

For a Paleogeography of Childcare: Infant-Carrying Technics on a Dynamic Planet

Nigel Clark and Rebecca Whittle

Forthcoming in *Environment and Planning F: Philosophy, Theory, Models, Methods and Practice*

Abstract

What happens to the mundane practice of carrying infants if we situate it in the context of climate change to come and a deep past of geoclimatic instability? This paper takes the resurgence of baby slings in the UK as an entry point into the deep, evolutionary history of child-carrying, and in this way, as a prompt for an experiment in repurposing the field of paleogeography. This involves viewing the technics of the baby sling both as an aid to mobility and as a materialization of care relations. We extend this approach with the help of the cooperative breeding hypothesis which contends that communally shared childcare has been pivotal to human evolution and survival. We also draw upon theories that attend to the geologically dynamic landscapes of East Africa in which humans evolved and the impact of long-term instabilities of global climate. Fusing these approaches while also accounting for critiques of evolutionary thought, we make a case that infant carrying slings help facilitate a confident, outward-facing orientation both to worlds of complex social interactivity and to an Earth which is rifted, variegated and dynamic.

Introduction: ‘Touch and Go’

“It makes sense to me to keep them close.... It’s weird that we’ve gone away from that at any point. You know, from like [way back] people would wear shawls and things ... even locally, you see old pictures with babies on their back when they are farming” (Naomi)

“My mum ... just kind of saying, “oh you need to... put him down in his pram you know” and “Oh your poor back”. We were over at her house one time and we were going for a walk on the moors... and she just sort of looked at me and she said “I think I’ll wear him [grandson]”. She was a bit tired afterwards but she was really pleased with it... after that she changed her mind completely about slings ... it was really nice, she got to wear him before she died.” (Christina)

“By the time we got into the car park... there was snow drifting in, it was absolutely chaos. So I thought ‘right I’ll get [baby daughter] inside’, so I went to the car, I opened the back door, I got her out and it was snowing so hard I shoved her down my jumper. And I crossed the road like this to the front door and she was fast asleep and I thought ‘oh’” (Jack)

We begin our story locally. The three excerpts above come from a project carried out by one of us that looks at how carrying children in slings impacts upon family mobility (Whittle 2019, 2021). Based in Morecambe Bay and Sheffield in the north of England, the research brought into relief subtle shifts in the ‘affective landscape of parenting’ afforded by infant-carrying (Whittle 2019: 146-8). As participants recounted, carrying infants close to the body – or ‘baby-wearing’ – brought together the practical advantages of hands-free, all-terrain conveyance with the sensual and affective pleasures of tactile contact. If not a panacea to the intense physical and emotional demands of caring for small humans, the recent upsurge of child-carrying slings in the study areas raised interesting issues around the way that combined pragmatic and affective affordances could be literally ‘materialized’ in simple devices.

The local aspects of the project, however, gestured towards grander scales. Constant allusion by participants to varied physical environments, such as hilly terrain and snowstorms in the examples above, served as reminders that landscapes of mobility are themselves uneven and shifting. To this we should add the prospect of still more unstable ground. Given the way that youthful activists are now insisting that their elders confront climate emergency, there is growing pressure to conceive of all intergenerational relationships in wider contexts of climatic uncertainty and change. From its concern with the relational implication of child carrying in specific contemporary spaces, then, questions began to haunt the project of what it might mean to carry children into a turbulent, even catastrophic future. And as we began to confront changes to come, we also found ourselves drawn to consider the geoclimatic instabilities of the past and the challenges they would have posed for looking after and conveying small humans. Spectral figures began to appear behind the baby-wearing families of Morecambe Bay and Sheffield, a great chain of care-giving bodies carrying children through deep time and across thresholds in the history of a dynamic planet.

As our opening quote exemplifies, many of the participants were aware of broader traditions of sling-use. The idea that slings, wraps, pouches and cradle boards are routinely used in much of the non-affluent world and have an extended human history is a staple of both popular literature advocating baby-wearing (Van Hout 2008) and academic research into infant care (Schön and Silvén 2017). ‘Infant carrying is a global but cross-culturally diverse practice’, observes physiotherapist Chidozie Emmanuel Mbada and her colleagues, before adding that it has become less common in the developed West as well as amongst some elites in the developing world (Mbada et al 2022: 535). Evolutionary theorists, meanwhile, suggest that our infants ‘are born with the expectation to be carried’, a predisposition they claim we have inherited both from ancestral humans and the much longer lineage of primates (Berecz et al 2020: 1).

Such spatial and temporal generalization of infant carrying raises questions not simply about the current ‘fashion’ for holding and conveying babies close to the body (Berecz et al 2020: 1), but about the longer term attenuation of such practices in Western societies. Psychologists Regine Schön and Maarit Silvén (2007: 144-146). observe that significant changes in societal attitudes towards child-rearing parenting involving separate sleeping arrangements, tight discipline and avoidance of ‘excessive’ physical affection were well under way by the 18th century, though they also point towards older European ‘cradle cultures’. Explanations offered for these changes are multiple, complex and hard to disentangle, and include the demands of industrial capitalism, the transition from extended to nuclear families, the rise of disciplinary societies, and later, the medicalization of infant care. Less equivocal are observed transcultural differences in infant care, with studies showing pronounced variation in the amount of time infants are in close physical contact with caregivers between the contemporary West and other societies, especially those that not heavily industrialised (Bánovský 2023; Schön and Silvén 2007: 144-146). An influential study showed that in two East African communities – one prominently hunter-gatherers, the other horticulturalists – babies spent some 79-99% of their time being carried, held or touched. This compared with around 18% in a sample of EuroAmerican families (Hewlett and Lamb 2002).

One manifestation of these changes, germane to our approach, is the rise of wheeled infant conveyances in the West: what we might see as the mobilisation of the cradle or cot. The earliest recorded child-carrying carriage was commissioned by the Duke of

Devonshire in 1733 (Bellis, 2020). By the 1830s baby carriages were being manufactured in the US, while perambulators or ‘prams’ gained popularity in Victorian England, boosted by Queen Victoria’s patronage (Sewell, 1923). The basic template prevailed until aeronautical engineer Owen Maclaren built a collapsible aluminium framed ‘stroller’ in the 1960s, which has subsequently been developed into a range of lightweight three and four-wheeled buggies – some of which can be switched from prone to seated-position (Hann, 2002).

Just as early perambulators belonged to an era and a social positioning in which horse-drawn vehicles prevailed, the foldaway buggy fitted snugly into the more socially inclusive and increasingly globalized automotive regime of the latter 20th century. Yet automobility itself has come to manifest an ambivalent relationship to physical environments whose looming instability it has helped induce (see Urry, 2004). Like the 4-wheel drive vehicles in which they are often conveyed, many late-model baby buggies are designed for uneven surfaces. Weather-shielded, seat-belted and riding on shock absorbers, the early-millennial infant, it might appear, is being readied for whatever turbulence lies ahead. But the environmental defiance and rugged individualism of the all-terrain buggy, we suggest, is far from the only mobility option for conditions of topographic and existential inconstancy.

Our concern with securing the child for a bumpy ride is likewise geographically and historically situated. But as we’ve indicated, our scope is a broader geography and a longer, more jarring history than that of wheeled infant mobility. In this article, we explore connections between 21st century baby-sling users and their hominin¹ predecessors who, it has been surmised, learned to bind infants to their hips or backs, long ago, in the east of the African continent (Berez et al 2020; Nowell 2021: 33-34). Whereas our proximate baby-wearers face a choppy exit from the epoch geologists refer to as the Holocene, their deep-time counterparts must have carried their children through the vacillating climatic conditions of the Pleistocene and perhaps the still-earlier Pliocene (Hrdy, 2009a: 230). And yet, though these infant caregivers are worlds apart, the basic functionality of the sling may well have barely changed, as if the technics of care have themselves folded in time like a pelt or swatch of fabric.

It's worth keeping in mind that of the various species comprising the genus *Homo* – current estimates range between nine and seventeen – *Homo sapiens* are the sole survivors. Until the waning of the last ice age, notes anthropologist Sarah Blaffer Hrdy (2009b: 6), the survival of our own species was ‘touch-and-go’. ‘Touch-and-go’, for us, speaks not only to the precariousness of the human genus throughout most of its roughly two million-year span, but also evokes the connection between tactility and mobility that characterizes the baby sling. And a practical and affective technics of conveying human youngsters, we speculate, may have played a significant role in surviving the geoclimatic upheavals of the last couple of million years.

Hrdy’s work is central to our argument. Over several decades, she and associated researchers have been making the case that a definitive characteristic of humans is the collective way they raise their infants – an argument fusing insights from psychology with evolutionary biology. Unlike near-relative great apes, Hrdy contends, human mothers routinely share care and provisioning of their offspring with others: a variation on a more general practice biologists refer to as cooperative breeding (Cant, 2012). It is onto this basic behavioral and evolutionary framework that we speculatively graft the input of infant-carrying technics. A detachable means of tethering a child to any of its caregivers, we propose, facilitates processes of cooperative rearing. Moreover, the positioning of the child high on the body of its carrier is believed to amplify the opportunity for infants to observe and participate in the social interaction of their seniors (Knowles 2016; Bánovský 2023). In this way, we attest to the value of a deep temporal perspective on questions of human infant mobility and the spaces of care and affection in which it is implicated – a move that would hardly surprise our physical geography colleagues. As human geographers, however, we want to do more than simply strap our own analysis onto the pre-existing body of evolutionary anthropology. What contemporary human geography and cognate disciplines invested in relational ontologies bring to an understanding of deep-temporal child carrying, we propose, is an attunement to the way affective relations, the materiality of social objects and the more expansive physicality of inhabited spaces come together. How do loving and caring dispositions come to be ‘materialized’ both in human bodies and in the extra-somatic devices humans construct, we ask, and how are these ‘matters of care’ implicated in diverse and shifting landscapes?

It also matters, we argue, that the likely site at which the child-carrying devices were first devised was topographically diverse and geologically active; that the technics of infant mobility emerged in the context of an Earth that is itself mobile. Here we draw upon the complex topography hypothesis advanced by geophysicist Geoffrey King, archaeologist Geoff Bailey and others which proposes that the tectonically active environment of the East African Rift Valley played a crucial role in early hominin evolution (King and Bailey, 2006; see also Clark et al 2018). Not only did the Rift Valley provide important resources for a ground-dwelling primate, this approach suggests, the challenge of ‘scrambling across complex 3D terrestrial landscape’ played a formative role in the evolution of hominin bipedal locomotion (Winder et al: 2013: 8).

Despite the resonance of negotiating 3D terrain and the more general question of putting social and physical dynamics into conversation, it is still relatively unusual for human geography to delve into geological and evolutionary timescales. Too often human geographers and fellow critical social thinkers assume that addressing such grander spatio-temporal scales implies a depreciation of ‘place-based’, ‘lived’ or ‘embodied’ experience (Clark and Gunaratnam, 2017; Clark and Szerszynski, 2021: 35-8). To address such concerns, we take inspiration from historian-anthropologist Gabrielle Hecht’s (2018) notion of ‘interscalar vehicles’ to affirm the possibility of articulating articulating between situated human lives and the extensive reaches of geological existence. The baby-sling is such a vehicle, we propose, a device that literally and metaphorically enfolds, knots, or binds the most intimate human acts to the enormity of the dynamic Earth.

At a juncture when Earth system change is high on scientific and political agendas, we are interested in the wider disciplinary implications of such a hitching together of tiny, impressionable bodies and a planet on which ‘variability abounds at nearly all spatial and temporal scales’ (Steffen et al., 2004: 295). If, according to philosophers Gilles Deleuze and Felix Guattari’s reading of the work of historian Fernand Braudel, all ‘history is a geohistory’ (1994: 95), then perhaps it is time to consider whether all human geography is at least potentially paleogeography. It seems to us that paleogeography – the Earth science subfield concerned with the changing configurations of continents, magnetic fields and other planetary components in deep geological time (Ross, 1999; Meinhold, 2019) – might take on new meanings both as the category of the ‘paleo’ expands to

embrace transformation of the geophysical Earth currently underway and as social and cultural thinkers become more willing to dig deep into the prehistory of our matters of concern (see Barnosky 2014).

We view this as part of a broader conversation, in particular with archaeologists Shumon Hussain and Felix Riede's recent proposal for a 'paleoenvironmental humanities' which seeks 'to align the rich, long-term archaeological datasets on human–environment interactions with issues, concepts, and concerns of the emerging environmental humanities and the climate change debate at large' (2020: 6). At the same time, we are deeply aware, as are many researchers in the field, that Euro-modern accounts of human origins and the gathering of evidence to support these stories have been constitutively implicated in the violence of geopolitical and epistemic coloniality. As paleobiologist Pedro Monarrez and his colleagues assert: 'Western paleontology did not develop independently from, or parallel with, racism and colonialism but has been intertwined with them throughout its history' (Monarrez et al 2021: 2). With this firmly in mind, however, we also affirm that deep time perspectives on human evolution and planetary change offer resources that can help destabilise narratives that promote or assume European supremacy (Gunaratnam and Clark 2012). A wide-angle lens on infant carrying not only brings into relief a world of practices that have been occluded by certain western assumptions about infant care, as we intimated above, it also raises questions about the implication of these Euro-modern conventions and related experiences in the unfolding of the current global environmental predicament.

Our exploratory paleogeography sets out from a scoping of how infant mobility fits into current concerns of human geography and neighbouring disciplines, taking this as an entry point to a review of what 'paleo-focused' disciplines have to say about hominin child-carrying practices. We then take a closer look at how the technics of the baby-sling serves to materialize intimate expressions of love, care and sensuality, in the light of the cooperative breeding hypothesis. In the subsequent section, informed by the complex topography hypothesis, we explore the relationship between the evolution of child carrying and the mobility of the Earth itself. By way of conclusion, we consider both drawbacks and advantages of thinking in evolutionary terms, and point to the prospects of a repurposed paleogeography for navigating imminent thresholds in Earth systems.

Theorizing Infant Mobilities Present and Past

Even before taking the deep temporal plunge, the question of how we transport our offspring brings together multiple current concerns of human geography and cognate disciplines. It draws us into considerations of mobility, specifically in relation to reproduction, infancy, and family life, which brings us to thematics of care, affection and sensuality, and the material objects that support practices of moving and caring. A previous publication by one of us reviews and integrates key contributions from these literatures (Whittle 2019). As this article shows, research on infant and family mobilities tends to focus on modes of ‘wheeled’ mobility prevalent in higher income regions, notably prams (Boyer and Spinney 2016; Jensen, 2017) and cars (Kerr 2015; Dowling 2000). Such work usefully shifts attention from powerful urban and corporate space-shaping actors towards more mundane and variegated familial groups. It helps us to move beyond parental experience to embrace child-centred perspectives and the agency of children – a growing concern that geographers (Holt, 2013) share with anthropologists and archaeologists (Lillehammer 1989; Hrdy 2009a; Nowell 2021: 7-13). The call to ‘rethink the right to the city as co-constituted through the relationships between spaces, prams, routines, routes, subjectivities and (non)humans encountered when out and about’ (Clement and Waitt 2018: 253) seems to us equally relevant to mobilities configured around contemporary baby-wearing (see Whittle 2019: 141). There is also a lively interest in walking in human geography (Wylie 2005; Lorimer 2011, Kärholm, et al 2017, Stratford et al 2020), though such work has rarely considered conveying infants as a key component of pedestrianism.

While much ‘wheel-based’ literature attends to caring and affective aspects of infant mobility, we would stress that a turn to mobilities centred upon tactile contact significantly reconfigures the emotional and sensory dimensions of child-caregiver relations. In this regard feminist concerns with the ethics, aesthetics and carnalities of care offer rich resources. Since at least the early 1980s, feminist researchers have been exploring ‘ethics of care’ as a counterpoint to prevailing critical concerns with justice, rights and utility, while contesting assumptions that women’s ‘natural fecundity’ and nurturing impulses predispose them to caregiving roles (Gilligan, 1982; Tronto, 1987). Taken up in human geography, such themes have been elaborated into inquiries about how care is embedded in social networks and how it gets extended through time and

space, along with more general questions about the role of intimacy and affect in the shaping of socio-spatial relations (Conradson 2003; Valentine 2008; Barnett 2013). Here too there are important parallels with archaeological research into deep histories of care and compassion (Spikins et al 2010).

As Gill Valentine (2008: 2102) proposes: ‘the hinge that links geographies of sexualities, children, young people and parenting together is affective structures or intimate relations’, an observation lending itself to reflecting on the literal ‘hinging’ between bodies performed by sling technics. The rhythm of caregiver’s walking, the echo of heartbeats, sharing bodily warmth and skin-to-skin contact – what anthropologist Diana Adis Tahhan (2010, 2013) refers to as ‘skinship’ – resonates with the sensuous, intercorporeal nature of care foregrounded by feminist scholarship (Diprose, 2002, Lupton 2013). Such concerns are attuned to the asymmetrical gendering of caring relations, while acknowledging the multiple, polymorphous ways in which give and take between bodies plays out. So too should we heed the cautionary note sounded by feminist and queer theorists that caring for another can be misdirected, disappointing, overwhelming, or otherwise ‘unbearable’ (Berlant and Edelman 2014; Diprose 2002: 190; see also Anderson 2022).

Our understanding of baby slings as technics of care takes further cues from science and technology studies scholar Maria Puig de la Bellacasa’s (2011, 2017) merger of feminist care ethics with the STS interest in extrusion of social agency into durable ‘things’. She calls upon us to attend to the processes by which caring relations can become sedimented into everyday objects, devices and technologies. Supplementing Bruno Latour’s ‘matters of concern’ (2004) with ‘matters of care’ Puig de la Bellacasa suggests, is especially urgent in the context of worlds that appear ever more precarious, damaged and ‘aching’ (2011: 100). Here we pick up resonances with Hecht’s notion of tools, tactics and practices which connect up scales and narratives that seem otherwise incommensurate: ‘interscalar vehicles’ whose careful construction and deployment might just help us to ‘de-escalate disaster’ in rapidly changing physical worlds (2018: 134, 115).

We approach slings as a supple and pliant ‘concretization’ of dispositions of care for an impressionable infant, while considering sling-enabled caregiving as both figure and practical means of negotiating with a not-necessarily compliant wider world. But as we

set about spatio-temporally scaling up the knotted-together journey of child and caretaker, it soon becomes apparent that much contemporary thinking about mobility and care lacks the desired reach. As human geographer Andrew Baldwin and his colleagues observe: ‘the movements that concern the mobility paradigm are mostly to do with people, objectives, technologies, knowledge, and capital ... the physical surface of the Earth over which movement is understood to occur, is for the most part inert’ (Baldwin et al 2019: 292). With few exceptions, they note, studies of mobility fall short of the scalar and dynamical compass that would allow the mobilizations of the planet itself to enter into accounts of people in motion (but see Szerszynski 2016; Clark, 2017). A related point could be made about the evolutionary aspects of human mobility or locomotor activity. Analogously, while much contemporary work on ethics and technics of care stretches beyond human realms and into wider ‘ecological’ entanglements, it is rarer to see close consideration of a changeable Earth as a site of or an incitement to care (but see Clark 2011), or to see sustained consideration of the evolution of human empathetic capacities.

Exit the social sciences conventionally concerned with ‘modernity’ and enter those disciplines that specialize in the ‘paleo’ domains, and unsurprisingly the emphasis shifts. In human biology, anthropology and archaeology, evolution of human locomotion, reproductive practices and child raising are such prominent concerns that we can offer only a brief overview here. As with the research we surveyed above, much of this work is inflected by broadly feminist concerns, if not always explicitly (see Hager 1997, Wylie 1997). Taking issue with the ‘Man the Hunter’ paradigm that consolidated in the 1950s and 60s – a model that largely relegated prehistoric women to sexual receptivity, child-raising, and hearth-bound domestic drudgery, several generations of mostly but not exclusively female paleoanthropologists countered by stressing the active, inventive and flexible roles played by women in the hominin story (Zihlman 1997; Hager 1997).

Central to this turn was a reassessment of the contribution of female foraging as complex, knowledge-intensive and nutritionally indispensable. Foraging, pronounced paleoanthropologist Lori Hager (1997: 8) required the skill of ‘orienting oneself in three-dimensional space’ – a point to which we will return. With the attribution of increasing mobility and versatility to prehistoric women came growing interest in how they conveyed their offspring. Along the way, research into child-carrying has had to reckon

with the uneven survival of hides, fabric and other perishable organic materials relative to stone tools (Berez et al 2020), while also contending with the male hunting paradigm's prioritizing of technics associated with acts of aggression over those that facilitated care.

Much of this scholarship is speculative and key claims are highly contested. Evolutionary theorists contextualise human or hominin infant carrying within the broader frame of primate evolution – proposing that 'our' practices are variations on the theme of ventral (on the back) conveyance of fur-clinging infants which has been a definitive characteristic of primate behaviour for much of the last 55 million years (Ross 2001). At a certain point, most often associated with upright walking or bipedalism and thinning of body fur, ventral carrying was succeeded by lateral (or side) carrying of infants with manual support from the care-giver (Bánovský 2023; Nowell 2021: 33-34). The timing and dynamics of this shift are complicated, not least by evidence that hominins continued to be occasional tree climbers – with markedly different challenges for infant carrying than ground-based locomotion – for several million years after they became upright walkers (Berez et al 2020).

When and why lateral carrying of infants came to be supplemented by supporting devices is likewise controvertible. Biological anthropologist Cara Wall-Scheffler and colleagues compared the energetic expenditure of walking long distances carrying an infant in the arms with journeys made using a sling that left the arms free. A significant difference – savings of around 16% – led them to conclude that 'the energetic drain of carrying an infant would be such that some sort of carrying device would have been required soon after the development of bipedalism and definitely to allow long distance travel, especially that out of Africa and across Asia' (Wall-Scheffler et al 2007: 841; see also DeSilva 2011). There are, however, concerted arguments for a later uptake. Associating sling invention with the evolution of the human brain and language skills, biologist Berez and her co-authors (2020) favour a starting point around the time of the emergence of *Homo erectus* some two million years ago. Archaeologist April Nowell largely concurs. 'There is no evidence of fiber technology before Neandertals', she argues, 'and certainly nothing about early hominin material culture suggest carriers were in use before *H. erectus* at the earliest' (2021: 34).

While the timing of sling invention remains contentious, the broader terms of the debate inherit much from the disenfranchisement with ‘Man the Hunter’ narratives. For those researchers reconsidering women’s roles, it has long made sense to credit female foragers with the earliest tool invention (Hager 1997: 6). In the mid-1970s, feminist anthropologist Elizabeth Fisher (1975) surmised that the first cultural device was a sling or bag for carrying foraged foodstuffs: a basic model that could well have been extended to conveying infants (see Le Guin 2019). Its worth recalling, however, that stone tools retain much of their centrality in human origin stories, with recent discoveries extending the earliest stone tool use to 3.3 million years ago, some half a million years before *Homo*’s currently calibrated appearance (Maslin 2017: 23-4). Questions remain as to why hominins capable of shaping stone could not have requisitioned hides, plant fibres or other available materials to help support a child on the hip.

Perhaps the thorniest issue in the evolution of hominin child-carrying is the relationship between the conveyance of infants and developments of brain capacity and by extension, intelligence. Giving birth to larger-brained, bigger-skulled babies poses what evolutionary theorists refer to as the ‘obstetrical dilemma’ of requiring a broadening of the pelvis which would in turn compromise bipedal locomotion (Isler and van Shaik 2012). Infant carrying in general, and sling-assisted carrying in particular, it has been argued, helps resolve this problem by facilitating the extended gestation of the infant – with further skull enlargement – outside the womb (Taylor 2010: 127-134; Knowles 2016). Recent research, however, contests claims for a trade-off between pelvic breadth and erect walking (see Berecz et al 2020; Nowell 2021: 23-28). Though operating outside our disciplinary comfort zone, we are inclined to follow Hrdy and fellow cooperative breeding theorists whose explanation for expanding brainpower prioritizes not a technical breakthrough, but the socio-cognitive inventiveness associated with collaborative child-rearing. ‘Creatures may not need big brains to evolve cooperative breeding, but hominins needed shared care and provisioning to evolve big brains’ asserts Hrdy. ‘Cooperative breeding had to come first’ (2009a: 277; see also Burkart et al 2009; Isler and van Shaik 2012).

Evidence for the primacy of distributed and flexible caring relations in nudging forward hominin cognitive evolution suggests to us that we consider the physical attachment of infants to caregivers in the broader context of their affective attachment to multiple

caring others. In the following section, we examine how child-carrying slings function as ‘materializations’ of cooperative childcare and its associated cognitive-affective dispositions.

Baby-slings as Technics of Cooperative Childcare

Among societies that have persisted with infant carrying, there is much observed difference in styles, devices and practices: variations that have been attributed to both infant care customs and environmental factors such as climate (Schön and Silvén 2007: 145-7). Across much of Africa infant carrying on the back is the norm, for example, side or lateral slings are more common in East Africa and on Pacific and Indian Ocean islands, while front carrying positions are popular in resurgent Western traditions (Mbada et al 2022). What cooperative breeding theory directs our attention to, however, is the matter of who is doing the caring and carrying – and the implications of this for the experience of the child.

It's worth noting that child-carrying technics are not as prominent in Hrdy's cooperative breeding narrative as they are in accounts with a more technical or locomotor focus. But they do pop up at opportune moments, for example in an account of a Hadza mother strapping her infant to a ‘protesting unrelated girl’ and in a captioned photograph of !Kung babies slung to the back of older children (2009a: 205, 274). The anecdote and image drive home Hrdy's point that infant caring is characteristically distributed beyond the immediacy of child-mother couplets. This too was apparent in the findings of our Morecambe Bay-Sheffield sling-use study (Whittle 2021). Neither the grandmother from our second opening quote nor the father who spontaneously adopted babywearing in a snowstorm were exceptional. Resistance to slings amongst relatives and others more habituated to prams and pushchairs was frequently reported, though as the following excerpts suggest, experiencing the benefits of slings can encourage their adoption:

“because I'm there all the time... she does struggle to settle with other people but as soon as she goes in the sling, wherever she is she settles. So... my husband and my Mum has done it as well, despite the fact she didn't really agree with it, she's put her in the sling and she settles straightaway... it's brilliant.” (Claire)

“I think there’s a... growing awareness and acceptance at the nursery... that sling is... a useful tool and that parents are into it... So... when Fionn arrived to... get him to sleep they put him in a sling a little bit. So they want to get some nursery slings and they’ve asked us if we could leave Fionn’s sling there for them to use.” (Brendan)

If we are to situate such experiences in a broader evolutionary context, it is important to note that they gesture not only beyond our era but beyond our species and genus. While prosthetic infant carrying aids may be human innovations, cooperative breeding – or routine nonparental care of offspring – is well-documented in a range of species including insects, fish, birds and mammals (Cant 2012). While small primates such as marmosets are consummate cooperative breeders or ‘alloparental’ carers, amongst the great apes care of offspring and food provisioning is overwhelmingly performed by the mother (Hrdy 2009a: 92-99). Hominins diverge from great apes both in their willingness to share infant support amongst a range of community members and in the regularity with which food is collectively distributed. The combination of alloparenting and shared provisioning, Hrdy and others suggest, made it possible for hominin mothers to bear children at shorter intervals than their great ape relatives, while enabling the energetically ‘expensive’ evolutionary innovation of larger brains (Hrdy 2004, 2009a: 275-77; Burkart et al 2009).

But this makes it sound rather mechanical. What Hrdy and her colleagues emphasise is that collective breeding both enables and encourages the infant to ‘appeal’ to potential carers. From almost the moment of birth, human infants are communicatively responsive to faces, sounds, gestures. In this way newborns contribute actively to making their own care ‘bearable’ to others, and from then on they rapidly acquire capacities for ‘reading’ the minds and moods of potential care-givers which serves to increase the likelihood of being looked after (Hrdy 2009a: 37-57, Hrdy and Birkett 2020). These ‘hypersocial’ capabilities, it is argued, are at the very core of what makes us human, the cognitive foundations of all our other collective, inter-subjective achievements (Hrdy 2004).

All of which means that the male-female pair bonding axial to the Man the Hunter paradigm is decentered and complexified. What tips the evolutionary balance is the presence of extramaternal caretakers – allomothers or alloparents – especially but not only female kin (Hrdy 2009a 250-264). Evidence shows that relative to other primates,

hominin post-reproductive female longevity is exceptional. Surviving grandmothers, it is argued, may have been every bit as helpful as spear-wielding male partners, especially given the value of the lifelong foraging experience of aging females under environmentally challenging circumstances. In sum: “vigorous senior women earned more descendants by feeding grandchildren’ (Hawkes et al 1998: 1336; cf Kachel et al 2011). Keeping in mind that for humans and other primates, infant transport is second only to lactation as an energetic demand on mothers (Gettler 2010), it also makes sense that elder kin would have shared carrying duties. And especially in the case of both older and younger ‘allocarers’, the energy saving contribution of the sling might have been crucial: recalling our grandmother in the opening quote, tired yet content after carrying her grandchild offspring across the moors.

This is more than a matter of *allomothering*. Both the behavioural and physiological appeal of care-attracting capabilities look to have crossed gender divides – and continue to do so. Evidence suggests that close contact with infants triggers hormonal as well as emotional responses in all humans. In the case of mature males, researchers note, this results in discernible lowering of testosterone levels which in turn encourages affectionate rather than aggressive behaviour (Hrdy 2001: 95-6; 2009a: 99; Gettler 2010). Our observed willingness of contemporary males to ‘wear’ infants, it seems, is more than a late modern trend. As anthropologist Lee Gettler (2010) observes, direct male care of infants is much more prevalent in many human populations than in other primates, especially great apes. Elaborating on the idea that sexual divisions of labour were less entrenched earlier in human evolution, Gettler concludes ‘early *Homo* males were, at very least, likely candidates to carry young in the course of foraging outings, leading to a reduction of maternal metabolic costs’ (2010: 14).

Then there is the contribution of infants themselves. As we’ve seen, a point of convergence amongst researchers exploring contemporary ‘infant geographies’ and those working in the field of the evolution of human child-raising practices is a concern with the experience, perspective and agency of children themselves. Both the cooperative breeding paradigm and our own observations suggests that there is a lot more going on in sling use than simple substitution for the loss of the fur that other infant primates cling to. Moist skin, proposes Mel Cyrille (2018), has adhesive properties. This is aided by the child’s own efforts – for like their primate relatives, human infants are ‘active

clinging young' (Berez et al 2020). Still more important is the active contribution of infants in soliciting care: the intimate investment that, as Hrdy reminds us, cannot be taken for granted even from the mother (2009a: 72-3, 119-121)². Even very small children, cooperative breeding theorists note, are adept at emitting and interpreting signals that indicate another's potential to provide care – a skill that has been observed in infants born sightless (Hrdy and Birkett 2020; Hrdy 2009a: 60). More than any other capability – it is this hyperbolic capacity to read and respond to affective states of numerous fellow beings, argues Hrdy, that has made us the genus and species we are (2009a: 28-9).

If, as Hrdy concludes, 'infants nurtured by multiple caretakers grow up not only feeling secure but with better-developed and more enhanced capacities to view the world from multiple perspectives' (2009a: 132) it is the sling that literally offers the platform for the profuseness of juvenile hominin experience. What is extruded and concretized in the technics of the sling is the affordance of sharing a world of complex affective communication – an intensity of sensory immersion of the infant that is unmatched by the experience of lying in cradles, prams, or even state-of-the art buggies. As a 'matter of care', what matters most is the combination of inward-facing tactile contact and outward-facing communicativity: the feeling of being at once physically secure and constantly challenged by the complexity of grown-up sociality. More than an energy-saving device that allows ambulant carers to swing their arms, more than a means of sharing body warmth, we contend, the child-carrying sling is a technics for fostering curiosity – a facilitator of self-amplifying socio-cognitive development.

Sustaining Life on *Terra Mobilis*

The fact that 'we' *Homo sapiens* exist at all suggests the arrangement was effective, even if survival was more fortuitous byproduct than primary intention. In this section, we look more closely at temporal and spatial factors, including changes in the Earth, that come into relief as our geographical horizons expand. As we saw earlier, much research on early hominin child-carrying still seems to assume relatively even terrain, while infant mobility research in human geography has addressed variable terrain but without a deep temporal perspective. An approach that contextualizes human evolution in landscapes contoured by active tectonics, we suggest, usefully brings these perspectives together.

The complex topography hypothesis proposes that the dynamic environment of the Rift Valley offered multiple attractions for rapidly evolving primates, including fresh-water, fertile soils, diverse ecosystems, and platforms from which to observe and trap prey (King and Bailey, 2006). Researchers further link this milieu to the evolution of bipedalism, making a case for scrambling as the vital intermediary between primate arboreal locomotion and hominin erect walking. It is not the demands of moving across grassy plains, primatologist Isabelle Winder and her colleagues argue, but the challenge of clambering over rugged ground that best explains the anatomical features of early bipedal hominins and their divergence from other primates (Winder et al 2013). Climbing over rocky terrain, they explain, took advantage of the upper-limb grasping ability of tree-dwellers, while selecting for arched, weight-bearing feet with lever or springing functions. Only later, as lower limbs grew more suited to striding, did hominins venture onto the savannah. In short, ‘transition from climbing in a complex 3D arboreal environment to scrambling across a complex 3D terrestrial landscape’ makes more sense than fast-forwarding from forest to flatland (Winder et al: 2013: 8). From a reproductive point of view, complex topography theorists add, Rift Valley landscapes offered both a profusion of high-quality brain-feeding nutrients to the skilled forager and a range of nesting sites relatively safe from predators, affordances which Winder et al (2013) suggest facilitated the appearance of the modern human life history with its extended childhood and shorter interbirth intervals. They also propose that enhanced propensity for carrying, assisted by shortening arms, was a useful byproduct of other developments.

The ‘scrambling’ aspect of the complex topography hypothesis, we speculate, has implications for considering carrying practices in general and infant carrying in particular. With regard to the task of gathering, the routine requirement for conveying foodstuffs from foraging grounds to hard-to-access base camps lends support to the foregrounding of carrying devices. Likewise, the demands of clambering suggest that benefits of infant-carrying aids might be as much about freeing up hands as about more energy-efficient striding. So too must we keep in mind that this topography was rugged and variegated because it was geologically active. To speak of mobility over the terrain in question is to invoke *terra mobilis* (Clark and Szerszynski 2021: ch 6): the ongoing activity of seismic and volcanic processes, shifting hydrology and slope morphology, the pulsing of fire and ecological succession. For a primate whose physiology required constant hydration, water bodies were likely to have been essential (Stein 2007), presenting the challenge of

carrying both water and infants. This would also have been a matter of navigating hydrological landscapes in transition, for as geologists remind us '(f)reshwater lakes within rift valleys were repeatedly created and destroyed by continuous morpho-tectonic adjustments' (Gani and Gani 2008, see also Maslin and Christensen 2007). Although it has long encountered spirited resistance from defenders of the 'savannah hypothesis', the idea that early hominins spent much of their time around and immersed in water bodies is also being reassessed in the light of the growing emphasis on tectonically active topography (Stein 2007; Calvin 148; 88-9). This in turn situates infant carrying techniques in a context of wading, fording rivers, and encountering intermittent flooding, as a complement to the demands of rock climbing.

In the still bigger picture, we should recall Hrdy's assertion, in reference to Pleistocene climate fluctuation, that hominin survival was 'touch and go'. Formulated around the same time as the active tectonics paradigm, the abrupt climate change hypothesis spotlights the devastating rapidity of past global climate change. 'Our ancestors lived through hundreds of such episodes', notes evolutionary psychologist William Calvin (2002: 3) '– but each became a population bottleneck, one that eliminated most of their relatives (see also Burroughs 2005: 99, 136). Cooperative breeding, suggests Hrdy, was a key to the survival of the hominin lineage that eventually branched into *Homo sapiens*. Though she also notes that any claim that 'the late Pliocene–Pleistocene crucible of unpredictable climate change with recurring periods of food shortage' served as a stimulus for shared child-rearing and collective provisioning amongst ancestral humans raises questions about why nonhuman primates didn't adopt similar strategies (2009a: 230).

While there is no simple answer, Hrdy draws attention to the pivotal role of the mother's matrilineal kinfolk – grandmothers, great-aunts and others – a contribution enabled by increasing hominin lifespans compared to other primates (2009a: 250-254). In turn, this relative longevity may have come down to hominin foragers learning to exploit a widening range of food sources, and developing ways to pass on this information and skill to younger group members (2009a: 256-7). At the same time, Hrdy adds, providing opportunities for bonding between infants and older kin would likely have played a part in cultivating shared caretaking propensities (2009a: 270-2). Here too, as we glimpsed earlier, human babies are active participants, deploying sophisticated capacities for eye

contact, imitation, and reading others' intentions that far outstrip fellow primates (Hrdy 2001: 98).

If this penchant for intercommunicative 'hypersociality' helped forge specifically hominin trajectories through epochs of whiplash climate change, we can see how child carrying devices – by facilitating foraging and enhancing infant participation in the world of intensive social exchange – may have played a significant 'supporting' role. We would also stress the importance of experiences of the physical environment that exceed mere survival, while recalling the diversity and dynamism of the Rift Valley milieu. A child perched on a caregiver's hip or back while they went about provisioning journeys would have likely experienced both a profusion of activities – climbing, wading, digging, picking, small-game hunting – and an exceptional range of landforms and lifeforms. Such mobile, multisensory encounters would not only have stimulated infant cognitive development, but from the secure vantage point of tactile contact, would have likely inspired confidence and trust amidst changeable environments. In other words, if '(c)are-taking inscribes new pathways in the brain' (Hrdy 2001: 76-7), this would have been enhanced by the fact that care-taking was performed literally along intriguing and invigorating pathways.

Working with more contemporary gatherer-hunter communities in the 1950s, psychologist Jean Leidloff noted how child-raising amongst the Amazonian Yequana people involved constant contact with care-givers while they engaged in sensorially rich daily activities. Of the Yequana infant, she observed, 'a great quantity and variety of experience come to him through his adventures in the arms of a busy person' (Liedloff 1986: 44). Linking such experience to the deep continuum of human evolution, Liedloff argued that everyday encounters with the sensory stimuli of '(t)hunder and lightning, barking dogs, deafening roars of waterfalls, splitting trees, flaring fires, surprise dousings in rain or river water' for a small child held by or strapped to its mother built the foundation of youthful confidence in the face of a challenging physical world (1986: 46). Conversely, she noted the debilitating effect on the 'civilized' child of being routinely detached from its primary care-giver's body and parked alone in a cot or pram, bereft of sensory immersion in the 'stream of life' (1986: 83).³

Add rocky outcrops, volcanoes and seismicity to the mix, and Leidloff comes close to

picturing what we see as formative experiences of small hominins slung to caretakers amidst the rugged geographies of Plio-Pleistocene East Africa. If rift valleys served as refuges during bouts of rapid climate change, so too, observe King and Bailey (2006) did they function as pathways for successive waves of migrating humans – across and out of Africa. This insight invites closer conversation with Hrdy’s point that ‘cooperative breeding was to permit a hunting and gathering ape to spread more widely and swiftly than any primate ever had before’ (Hrdy 2009a: 89), and with our own foregrounding of infant carrying aids.

If in one sense child-carrying slings are vehicles for the spatial traversal of complex, dynamic terrain, Hrdy’s account also evokes vehicles of another kind, those that help connect bodies over multiple generations. In a literal sense, we envision slings and related technics of child-mobility as interscalar vehicles, helping hominins both to negotiate the surface of a changeable Earth and binding together a chain of caring bodies across vast, eventful reaches of time (see Clark, 2017). Indeed, we might say that infant-carrying aids help give or generate time itself, at least for our genus, through their contribution to the opening up and sustaining of futurity – perhaps as pressing a challenge in the current geoclimatic juncture as it was during Plio-Pleistocene climatic swings.

Toward a Paleogeography of Child-Carrying

Using a borrowed sling, a contemporary mother experiences the tactile qualities and hands-free affordances of babywearing, without realizing the practice may have barely changed since the ramblings of *Homo erectus*. A 21st century grandmother straps on her grandchild, unaware of the contribution of postmenopausal matrilineal kin to hominin survival during Pleistocene climatic upheaval. A suburban father bundles his baby daughter under his clothing to shelter her from driving snow, perhaps reprising a primordial response to protecting a child from rain, ash or smoke. Each of these contemporary infant caregivers feels a tug of familiarity, though there may be a rupture of many generations in the tradition they are reprising.

To contemporary human geographers, the idea that assumptions of a unilinear and progressively modernizing human trajectory might be thrown off course by the reappearance of ancient practices is unlikely to be especially perturbing. Such

complications of here and there, now and then, are familiar contours of relational thought. But the accompanying tone of post-foundationalism, anti-essentialism, and the valorisation of plural ontologies tends to discourage taking the originary stories of the paleo-disciplines as fertile ground for critical thinking, especially when evolutionary discourses seem to imply that inaccessibly anterior developments set standards for what is admissible in the present. The linking of certain reproductive strategies with evolutionary success in the work of Hrdy and others, we note, has attracted criticism for naturalising liberal ideologies – by privileging what science studies scholar Donna Haraway (1992: 350) referred to as an ‘investing strategic self’. Hrdy’s evolutionary take on the family has likewise been targeted for taking adaptive utility or survival as the measure of humans and other species (Laracy 2011). Not only does the couplet of infant-carrying technics and cooperative breeding risk essentialising a particular vision of what it means to be human by this logic, but current concerns with decentring ‘the anthropos’ also prompt us to consider whether the story we have been telling conveys a certain human exceptionalism. These questions need to be taken seriously, we suggest, not just because they highlight risks of this way of thinking, but because addressing such concerns can also accentuate the strengths of an evolutionary and paleogeographic approach to infant mobilities.

It’s worth recalling that despite some misgivings Haraway commended Hrdy’s project for the way it emphasised female proactive sexuality and collective agency (1992: 359, 350-1). But as we touched upon earlier, subsequent work on alloparenting has further unsettled gendered divisions of labour, both by widely redistributing ‘mothering’ roles and by foregrounding the breadth of activities caregivers can engage in while carrying children. More difficult to work around is the persistence of themes of survival, adaptability and fitness in evolutionary anthropology – or the logic of ‘earning descendants’. However awed we might be by the way ancestral humans endured Plio-Pleistocene climatic instability, and whatever anxieties we may have about Earth system upheavals now underway, it is important to consider recent critical work that troubles the centrality of survival and the related intensity of investment in the figure of the child. Alongside literary studies scholar Rebekah Sheldon’s timely interrogation of the trope of reproductive futurity, queer theorists such as Lee Edelman (2004) have posed searching questions about the way that child-enthralled future visions serve to devalue tactics, dispositions and desires that are neither focused on the child nor deferred to some future

moment, while geographer Ben Anderson (2022) cautions against prioritizing infant-caregiver bonds in our theorization of attachment. Such critiques have informed our own prioritization of affective, expressive and tactile encounters – and helped us to conceive of both short or long-term survival less as an end-in-itself and more as a sometime byproduct of a suite of intimate gestures performed for their own pleasure and satisfaction.

Moreover, while child-carrying practices are the crux of this paper, we see no reason why the intercorporeal, empathic and multi-sensual experiences at the core of caring for small humans might not be generalized far beyond infant-caregiver relations. Indeed, this is what the notion ‘of our peculiarly “hypersocial” intersubjective aptitudes points towards (Hrdy 2004: 87). It also resonates with the idea, prominent in theories of care, that caring relations tend to be set in motion by a fundamental receptivity or opening of the self, and only later – if at all – settle into more regulated or calculated sets of exchanges. So too should we recall Hrdy’s point that hominin ‘big brains’ were more likely a collateral effect of shared care and provisioning than a causal factor, a point that we would extend to survival or ‘living on’ more generally. As Hrdy makes clear: ‘(n)atural selection has no way to foresee eventual benefits. Future payoffs cannot be used to explain the initial impetus’ (2009a: 30).

We also note that identifying peculiar or unique characteristics of our own species and genus is not the same thing as advancing human exceptionalism. Whereas much contemporary human geography highlights differences between human groups and shies away from identifying categorical traits of humanness, the cooperative breeding paradigm – along with human evolutionary theory more generally – concerns itself with the specific and definitive features of the extended hominin family. But evolutionary conceptions of the human oblige researchers to take seriously the capabilities, achievements and developmental pathways of other-than-human forms of life – as we have seen in the acknowledgment that cooperative breeding is a strategy that spans multiple biological lineages. A focus on infant carrying also opens up speculative questions about the possibility of ancestral humans taking cues from the way other species carry their young, together with more accessible evidence of our species making use of their child-carrying devices to convey the young of other, companion or domesticated species. And though we cannot assume any deep, evolutionary resonances,

it's worth noting the international outburst of knitting 'pouches' for orphaned, injured and traumatised animals during the 2019-20 Australian bushfires (Paul 2020).

Still more important for us is the way that developing the insights of the other paleo disciplines into a revitalized 'paleogeography' opens relational approaches to the deep temporal transformations of the Earth. Rather than anchoring the arc of human evolution in a stable ground, attention to the dynamism of the early hominin environment offers a reminder that origins tend to be complex, shifting, and equivocal, and in the case in question, quite literally rifted.

Baby-carrying slings bring together the security of tactile contact with a raised, outward-facing orientation to the social milieu, an idea we have fused with the claim of cooperative breeding theorists that socially-distributed childcare encourages curiosity, confidence and receptivity in our young. Hrdy's evidence that 'children who are accustomed to multiple caregivers grew up less likely to fear strangers' (Hrdy 2009a: 134) is one we have sought to extrapolate to the strangeness or self-estranging dynamics of the Earth. As Hrdy herself observes of foraging communities world-wide, and as Indigenous spokespeople have long insisted, this sense of trust and security extends well beyond the immediately 'human' sphere. For all the challenges posed by shifting, changeable milieux, foragers 'tend to share a view of their physical environment as a "giving" place occupied by others who are also liable to be well-disposed and generous (Hrdy 2009a: 133). Or as botanist and Potawatomi nation member Robin Wall Kimmerer reminds us, not only does a deeply inscribed sense of the generativity of the living Earth help Indigenous peoples endure episodes of eco-climatic hardship and extremity, it can also offer support in the face of ecological degradation. 'Even a wounded world holds us,' she reflects, 'giving us moments of wonder and joy' (2013: 327).

In this way, we position our thoughts on the technics of infant-carrying within the broader paradox that socio-cognitive attributes deeply inscribed in hominin evolutionary pathways could be a key to flexible responses to human-induced change in Earth systems. Our point is not simply that slings may be useful as post-Holocene physical upheaval impairs the relatively even and regular surfaces that support wheeled vehicles – for some of us, at least – in well-resourced regions. They are also good to think with and

through. Baby-wearing technics, we suggest, enabled a combination of tactile security with the ongoing exposure of a receptive, hyper-alert infant primate to the panorama of *terra mobilis* over million-year timescales. While such devices are unlikely to play more than a supporting role in sociotechnical responses to Earth system change, they are exemplary ‘interscalar vehicles’ for navigating between the intimacies of human care and the grand challenges of learning to live with post-Holocene planetary instability. It is in this regard that we propose technics of infant mobility as a generative point of entry into a reimagined paleogeography: a field we envision as being hospitable to the disciplines that currently specialize in evolutionary thinking but also attuned to human geography’s own potential contribution to the wide-angle storying of our extended hominin family.

By helping fold and stretch our imaginations, baby-slings invite us to consider how contemporary socio-spatial questions about ‘orienting oneself in three-dimensional space’ have deep temporal precursors: antecedents that bring into focus the ongoing geological formation of those spaces. While our deep dive into infant carrying serves as a reminder that early childhood experience may be crucial for preparing young people to respond flexibly and confidently to the geoclimatic transformations now underway, we have been keen to temper this point with cautionary notes about offloading the burden of planetary salvation onto younger generations. If what a small child encounters as they move through the world is formative, then what matters – at least as much as how they are supported and conveyed – are the activities going on around them. And the activities we would hope they witness ought to already include the wide-ranging, richly-textured, hands-on work of collectively engaging with rapid planetary change.

References

Anderson, Ben (2022) Forms and scenes of attachment: A cultural geography of promises, *Dialogues in Human Geography*, DOI: 10.1177/20438206221129205

Baldwin, Andrew., Fröhlich, Christiane and Rothe, Delf (2019) From climate

migration to anthropocene mobilities: shifting the debate, *Mobilities* 14:3, 289-297, DOI: 10.1080/17450101.2019.1620510

Bánovský, Juraj (2023) On the importance of infant carrying for social learning and the development of social cognition, *Philosophical Psychology*
DOI 10.1080/09515089.2023.2217211

Barnett, Clive (2013) Who Cares? In Cloke, P., Crang, P., & Goodwin, M (eds) *Introducing Human Geographies* (2nd edn) London: Routledge. Pp.589-601.

Barnosky, Anthony (2014) Palaeontological evidence for defining the Anthropocene. In Waters, C., Zalasiewicz, J., Williams, M., Ellis, M. & Snelling, A.(eds) *A Stratigraphical Basis for the Anthropocene*. London: Geological Society, Pp 149–165.

Bellis, Mary (2020) The History of Baby Carriages. *ThoughtCo*, Aug. 27,
[thoughtco.com/history-of-baby-carriages-4075936](https://www.thoughtco.com/history-of-baby-carriages-4075936)

Berecz, Bernadett., Cyrille, Mel., Casselbrant, Ulrika., Oleksak, Sarah and Norholt, Henrik (2020) Carrying human infants – An evolutionary heritage. *Infant Behavior and Development* 60 doi:10.1016/j.infbeh.2020.101460

Berlant, Lauren and Lee Edelman (2014) *Sex, or the Unbearable*, Durham and London: Duke University Press.

Boyer, Kate and Spinney, Justin (2016) Motherhood, Mobility and Materiality: Material Entanglements, Journey-Making and the Process of ‘Becoming Mother. *Environment and Planning D: Society and Space* 34 (6): 1113–1131. doi:10.1177/0263775815622209

Burkett, Judith., Sarah Blaffer Hrdy, and Carel Van Schaik (2009) Cooperative Breeding and Human Cognitive Evolution. *Evolutionary Anthropology* 18:175–186.

Burroughs, William (2005) *Climate Change in Prehistory: the end of the reign of chaos*. Cambridge: Cambridge University Press.

Calvin, William (2002) *A Brain for all Seasons: Human Evolution and Abrupt Climate Change*. Chicago: University of Chicago Press.

Cant, Michael (2012) Cooperative Breeding Systems. In Royle, Nick., Smiseth, Per and Kölliker, Mathias (eds) *The Evolution of Parental Care*, Oxford: Oxford University Press. Pp 206-225.

Clark, Nigel (2011) *Inhuman Nature: Sociable life on a Dynamic Planet*. London: Sage.

Clark Nigel (2017) Anthropocene Bodies, Geological Time and the Crisis of Natality, *Body & Society*, 3(3) 156–180.

Clark, Nigel., Alexandra Gormally and Hugh Tuffen, “Speculative Volcanology: Time, Becoming, and Violence in Encounters with Magma” *Environmental Humanities* 10 no1 (2018): 273-294.

Clark, Nigel and Gunaratnam, Yasmin (2017) Earthing the *Anthropos*? From ‘Socializing the Anthropocene’ to Geologizing the Social. *European Journal of Social Theory* 20(1) 146–163.

Clark, Nigel and Szerszynski, Bronislaw (2021) *Planetary Social Thought: The Anthropocene Challenge to the Social Sciences*, Cambridge: Polity Press.

Clement, S., and G. Waitt. (2018) Pram Mobilities: Affordances and Atmospheres that Assemble Childhood and Motherhood on-the-Move, *Children’s Geographies*.
doi:10.1080/14733285.2018.1432849.

Conradson, David (2003) Geographies of care: spaces, practices, experiences, *Social & Cultural Geography*, 4:4,451-454, DOI: [10.1080/1464936032000137894](https://doi.org/10.1080/1464936032000137894)

Cyrille, Mel (2018) *Clinging Young: Science of In-arms Carrying*. Great Britain: Cyrille.

Deleuze, Gilles and Félix Guattari (1994) *What Is Philosophy?* New York: Columbia University Press.

DeSilva, Jeremy (2011) A shift toward birthing relatively large infants early in human evolution, *PNAS* 108 (3): 1022–1027.

Diprose, Rosalyn (2002) *Corporeal Generosity: On giving with Nietzsche, Merleau-Ponty, and Levinas*. Albany, NY: State University of New York Press.

Dowling, R. (2000) Cultures of Mothering and Car Use in Suburban Sydney: A Preliminary Investigation.” *Geoforum* 31: 345–353. doi:10.1016/S0016-7185(99)00048-2.

Edelman, Lee. *No Future: Queer Theory and the Death Drive*. Durham and London: Duke University Press. 2004.

Fisher, Elizabeth (1979) *Woman's Creation: Sexual Evolution and the Shaping of Society*. New York: McGraw-Hill.

Gettler, Lee (2010) Direct Male Care and Hominin Evolution: Why Male–Child Interaction Is More Than a Nice Social Idea. *American Anthropologist*. 112 (1) 7-21.

Gilligan, Carol (1982) *In a different voice: Psychological theory and women's development*. Cambridge: Harvard University Press.

Hann, Michael (2002) Stroll On. *The Guardian*, 20 March.
<https://www.theguardian.com/lifeandstyle/2002/mar/20/familyandrelationships.michaelhann>

Hager, Lori (1977) Sex and Gender in Paleoanthropology, in Hager, Lori (ed). *Women in Human Evolution*. London: Routledge. Pp.1 -27.

Haraway, Donna (1992) *Primate Visions: Gender, Race, and Nature in the World of Modern Science*. London: Verso.

Hawkes, K. J. F. O'Connell, N. G. Blurton Jones, H. Alvarez and E. L. Charnov (1998) Grandmothering, Menopause, and the Evolution of Human Life Histories, *PNAS*, 95 (3): 1336-1339

Hecht, Gabrielle. (2018) Interscalar vehicles for an African Anthropocene: on waste, temporality, and violence, *Cultural Anthropology*, 33(1): 109-41.

Hewlett, Barry and Lamb, Michael (2002) Integrating evolution, culture and developmental psychology: explaining caregiver–infant proximity and responsiveness in central Africa and the USA. In Keeler, Heidi., Poortinga, Ype and Schlömerich, Axel (eds) *Between Culture and Biology: Perspectives on Ontogenetic Development*. Cambridge: Cambridge University Press. Pp 241-269.

Holt, Louise (2013) Exploring the Emergence of the Subject in Power: Infant Geographies. *Environment and Planning D: Society and Space* 31: 000. doi:10.1068/d12711.

Hrdy, Sarah Blaffer (1999) *Mother Nature: A History of Mothers, Infants and Natural Selection*. New York: Pantheon.

Hrdy, Sarah Blaffer (2001) The Past, Present and Future of the Human Family, *Tanner Lectures on Human Values*, University of Utah.: 57-110.

https://tannerlectures.utah.edu/resources/documents/a-to-z/h/Hrdy_02.pdf

Hrdy, Sarah Blaffer (2004) Comes the Child before Man: How Cooperative Breeding and Prolonged Postweaning Dependence Shaped Human Potentials in Barry Hewlett and Michael Lamb (eds) *Hunter Gatherer Childhoods*. New York: Aldine/De Gruyter.

Hrdy, Sarah Blaffer (2009a) *Mothers and Other: The Evolutionary Origins of Mutual Understanding*. Cambridge MA.: Harvard University Press.

Hrdy, Sarah Blaffer (2009b) The Evolution of Motherhood. *Nova Newsletter*.
<https://www.pbs.org/wgbh/nova/article/evolution-motherhood/>

Hrdy, Sarah Blaffer and Birkett, Judith (2020) The emergence of emotionally modern humans: implications for language and learning. *Philosophical Transactions of the Royal Society B* 375: 20190499. <http://dx.doi.org/10.1098/rstb.2019.0499>

Hussain, Shumon and Felix Reide (2020) Paleoenvironmental humanities: Challenges and prospects of writing deep environmental histories. *WIREs Climate Change* 11 (5): e667. <https://doi.org/10.1002/wcc.667>

Isler, Karin and Carel van Shaik (2012) How Our Ancestors Broke through the Gray Ceiling: Comparative Evidence for Cooperative Breeding in Early Homo. *Current Anthropology*, 53, S6: S453-S465.

Jensen, M. (2017) Urban Pram Strolling: A Mobilities Design Perspective. *Mobilities*. doi:10.1080/17450101.2017.1394683.

Kachel, A Friederike., Premo, L., and Hublin, Jean-Jacques (2011) Grandmothering and natural selection *Proceedings of the Royal Society: Biology*. 278: 384–391 <http://doi.org/10.1098/rspb.2010.1247>

Kärrholm, M., Johansson, M., Lindelöw, D. and Ferreira, I. (2017) Interseriality and different sorts of walking: Suggestions for a relational approach to urban walking. *Mobilities*, 12(1): 20–35.

Kimmerer, Robin Wall (2013) *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants*. Minneapolis: Milkweed Editions

King, Geoffrey, and Bailey, Geoff (2006) Tectonics and Human Evolution. *Antiquity*, 80: 265–86.

Knowles, R. (2016) *Why Babywearing Matters*. London: Pinter and Martin.

Gani, M Royhan and Nahid Gani, (2008) Tectonic Hypotheses of Human Evolution, *Geotimes* Jan. http://www.geotimes.org/jan08/article.html?id=feature_evolution.html

Gunaratnam, Yasmin and Clark, Nigel (2012) 'Pre-Race, Post-Race: Climate Change and Planetary Humanism', *Darkmatter* 9 (1) online at:
<http://www.darkmatter101.org/site/2012/07/02/pre-race-post-race-climate-change-and-planetary-humanism/>

Laracy, John, (2011) Hrdy's Evolutionary Model of Family, *Humanum*, Fall
<https://humanumreview.com/articles/hrdys-evolutionary-model-of-family-1>

Latour, Bruno (2004) Why has critique run out of steam? From matters of fact to matters of concern. *Critical Inquiry*. 30 (2): 225-248.

LeGuin, Ursula (2019) *The Carrier Bag Theory of Fiction*. Ignota

Leidloff, Jean (1986) *The Continuum Project In Search Of Happiness Lost*. Boston: Da Capo Press.

Lillehammer, Grete (1989) A child is born. The child's world in an archaeological perspective, *Norwegian Archaeological Review*, 22 (2) 89-105, DOI:
10.1080/00293652.1989.9965496

Lorimer, Hayden. (2011). Walking: New forms and spaces for studies of pedestrianism. In T. Cresswell, and P. Merriman (Eds.) *Geographies of mobilities: Practices, spaces, subjects* Farnham: Ashgate. Pp. 19–34.

Lupton, D. (2013) Infant Embodiment and Interembodiment: A Review of Sociocultural Perspectives. *Childhood* 20 (1): 37–50. doi:10.1177/0907568212447244.

Meinhold, G (2019) Introduction: Advances in Palaeogeography. *Geological Magazine*. 156 (2)179-181.

Maslin, Mark (2017) *The Cradle of Humanity: How the Changing Landscape of Africa Made Us so Smart*. Oxford: Oxford University Press.

Maslin, Mark and Beth Christensen (2007) 'Tectonics, orbital forcing, global climate change, and human evolution in Africa' *Journal of Human Evolution* 53: 443-464.

Maslin, Mark., Chris Brierley., Alice Milner, Susanne Shultz, Martin Trauth and Katy Wilson (2014) East African climate pulses and early human evolution, *Quaternary Science Reviews*, 101: 1-17.

Mbada, Chidozie Emmanuel., Adebayo, Owanike Shakirat., Olaogun, Matthew Olatokunbo. et al (2022) Infancarrying techniques: Which is a preferred mother-friendly method? *Health Care for Women International*, 43:6, 535-548, DOI: 10.1080/07399332.2019.1615915

Monarrez, Pedro., Zimmt, Joshua., Clement, Annaka. et al (2021) Our Past Creates Our Present: A Brief Overview of Racism and Colonialism in Western Paleontology. *Paleobiology* 48 (2): 1–13. doi.org/10.1017/pab.2021.28.

Nowell, April (2021) *Growing up in the Ice Age: Fossil and archaeological evidence of the lived lives of Plio-Pleistocene children*. Oxford: Oxbow.

Paul, Kari (2020) Kangaroo pouches, koala mittens: knitters unite to aid animals in Australia fires. Guardian 8 January <https://www.theguardian.com/australia-news/2020/jan/07/australia-wildfires-animals-shelters-knitting>

Puig de la Bellacasa, Maria (2011) Matters of care in technoscience: Assembling neglected things, *Social Studies of Science*. 41(1) 85-106. DOI: 10.1177/0306312710380301

Ross, Caroline (2000) Park or Ride? Evolution of Infant Carrying in Primates, *International Journal of Primatology*, 22 (5) 749-771.

Ross, Gerald (1999) Paleogeography: an earth systems perspective, *Chemical Geology* 161: 5-16.

Schön, Regine and Silvén, Maarit (2007) Natural Parenting — Back to Basics in Infant Care. *Evolutionary Psychology*. 5(1): 102-183.

- Sewell, Samuel (1923) 'The History of Children's and Invalids' Carriages', *Journal of the Royal Society of Arts*. 71, 3694: 716-728.
- Sheldon, Rebekah. *The Child to Come: Life After the Human Catastrophe*. Minneapolis: University of Minnesota Press. 2016
- Spikins, PA., Rutherford, HE and Needham AP (2010) From Homininity to Humanity: Compassion from the Earliest Archaics to Modern Humans, *Time and Mind*. 3:3, 303-325, DOI: 10.2752/175169610X12754030955977
- Steffen, W., J. Jäger, P. Matson, B. et al. (2004) *Global Change and the Earth System: A Planet Under Pressure*, Berlin: Springer-Verlag.
- Stein, John (2007) 'The Evolution of Speech and Language', in *Pediatric ENT* John Graham., Glenis Scadding, Peter Bull (eds), Springer-Verlag Berlin. Pp 19-26.
- Szerszynski, Bronislaw (2016) 'Planetary Mobilities: Movement, Memory and Emergence in the Body of the Earth'. *Mobilities* 11(4): 614–628. doi:10.1080/17450101.2016.1211828.
- Tahhan, D. A. (2010) 'Blurring the Boundaries between Bodies: Skinship and Bodily Intimacy in Japan'. *Japanese Studies* 30: 215–230. doi:10.1080/10371397.2010.485552.
- Tahhan, D. A. (2013) 'Touching at Depth: The Potential of Feeling and Connection'. *Emotion, Space and Society* 7: 45–53. doi:10.1016/j.emospa.2012.03.004.
- Taylor, Timothy (2010) *The Artificial Ape: How Technology Changed the Course of Human Evolution*. New York: St Martin's Press.
- Tronto, Joan (1987) 'Beyond Gender Difference to a Theory of Care', *Signs*, 12 (4). 644-663
- Urry, J. (2004) 'The 'System' of Automobility'. *Theory, Culture & Society* 21(4/5). 25-39.

Valentine, G. (2008) The Ties that Bind: Towards Geographies of Intimacy. ” *Geography Compass* 2 (6): 2097–2110. doi:10.1111/geco.2008.2.issue-6.

Van Hout, I. (2008) *Beloved Burden: Baby Carriers in Different Countries*. Washington, University of Washington Press.

Wall-Scheffler, C., Geiger, K. and Steudel-Numbers, K (2007) Infant Carrying: The Role of Increased Locomotory Costs in Early Tool Development, *American Journal of Physical Anthropology* 133 :841–846.

Whittle, Rebecca (2019) Baby on board: the impact of sling use on experiences of family mobility with babies and young children, *Mobilities*, 14:2, 137-157, DOI: 10.1080/17450101.2018.1533682

Whittle, Rebecca (2021) Towards interdependence: using slings to inspire a new understanding of parental care. *Children’s Geographies*, DOI: 10.1080/14733285.2021.1955091

Winder, Isabelle., Geoffrey King., Maud Deves and Geoff Bailey (2012) Complex topography and human evolution: the missing link, *Antiquity* 87: 1-17.

Wylie, Alison (1997) Good Science, Bad Science, or Science as Usual? Feminist Critiques of Science, in Hager, Lori (ed). *Women in Human Evolution*. London: Routledge. Pp 29-54.

Wylie, John (2005) A Single Day's Walking: Narrating Self and Landscape on the South West Coast Path, *Transactions of the Institute of British Geographers* 30 (2): 234-247

Zihlman, Adrienne (1997) The Paleolithic Glass Ceiling: Women in Human Evolution, in Hager, Lori (ed). *Women in Human Evolution*. London: Routledge. Pp 91-113.

¹ Hominini or hominins is the taxonomic grouping that includes the genus *Homo* – ‘modern’ humans and their extinct ancestors – along with chimpanzees and bonobos.

² An important theme in Hrdy's earlier work is that human maternal bonding happens in stages, and that infanticide or new-born abandonment is common – cross-culturally and historically – wherever mothers feel they lack the assistance necessary to raise the child (1999: 293-317).

³ Other aspects of Liedloff's book we find problematic: the evidence based on a single community, the links between Western childraising and drug abuse, homosexuality and other so-called problems.