's Intra-Active Authoring and the Sounds of Emplaced Invention', *Journal of Literacy Research,* 50 (4), pp. 502 - 523. doi: https://doi.org/10.1177%2F1086296X18802880

Waterhouse, AHL., Otterstad, A, M., and Jensen, M. (2016) '…anything but synchronized swimming/methodologies … artistic movements in/with unknown interventions', *Qualitative Inquiry,* 22 (3), pp. 201 - 209. doi: https://doi.org/10.1177%2F1077800415605063

Weaver, J. A., and Snaza, N. (2017) 'Against methodocentrism in educational research', *Educational Philosophy and Theory*, 49 (11), pp. 1055 - 1065. doi: https://doi.org/10.1080/00131857.2016.1140015

Weldemariam, K. (2020) 'Learning with vital materialities: weather assemblage pedagogies in early childhood education', *Environmental Education Research*, 26 (7), pp. 935 - 949. doi: https://doi.org/10.1080/13504622.2020.1761300

Wells, N., and Evans, G. (2003) 'Nearby Nature: A Buffer of Life Stress Among Rural Children', *Environment and Behavior,* 35 (3), pp. 311 - 330. doi: https://doi.org/10.1177/0013916503251445

Werker, J., Wulf, C., Zapp, P. Schreiber, A., and Marx, J. (2019) 'Social LCA for rare earth NdFeB permanent magnets', *Sustainable Production and Consumption,* 19, pp. 257 - 269. doi: https://doi.org/10.1016/j.spc.2019.07.006

What is Forest School? (no date) Available at: https://forestschoolassociation.org/what-is-forest-school/ (Accessed 27 July 2022).

Whatmore, S. (2006) 'Materialist returns: practising cultural geography in and for a more-than-human world', *cultural geographies,* 13, pp. 600 - 609. doi: https://doi.org/10.1191%2F1474474006cgj377oa

White, H., and Trudgeon, R. (1983) 'Birmingham's Gun Quarter: A Skilled Trade in Decline', *Oral History,* 11 (2), pp. 69 - 83. Available at: https://www.jstor.org/stable/40178771(Accessed 01 March 2022)

White, E. J., Rooney, T., Gunn, A., and Nuttall. J. (2021) 'Understanding how early childhood educators 'see' learning through digitally cast eyes: Some preliminary concepts concerning the use of digital documentation platforms', *Australasian Journal of Early Childhood,* 46 (1), pp. 6 - 18. doi: https://doi.org/10.1177%2F1836939120979066

Woodyer, T. (2008) 'The body as research tool: embodied practice and children's geographies', *Children's Geographies*, 6 (4), pp. 349 - 362. doi: https://doi.org/10.1080/14733280802338056

Woodyer, T., and Geoghegan, H. (2012) '(Re)enchanting geography? The nature of being critical and the character of critique in human geography', *Progress in Human Geography*, 37 (2), pp. 195 - 214. doi: https://doi.org/10.1177%2F0309132512460905

Woolley, H. & Griffin, E. (2015) 'Decreasing experiences of home range, outdoor spaces, activities and companions: changes across three generations in Sheffield in north England', *Children's Geographies,* 13 (6), pp. 677-691. doi: https://doi/org10.1080/14733285.2014.952186

Wylie, J. (2005) 'A Single Day's Walking: Narrative Self and Landscape on the South West Coast Path', *Transactions of the Institute of British Geographers*, 30 (2), pp. 234 – 247. Available at: https://www.jstor.org/stable/3804521 (Accessed 28 July 2022).

Youngblood Jackson, A. (2010) 'Deleuze and the girl', *International Journal of Qualitative Studies in Education,* 23 (5), pp. 579 - 587. doi: https://doi.org/10.1080/09518398.2010.500630

Yusoff, K. (2015) 'Geologic subjects: nonhuman origins, geomorphic aesthetics and the art of becoming *in*human', *cultural geographies,* 22 (3), pp. 383 - 407. doi: https://doi.org/10.1177%2F1474474014545301

Yusoff, K. (2018) 'Politics of the Anthropocene: Formation of the Commons as a Geologic Process. *Antipode*, 50 (1), pp. 255 - 276. doi: https://doi.org/10.1111/anti.12334

9 APPENDICES

9.1 Information sheet for participants and parents/carers

9.2 Parent/ carer consent form

9.3 Participant consent form

9.4 Participant media consent form

9.5 Information for park users

9.6 Vimeo links to selection of videos

9.1 Appendix 1 – Information sheet for participants and parents/carers

Appendix 13

[redacted] – let's go out to the woods!

Who am I?

Hi my name is Polly, I am a researcher at the University of Birmingham. I am interested in woods, the outdoors, the environment and how you as young people think and feel about these things. I am also interested in what young people do in these places.

I am carrying out some research in Highbury Park over the next year and would like to invite you to take part.

What is the research about?

My project will look at young people in urban woodlands, asking questions such as:

When do you come here? What do you do here? Where do you go? Who do you come with? Do you run or walk or lie down or sit down? How does it make you feel? What do you listen to? What do you touch? What do you see? What does it make you think about?

The research will also explore other things living in the woods such as animals, birds, trees, water, soils and plants.

If I take part, what will I do?

- Walks around the woodland
- Making your own videos and recording sounds - together we will make a website
- Making leaf-fall traps and collecting materials (like leaves, sticks, mud) to make art
- Using microphones to listen to the other sounds in the woods (like the sounds underground, the sounds of trees and other animals)
- Measuring trees growing
- Measuring heat from our bodies, animals and trees
- Lighting fires and thinking about how we use fire
- Using our bodies to explore the woods, for example by lying down, climbing trees,
- Going on a trip to a research woodland where experiments about climate change are happening
- Arts and crafts workshops
- Interviews with Polly about how you feel about the project

What will happen to the information?

All the information you share with me will have your name and personal information removed. You shall help to edit the sound and video recordings and they will be put on a website. I shall also use the information to write reports to share with other researchers and educators.

We will store all the information on secure computers at the University of Birmingham and your name will not be used in this.

What happens if I change my mind about taking part?

That's ok! You are allowed to change your mind about taking part, you should only take part if you want to. If you change your mind after 30th November, then any of the information we have already collected will still be used but your face will be blurred out of any pictures and images we use.

For questions and inquiries, email Polly [redacted] or call University of Birmingham 0121 414 5531

9.2 Appendix 2 – Parent/carer consent form

Appendix 11

Polly Jarman Forest Edge PhD Researcher
[redacted]

UNIVERSITY OF BIRMINGHAM

Thesis research: exploring young people's encounters with urban woodlands in Birmingham.
Consent form for parents/guardians.

Thank you for supporting this research, as a parent/guardian of a participant in this research, please read these sentences and check that you agree. If you agree please initial each box and sign your name at the bottom of the page. All data relating to this research will be stored in accordance to the Data Protection Act, 2018.

☐ I have been given written and verbal information about the research.

☐ I have had the chance to ask questions about the research and I am happy with the answers.

☐ I understand that my child can choose to participate in this research and can withdraw their consent at any time during the research. If they choose to withdraw after November 30th 2019 then all information already gathered shall remain within the research but shall be anonymous and all images or photos used shall be blurred to ensure anonymity.

☐ I understand that as part of this work, participants will be recorded using video cameras and audio technologies during the walking interviews and focus group workshops.

☐ I understand that the original recordings of these activities shall not be shared with people outside of the research.

☐ I understand that participants will also have the opportunity to use video and audio technologies to make their own recordings.

☐ I consent to my child's image and voice being included in the recordings and videos created by participants, for use on an online blog, website as part of the evidence of this research and for editing into a final video or sound recording to support this research. This research will be available on the Internet for the public to view. Data from this research may also be used in published papers and future academic writing.

☐ I understand that my child will have the opportunity to view and listen to these recordings before they are published and will have the chance to help select images to be used on social media and the research blog.

☐ I understand that if I do not wish my child's image or voice to be used in the research that my child will be able to participate in some of the activities that do not include this element. If this consent is withdrawn after November 30th 2019 then all images in existing data shall be blurred to remain anonymous.

☐ I understand that all personal information of all participants shall be kept anonymous in all research reports, write-ups and any subsequent published papers. This includes the name, age, address, gender, ethnicity and disability status of participants.

I have read this consent form and understood the information leaflet. I therefore give permission for

..... (child's name) to participate

Name of parent / guardian	Date	Signature
Principal Investigator	Date	Signature

Copies: *Once all parties have signed, the parent/guardian should receive a copy of the signed and dated participant consent form. A copy of the signed and dated consent form should be placed in the main project file, which must be kept in a secure location*

9.3 Appendix 3 – Participant consent form

Appendix 5

Polly Jarman Forest Edge PhD Researcher
[redacted]

UNIVERSITY OF BIRMINGHAM

[redacted] Consent form for participants under 18.

Before you take part in this project, it is important that you read these sentences and check that you agree. If you agree please write your initials in each box then sign your name at the bottom of the page.
All data relating to this research will be stored in accordance to the Data Protection Act, 2018.

☐ I have been given written and verbal information about the research.

I ☐ have had the chance to ask Polly questions and I am happy with the answers.

☐ I understand that I can choose if I want to take part or not. If I wish to withdraw after November 30th 2019, my information will remain anonymously within the research but any images or photos in which my face is recognisable shall be blurred.

☐ I understand that I can change my mind about taking part at any time and it will not change how people treat me.

☐ I understand that I will be talking with Polly and sometimes also with other young people about my experiences.

☐ I don't have to answer all of the questions that Polly asks, I can say I don't want to answer that question.

☐ I understand that, if there is a concern about my wellbeing, welfare or safety, Polly and other adults cannot always keep what I say private and might need to tell someone else and that this will be explained to me if this happens.

☐ At any time, I can say to Polly I don't want her to write down something I say in the research report.

☐ My name and personal details, including my address, will not be in the final research report.

☐ I understand that the activities will be recorded using a Go-Pro and a Dictaphone, for Polly remember what is said.

I would like to take part in this project

_____	_____	_____
Name of young person	Date	Signature
_____	_____	_____
Principal Investigator	Date	Signature

Copies: *Once everyone has signed, the parent/guardian of the participant shall receive a copy. A copy of the signed and dated consent form should be placed in the main project file, which must be kept in a secure location*

9.4 Appendix 4 – Participant media consent form

Appendix 6

Polly Jarman Forest Edge PhD Researcher
[redacted]

[redacted] media consent form for participants under 18.

Before you take part in this project, it is important that you read these sentences and check that you agree. If you agree please write your name in each box then sign your name at the bottom of the page.
All data relating to this research will be stored in accordance to the Data Protection Act, 2018.

☐ I understand that I will be taking part in activities where Polly will record what I say and what I do by a Dictaphone, a video camera, a digital camera or a GoPro camera.

I ☐ understand that the sounds and images recorded of me will be to make short films and sound recordings to share in future publications and research articles that Polly will write.

☐ I understand that these images and recordings may be used for a website I will help to make and that this will be available on the Internet.

☐ I understand that I will also be invited to make my own video and sound recordings that will also be used in the research.

☐ I understand that I will have the chance to view and listen to these recordings before they are published and will have the chance to help choose which to use.

☐ I understand that the recordings will not use my name or any personal information and that my name, address and personal information shall not be shared with anyone.

☐ I understand that after Phase 1, if I choose not to continue with the project, recordings that include me might still be used but that my face will be blurred and not recognisable.

☐ I understand that if I do not want my voice of image to be part of the project that I will still be able to join in some of the activities without my voice or image being used. However, the information that is collected activities will also be used anonymously in the research publications and future articles by Polly.

☐ I understand that walking interviews and workshops will also be recorded and made anonymous and that the original recordings shall not be shared with anyone outside of this research.

I would like to take part in this project

_____	_____	_____
Name of young person	Date	Signature
_____	_____	_____
Name of principal investigator	Date	Signature
_____	_____	_____

Copies: *Once all parties have signed, the parent/guardian should receive a copy of the signed and dated participant consent form. A copy of the signed and dated consent form should be placed in the main project file, which must be kept in a secure location*

9.5 Appendix 5 – Information for park users

Polly Jarman Forest Edge PhD Researcher
[redacted]

UNIVERSITY OF BIRMINGHAM

Exploring young people's encounters with urban woodlands – an information sheet

What's happening in the park?

Polly Jarman is a PhD Candidate in the Geography Department at the University of Birmingham. Her research explores young people's encounters with urban woodlands. She interested in the ways in which young people interact with these spaces, how they feel in them and how they engage with other things in the woods (like trees, animals, birds, water, mud, fire, sticks).

Over the duration of a year, Polly will be working with groups of young people who are local to the area, attending local schools or home-education groups. These young people will be aged between 10-14 years old. They will have given their individual consent as well as obtained full consent from parents/carers and the school where appropriate. This will enable participants to take part in a series of creative and exploratory workshops and activities situated in the woods.

Who will be present?

Polly is a trained forest school leader with experience working with young people in outdoor settings. She may be delivering a workshop alone with a group of young people. Other trained adults will accompany her and the groups of young people, where appropriate.

What kinds of activities can I expect to see?

Polly and the participants will be taking walks through the woods together. They will be using video and sound technologies to record their experiences. In addition, they will be trialling a variety of experiments to explore a relationship with the other living things in the woods. These experiments will include measuring tree growth, setting up a leaf-fall trap, making art from found materials, using microphones to record underground noises, using infrared sensors to explore heat and temperatures within the woods and also using a fire pit and lighting fires to discuss emotions related to fire.

Polly will also be undertaking observations within the site during her research. These observations will be to record changes and activities taking place over a long period (6 months) of time. She will be making short video and sound recordings, hoping to capture aspects such as weather changes, movement of bodies and living things, noise level changes, and seasonal changes in light and canopy cover. She will be writing small descriptive pieces about these observations; she will not be talking with any members of public or recording any personal information. She will not be taking images or sound recordings that will capture any identifying features or conversations from people who have not given their written consent to participate in the research.

Please be aware that the local police and park rangers have been informed of this research.
If you have any further questions, please contact the School of Geography, Earth and Environmental Sciences at UoB [redacted]

9.6 Appendix 6 – Vimeo links to selection of videos

The supplementary video files can be accessed at the below link and include five videos in a showcase folder. These are videos from my editing, cutting, playing around, experimenting, slicing and overlaying processes and include the following videos:

Underwater 13 11 19

Underwater 27 11 19

Zooming into 13 11 19

Duckweed pond

Magnet fishing storying over underwater

Please visit Vimeo with this link:

Jarman, P. (2022) PhD research videos (02 08 2022) Available at: [redacted]

Please use [redacted] as the password to access all videos.