Reconceptualizing Educational Research Methodology

ISSN: 1892-042X Vol 16, No 2 (2025) https://doi.org/10.7577/rerm.6016

Scaling as Methodological and Material Activation Technique

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Abstract

In this methodological paper, we propose that knowledge production and worldbuilding creations (in the context of scholarship) often provide a sense of activation and urgency to act. Namely, we focus on scaling as one possible activation technique for qualitative inquiry building on particular worlds, potential relationships, and emerging '(dis)order' within the world. Scaling as an activation technique and the concept of *scale* enable scholars to consider their relationality with others, to identify within themselves relationalities regarding their areas of study, to consider how close/far data, knowledge, and participants are and become, which theories and practices are foregrounded and backgrounded, and how relationality within scales and scaling might operate. First, we discuss the relational nature of scaling and how scales are situated in relational spaces. Then we draw from the past scaling traditions and situate scaling in the context of mountains and mountain matter(ings). Finally, we share two scaling activation examples and conclude with a discussion about boundaries and the limits of humanely perceived relationalities and scaling. We propose that *nonhuman* and/or *more-than-human* 'scales' are particularly pertinent to understanding the limitations of human knowledge and various forms of relationalities.

Keywords: Scaling, activation technique, mountains, relationality

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Relational spaces of scales and scaling in qualitative inquiry

Scaling often happens in relational spaces and scales carry within them different forms and elements of space, places, and space-time-mattering (see also Barad, 2007). Methodologies generate knowledges and realities, yet these realities are always in relation to other realities, subjects, objects, and ecologies (see, e.g. Haraway, 2016; Manning, 2013; 2020). Furthermore, methodologies are choices that guide various structures and elements in building a study and research design. Thus, we propose that methodologies create a potential relationship, emerging and emergent '(dis)order' within the world through different techniques and strategies. The term '(dis)order' evokes simultaneous potential for (relational) order and disorder depending on different activation events and onto-epistemological orientations. In addition, methodologies activate temporary and relational worldbuilding structures, which foreground and background certain views, experiences, materials, and relationships across different time-spaces. Scaling is one of these methodological engagement and activation techniques. Engagement with *scales* can enable qualitative scholars to consider their relationality with others, how close/far data, knowledge, and participants are and become, which theories and practices are foregrounded and backgrounded, and how relationality might operate. Scale's relational structures and foregrounded (dis)orderly elements enable scholars to focus on particular worldbuilding structures and relations (also with otherness) while embedding themselves within chosen frameworks and ecologies. In addition, these structures are not always fixed and visible, but they constitute a potential network of proximities, virtual constellations, and possible densities of relations and affects.

In the context of qualitative inquiry, the role of world-building relations can be seen as one of the foregrounded elements of inquiry process since scholars have multiple options on how to build knowledge and reality in their studies (see, e.g., Jackson & Mazzei, 2012; Pernecky, 2016). In addition, *how* something becomes knowledgeable, sensed, related to, and noted in a study and how something becomes knowledge, data, or a meaningful element in a study varies. These processes are often guided by subjectivities and relational ecologies building particular kinds of realities, and *how* used theories shape available methodological tools and practices always take place in a specific and limited time-space. Relational and continuously shifting/created design and knowledge process also acknowledges that many relational and material practices take place beyond human awareness and directed intentionality. Manning and Massumi (2014) referred to the energy of movement, rhythms, and compositional relationality as mutual envelopment and relational experience of activation. For us, methodological activation can take forms of transrelating, transduction, and transiting between knowledges, effects, affects on a scale. In this paper, we detail two examples of scaling as methodological activation that make visible relationality with/between more-than-human others. We present our examples of scaling as one way that non-representational, post-qualitative inquiry could begin to work with data encounters that are complex, multidimensional, or beyond human perception.[1]

1 Our backgrounds in diverse scientific fields spanning three continents and scientific traditions such as biology, education, research methods, mental health care and geography activated us to consider relationality in (dis)order among multidimensional elements, levels and crossing of scales in our own work and this shared experimental project.

Human-centered scales are often used in qualitative inquiry (see, e.g., Asadullah et al., 2023; Shach-Pinsly, 2019). More importantly, for this paper, scales that incorporate nonhuman or more-than-human elements are particularly pertinent to understanding the limitations of human knowledge and worldviews, as well as myriad forms of relationalities between humans and our nonhuman/more-than-human counterparts. For instance, geological dimensions, including geological time, erosion, and sedimentation (Kidder et al. 2008), hint at geological scales that situate human and more-than-human materiality in relation to each other. In this paper, we are particularly intrigued by the diverse ways scholars could bring geo-centeredness, time, and material and relational sedimentation together. We experiment with scales and conceptualize scales involving geological time and earth processes as a form of methodological activation technique and worldbuilding process. Braidotti (2013) asked about the role of geo-morphism in the context of complex relationality and relationships: "What would a geo-centered subject look like?" (p.81). Similarly, we wonder what kind of scaling and world-building would recognize geo-centered subjects and how these scales could be perceived through relationalities among qualitative researchers. We approach scales and scaling as vital tasks and techniques within knowledge and world-creation processes in the context of qualitative methodology. It is also important to remember that qualitative researchers' methodological and worldbuilding decisions always portray worldbuilding as selective, political, and intentional practices.

More specifically, we see the spatiotemporal scales as not something intrinsic to the thing/object/subject i.e. mountains but as expressions of their material agency that is experienced by the researcher in the field. Following the concept of "geological agency" as expanded on in Hadfield-Hill and Zara (2020), we see scaling as one way to engage with the agentic material-human-multispecies-mountain assemblage that is particularly timely for addressing—but ultimately goes beyond—the Anthropocene. The dispersed agency of and changing relations between the agents within this mountain assemblage can be deterritorialized and reterritorialized (Deleuze & Guattari, 1987, p. 10) through scaling. Scales and scaling entail an agency that spans geological time and earthly space. In this sense, scaling pertaining to mountains, for example, is neither a purely human artifact nor an intrinsic property of mountains themselves—but an act of co-creation engaged in by human and nonhuman subjects, both of whom retain their respective agencies. The one crucial point worth remembering is that insofar as the measurements in the scaling act are expressed in human terms (kilometers, years, million and so on), they are merely translations of a material agency that traverses vast extents of time and space, the fuller nature of which remains insufficiently known to us humans to date.

How does scaling live in the context of qualitative inquiry? How does a researcher create and weigh the scales? Some scholars could utilize scales as a tool for seeing and connecting usually to what is already known. Scales can measure 'perceived and constructed' dimensions and distances. May some scales function like concepts with upper categories, looking at reality from a chosen and value-laden perspective? Might scales themselves organize the world around us? May scales constitute us as inquirers? For example, Marston et al., (2005) discussed flat ontologies as self-organizing systems where multiplicity of complex and moving/shifting relations and singularities

lead to the creation of new events, practices, and scales. Additionally, Marston et al. play with the idea of site ontology, which explains how the materiality of the built environment, including "natural" elements, can act as an "ordering force" (p. 425) that facilitates and limit human practices. Could scaling in qualitative inquiry activate site ontologies, flat ontologies, and non-hierarchical relations? Or might scaling enable the being and becoming with the multiplicities while aiming to comprehend and actualize any given topic and make sense of (dis)order within complex systems? Does this move require scholars to feel free to shuffle traditional scales, as well as the multiplicity/plurality of possible scales? How might we move toward the non-visible, non-measurable, non-reachable scales?

Scaling Traditions/Movements/Controversies/Speculations

Scales and scaling have long traditions and can be seen in a variety of disciplines, from human geography to organizational psychology to biology. The scales in these disciplines are diverse and represent comparisons between time, space, and systems. However, scales are not a fixed entity and can undergo shifts as new information is introduced. It could be proposed that any type of scaling anchors and temporary freezes/locates data, information, perception, and affect. The actual act of scaling temporary stabilizes (yet to move again).

In human geography, Burgess (2020) proposed that scales "are geographical referents constituted in political practices" (p. 233). Scales also function as episto-ontological structures and reality creators. Taylor (1981) articulated that geographical scales can function as ways of interpreting reality, ideology, and experience. Scales represent a chosen level and dimension of observation, and a few phenomena can be elucidated at single scales of observation (Pachepsky & Hill, 2017). Additionally, Brenner (1998) introduced scalar structuration as one way to illustrate the relationship between different scales and proposed a focus on re-hierarchization among differentiated spatial units. Herod and Herod (2010) differentiated between topographical and topological scales. Topographical scale establishes a boundary line to enclose a particular absolute space, whereas topological scale connects networks and relationships via lines and nodes. The connections between these lines and nodes are not fixed, leaving room for multiple relational iterations.

But these are merely about spatial scales—with authors preferring one way of interpretation over the other—and do not inform us much about temporal scales. Indeed, the temporal dimension has been rather rarely engaged in qualitative research, perhaps because most qualitative researchers are habituated to dealing with phenomena at the human temporal scale (see Gore et al., 2021 for an overview of temporality in qualitative research). There is some literature that recognizes the centrality of time in shaping processes and outcomes at both individual and organizational levels (see, for example, Spencer et al., 2021; Hoorani et al., 2023). For example, Spencer et al. (2021) developed the theoretical approach of Thematic Trajectory Analysis (TTA) that seeks to employ a processual approach to micro and individual level research. In fact, this realization had already occurred among qualitative researchers in the 1960s and 1970s, when processual complexity was acknowledged (Hammersley, 2008), and terms such as diachronic

design and longitudinal research came into vogue. However, it should be noted here that the emphasis on 'process' as revealed through these works is still very much confined within the social sphere.

Different relational knowledges and realities emerge when we shift between scales. In biology, the levels of organization— "molecule, cellular… ecosystem" (Dobzhansky 1964, p. 444)—are a way to frame the flow of intra-actions within and between organisms and environments. Dobzhansky writes about the ontological reductionism of biology, where complex ecological systems are seen only as an amalgamation of simple molecular reactions (p.446). Prioritizing one scale as more basal than other scales can homogenize our worlding if this molecular scale is all that constitutes humans and more-than-humans. Seeing all intra-actions merely as products of molecular reactions can negate the agency of different actors in a system. At the same time, we wonder how scaling may produce understandings of the world differently, and how these understandings are potentially reproduced in next studies.

In human geography, scales and the notions of scale hierarchies have also been contested (Marston et al., 2005). Whereas Pachepsky and Hill (2017) claim that scales and the connections between the scales are needed for the description of the world and for solving environmental and societal problems, Marston et al. (2005) argue for the removal of scales altogether. We acknowledge the problematics of scales as existing and true ontological structures but see the usefulness of scaling and scales as relational and worldbuilding tools (see also Jones, 1998). When juxtaposed with a flat ontology, scaling can produce a type of productive tension. The type of speculative scaling we propose in this paper seeks to question the hierarchies that can result in the marginalization of the more-than-humans and companion species—as well as 'other otherness'—we live with. Scaling, when performed as a situated intervention, can make taken-for-granted hierarchies visible and reveal nuances of subject-object relations. At the same time, scales orient foreground and background activities and elements, which can create hierarchies and priorities.

Scaling in the context of mountains

In this paper, we use examples related to mountains to illustrate how different scales might function and what kinds of realities they might produce. We choose mountains as one form of material activation and exemplary space since mountains are shaped over millions of years in a geological timescale, which is in many ways beyond human understanding and experiences. Mountains have a disorienting materiality which, through mountain relations and materiality of mountains, breaks through normative elements and practices of walking, sensing, aging, communicating and so on. According to Cohen (2015), "because of its habit of undermining human singularity, of revealing common materiality as well as the recurring affinity, to convey within its materiality the thickness of time, stone triggers the vertigo of inhuman scale, the discomfort of unfamiliar intimacy, and the unnatural desires that keep intermixing the discrete," (p. 23-24). This vertigo and discomfort are mirrored in Springgay and Truman's *Stone Walks* (2017), in which stone is seen not as a stable entity, but as constantly shifting/transforming/becoming, frequently below

the scale which humans can perceive. While the shape of a mountain is familiar to almost all of us, geologically, there is no agreed definition of a mountain. Geologically, mountains are usually seen as the regions where the continental crust has been thickened due to accretion and/or uplift (Condie, 2016). The largest of continental mountain chains, such as the Andes and Himalayas, can be several thousand kilometres long and can rise as much as nearly 9 km from the sea level. However, these are the mountains that we can commonly 'see', and therefore, they are etched in our individual and collective imaginations. There are elevated regions underneath oceans, the Mid Oceanic Ridges (or Mid Ocean Rises), that can be 40,000 km long, 2000 km across, and 2.5 km high (Johnson & Harley, 2012). These are the largest mountain systems on the planet, only the ocean basins hide them from our view and thus prevent them from occupying a space in our imagination. Mountains, therefore, can exist in high places as well as in depths. What is more, continental mountain systems can be interpreted as a result of the opening and closure of ocean basins (Yuan et al., 2009); subduction of the oceanic crust plays a prominent role in collision zones, and the Mid Oceanic Ridges are places where new oceanic crust is born (Harris, 2012). Seen from this angle, mountains are expressions of the growing and evolving continental crust that occur in continent-continent collision zones and island arc systems (Shroder & Price, 2013; Condie, 2016). Situating our examples in the context of mountains also challenges us to think about scales as orientation spaces at a time when scholars are facing the limits of their knowledge and verifiable truths while being challenged by a global ecological crisis.

Aldo Leopold entreats us to "think like a mountain" (1949), to "leap from. . . the diminutive boundedness of merely human tales" (Cohen, 2015), as a way of interacting with the environment beyond the human sphere. Though a complete understanding' of the mountain is out of reach for humans, living and being in close relations with the mountains can invite humans to explore the dynamic scales of mountains, which are often taken for granted as fixed and stable in singular scales. Geographical and other dynamic scales of mountains live with the humans who explore them. This continuously evolving and intra-active relationality constitutes human and more-than-human sediments, matter, debris, waste, nutrients, and different geographical forces.

More specifically, mountains can be seen as epitomes of geological time, a scale that is vastly different from the timescale humans live in, understand, and comprehend. On the continents, mountains are affected by slow erosion by glaciers, wind, and precipitation operating over the geological timescale (c.f. Owens & Slaymaker 2004). Some mountains are formed relatively fast, through volcanism, and the energy they embody hints at another aspect of the term 'scale,' as it has been argued that a single eruption of the (Toba) volcano could have contributed to a planetary-level climate change (Timmreck et al. 2012). In this way, the stones that make mountains and the pebbles and the dust that we step over or inhale embody vast timescales as well.

Qualitative researchers can employ speculative activation techniques and participatory modes of inquiry—the salient point being the counterpart in this participation is not a human subject but a geological one. For example, trekking in the mountains and looking at the patterns etched on the surface of a rock as a process that has operated on what was once a shallow seafloor can open

new vistas of perception, relations, and world-building. But here, we must be careful to incorporate the understanding (derived from a performative/agential realist insight of mattering and phenomena) that this 'looking at' the rock is not an action that is fully under the control of an independent human mind; it is an intra-action involving sensory perceptions and thinking abilities being 'awakened' by the materiality of the rock itself. This, of course, further entails that this view of the rock is inherently partial: any one rock that we can take a close look at, there are countless others that remain unseen—indeed, if we remember the vast undersea mountain formations, then entire mountain ranges are hidden from our fields of perceptions.

In this context we would like to highlight two different 'scales' when we think of mountains, spatial and temporal (though we also agree that mountains cannot wholly be "contain[ed] within bounded spatial and temporal scales" (Cohen, 2015)). The spatial scale relates to their extent, while the temporal scale pertains to them growing and shrinking in geological time. As Barad (2007) observed, in geological time mountains are moving, fluid entities rather than the fixed landforms of high relief we associate with them—it is also known to earth scientists that mountains are not static expressions of relief but embody combinations of constructive and destructive earth processes such as erosion (Egholm, 2013). It must also be noted that both these spatial and temporal scales are human approximations and estimates—although the material reality of mountains spanning geological time and spatial extents of the planet's surface is there to inform these scales, they are always constructed like all human knowledge within the human temporal perspective. However, mountains are neither merely passive objects of construction nor inert canvases on which some socially constructed reality takes shape, they have their own agency—one that spans vast spatiotemporal scales—making them what the British nature writer Robert Macfarlane describes as "a collaboration of the physical forms of the world with the imagination of humans (Macfarlane, 2003, p 19).

Mountains beckon us to immerse ourselves with their material agency that is expressed at spatial and temporal scales. As mentioned earlier, mountains cannot be defined as a particular type of earth feature—this conundrum is a direct outcome of their material complexity that assumes different, fluid forms across space as well as evolve through time. This material agency, which straddles geological periods and operates across continents, is condensed in the rocks that we encounter when visiting a mountain, in the relief that we must scale to reach their tops, and in the ravines that flow out of their sides. This is perhaps the simpler part of imagining scaling with mountains. The more difficult and less-than-apparent part comes when we realize that we ourselves are products of those very scales in the sense that they actively engage with our senses to give rise to what we eventually identify as 'topography,' 'height', 'verticality' and so on. This is an earth agency speaking directly to us, or rather, moulding our perception in a way that gives rise to the notions we associate with mountains. A somewhat related strand of thought was explored in the formative paper by Simpson (2019) where he eloquently argued how mountains shaped a multitude of modernities through their manifold and complex agency. It should also be added that the term 'scaling' here does not signify an inert human construct but a vibrant engagement with mountain materiality akin to the agential realist conceptualization of 'apparatuses' that are not purely laboratory artifacts but are specific material discursive practices (Barad, 2007).

Scaling in this context is thus not only a human attempt to understand and measure mountains, but a sense of being, an awakening of perception, that is co-created by the materiality of mountains and our senses; or even a mishmash of processes that not only blur the subject-object dualism, but also denies us humans the position of the arbiter of reality or worldmaking. Again, we can draw vital insights from Barad's account of intra-actions and 'agential realism' (Barad, 2007). For Barad the primary ontological unit is not an independent object but phenomena that are 'the ontological inseparability/entanglement of intra-acting "agencies"' (p. 139). In this sense specific intra-actions give rise to specific formations, as Barad outlines in the following words: "The world is an open process of mattering through which mattering itself acquires meaning and form through the realization of different agential possibilities. Temporality and spatiality emerge in this processual historicity" (p. 141).

Actualizing mountain scales in qualitative inquiry: two examples

While carrying out research with the mountains, we were puzzled with methodological questions related to scales: how do we understand our interaction with a mountain that encompasses a variety of different scales and prompts numerous scaling practices, when we find ourselves at its foothill, shoulder, on the summit, or next to a small rock? How do these scaling explorations shape our qualitative world-building and our relations with the world? To explore this question, we engaged in personal explorations with scaling in the context of mountains. We wondered how our human approximations and perceptions, affective capacities, and ways of understanding may evolve as we approach a mountain from afar, go very near it, or even stand on top of it.

As our next examples illustrate, mountains signified and provoked different states, beings, and becomings based on different scaling practices. These scaling activations foreground the agency of the stone and the shifting and unstable relationality between the *bio* and the *geo* when working with a geo-centered subject. Furthermore, they activate and cross scales, creating new understandings of non-directionality and spatial movement. Our examples also promote awareness of complexity and co-existence of elements traditionally belonging to specific and separate scales. We labelled these scaling examples and practices as embodied digital scaling and transrelational scaling.

Example 1: embodied digital scaling

Turning to digital and visual tools can provide a way to express the folding, enfolding and refolding (Mazzei, 2017, p.155) nature of the mountain experience and material relations.

Figure 1: Digital scaling

At the level of couplings, these levels of visual information and experiences before and during humans enter mountains are entangled. Processing the visual picture guided by questions that allow for exploring the inner scales in conjunction with "the mountain." Digitally embodying the experience on a mountain allows one to express affective moments in ways that may not be possible when one is physically on the mountain (see Figure 1). Digital pre-exploration can guide the exploration of *how* something becomes knowledge, data, or a meaningful element in a study, guiding positionalities and relational ecologies or building particular kinds of realities in a specific and limited time-space. An example of a digital scaling exercise is to first write a story of the mountain, choosing a picture of a mountain (either lived experience or digital, real or imaginative), and using this photo as the basis of one's own reflections and ponderings in relation to the mountain. In this practice, the exploration included creating a digital body image with incorporated affects in relation to "the mountain", time, and age. The process and inner relations can be further explored. Thus, multiple relations and different relational scales can be constantly evoked in living the present (see Mazzei, 2017), and by stepping in and out of one's positionality and isolation into an ontology of processual relationality. Selective worldbuilding can merge within subjective lived experience in connection with non-human materiality. From a human centered and phenomenological perspective, the experience can have conscious and unconscious levels, inner scales, emerging thoughts, affects, and it can have bodily sensed emotions. The different relational knowledges and realities emerge when we shift between scales with different foci. As bodies resonate, the bodies synchronize with external processes (Fuchs 2020) both on a conscious and nonconscious, prereflective level.

According to Fuchs (2020), prereflective internal time consciousness is marked by the rhythmicity of vital processes (heartbeat, respiratory rhythm) as well as by cyclically recurrent drives, urges, and needs. The body forms affective experiences in implicit or body memory, where the body is affected irrespective of an individual's capacities and choice-making within microtemporality of experience (Fuchs 2020). Fuchs (2020) explains that the individual's capacities, habits, and dispositions are embodied. The repeated experiences "melt" into body memory, the scaling of human experience connecting with the non-human is an embodied experience, and of living complex experiences. The embodied digital mountain scales can be experienced in the motion and movement; the experienced affects all occur simultaneously.

Moving in the mountains relates with the unconscious via the body – the time perspective within mountains is not comprehensible. Bodies sharing the same space with mountains can resurface any memory or material affected by the mountain experience. According to Fuchs (2012), the unconscious within the lived space can be conceived as containing all the other ideas not present

at a particular moment. From the scaling perspective, this means that the scales are available, depending on the respective experiences, capabilities, and motives of a person, and the bodily memories will bear varying significances, relevancies, or valences (Fuchs 2012). Such scales would be *procedural* (patterned sequences of movement, well-practiced habits), *situational* (extending to the spaces and situations in which we find ourselves), *intercorporeal* ("in between bodies"), *incorporative* (a body-for-others, a carrier of social roles and symbols), *pain* (the reactivation of pain memory may occur even after a long period of latency), and *traumatic memory* (body memory caused by trauma, that is, the experience of a serious accident, of rape, torture) (Fuchs 2012). While these scales are normally applied to human experiences, in this case, we can use them as provocations to explore the life (hi)story of the mountain and how its agency affects us as we digitally explore it. What would a well-practiced habit of a mountain be? What kind of social role does an agentic mountain play among humans, other mountains, and the vast ecologies that interact with it?

Example 2: transrelational scaling

Transrelational scaling uses lines to connect different nodes, objects, and elements of mountains which are related and linked but which do not provide expected or 'real' connection between the two pictures, images, perceptions, or constructed realities. A transrelational scaling may establish a co-created virtual connection and lines of speculated relationality. These kinds of scales utilize interactive, plural, and continuously changing relationships as spaces for activation and eventhood. For example, the relative length of the lines connecting various nodes and objects of the scalable world (within the example picture) offers both imaginative and sensed speculative/visualized relations. These scales can also utilize spectrums and diverse degrees of distinctions (see also Levitan, 2019 and Rousell, 2021) enabling viewers to see close and far at the same time, visualize a particular space as an interplay between dark and light, side, and above, few and many, there and here, path and off path, clusters and isolations and so on. These different scenarios offer insights into the different worlds and reality amplifiers. Furthermore, the perceived distance between the objects in the left part of the figure is both disrupted and united by the lines connected through the right figure. The picture angle creates a perception of two separate scales or one relational scale, while the same formations are present in both pictures but from different angles. This example illustrates how scales bind our environments and spaces while also producing unanticipated connections and affects.

In the context of peace studies, Courtheyn (2018) introduces a radical transrelational peace that builds on ecological dignity, social relatedness and movement, and relational ontologies. This form of relating "questions isolating contexts from one another and argues for a more nuanced understanding of how multiple 'locals' nurture or undermine ecological dignity in a globalizing world" (Courtheyn, 2018, p. 743). The 'local' of sky interacts with the dust, plants, rocks, and sand. Cactus connects with other plants, grass, and sun. Sun, sky and shadows shape each other, and brown and blue intermingle, also bringing sharp and smooth surfaces together. Transrelational peace is one potential product of a transrelational scaling, which aims to counter the hierarchical dualisms of modernity and elements that can be governed through hierarchies. The big rocks enunciate small grains of sand, dust, and pollen. Furthermore, "radical trans-relational peace of

ecological dignity generates more equitable relationships, and it functions through solidarity networks" (Courtheyn, 2018, p. 754). During transrelational scaling, pre-periphery relationships are equalized, like our examples of rocks. Different rock formations and the plurality of angles can be perceived simultaneously. Transrelational scaling is always already imperfect, unfinished, and becoming where difference and dissent are highlighted rather than suppressed. How might transrelational scaling manifest itself and be otherwise by looking across positionings to counter potential dominance and privileged positioning, foregrounding, and standpoint?

Sometimes scaling may co-construct distance and size and offer shifting directionality. Translational scaling may also function as a cartography of a kind where different surfaces can be linked and connected without a 'truth value'. Surfaces collide and merge while different mountain landscapes become possible. In addition, truth and ontological inter-relational status of the (rock) images might be questioned while the epistemology, narration, perspective affect these images together to generate a situated and contextual transrelational zone (see Figure 2).

Figure 2: Transrelational scaling

Scaling can serve as a way of putting inquiry elements and worldbuilding experiences in a dialogue with each other, creating a space for attuning to more-than-human agency. This can be applied to agents within a scale or different scales themselves, such as biological and geological movement scales, which can be connected in such a way that highlights the entwined and mutually affecting more-than-humans in each scale. Body mapping (Boydell, 2020; Fullagar, 2020) provides us with yet another foregrounding technique of scaling that could explore the "affective forces" (Rousell 2021, p 582) felt as they pass through the body. This is normally accomplished by having study

participants make an outline of themselves and annotate the body outline with words or drawings that represent their embodied experiences. To get a sense of the relationality of the mountain, qualitative researchers could embody the mountain's movements and use the method of body mapping to speculatively explore how the biological scale of one's human body restricts or makes possible other types of mountain movements. Which lines could be formed, and which connections could and could not be made? This diffracts the experience of the mountain at the human spatiotemporal scale, with the movements bounded by biological possibilities. The mountain may also function and interact as a body/bodyform because of the crossing between biological and geological scales. What would this mean for seeing the mountain as a living, sensing, and interacting system? How does it affect the way we see movement when we put biological and geological scales in a dialogue with each other?

'The boundary question' of scales and future thinking

The linking of the biological scale of human and more-than-human bodies to the geological scale of the mountain body blurs the boundary between the two by accentuating the places where they are present in each other. The biological scales of the plant and animal life cannot be disentangled from their living arrangements with the mountain, just as the geological scale cannot be removed from the fossilized creatures within the mountain. Our examples of scaling as a methodological activation technique and the crossing of scales creates a layered worldbuilding that enables us to access the co-existence of elements that might not be in direct relation to each other within discipline-specific and normative discourses and practices. Scales are not independent units or spaces for the 'measurement' of individual relations. Rather, scales are always inter-relational where objects become (accessible) only in relation to subjects and subjects in relation to other subjects. Specifically, our experimentations with scaling gave us points of relation for the vast spatial and temporal scales discussed earlier. It could be argued that scaling and scales form some type of clusters and recognizable formations, which can be problematic from the materialisms and intra-active perspectives. However, in this paper, we do not see these 'clusters' as stable formations or ways to 'capture', represent and rigidly structure our worlds. Rather, these clusters function as temporary actualizations of shifting and animating relations as we have experienced and lived them.

Qualitative researchers can facilitate and practice post-disciplinary approaches that take emergent and potentially unrecognizable forms and materializations under activation. Practices such as scaling could help qualitative scholars work through complexity in non-representational and non-transcendental spaces. Vannini (2015) propose that non-representational research could function as a unique style; a style that territorializes, de-territorializes, and animates life. In this paper, we have engaged with life, animated and non-animated lives connected with mountains and rocks. Furthermore, in non-representational research, the focus on multiple potentials of and for the future is foregrounded rather than focusing on the past which took place before the representation process. Vannini suggests to enliven rather than report, rupture rather than describe, and utilize different possibilities of encounter than representative ideals.

Material reality may also enable qualitative scholars to relate at deeper and more responsive

levels. Mountains are also increasingly affected by human-scale events such as the development of cities and land-use change (Strong 1995; Halofsky et al. 2017). Researchers have documented mountains' transformation through agriculture and transhumance (Vaccaro & Beltran 2010; Lozny 2015) articulating the case that the human scale is irretrievably intertwined with the geological. Perhaps scaling and diverse scales can document transformations, changes, and moving relations. It can be argued that even as mountains seem to be far removed from the human timescale, they are increasingly affected by us and are indeed vulnerable entities in the Anthropocene (Chakraborty, 2021). In the Anthropocene, the material agency of the mountains is perhaps facing a novel situation of being confronted by a human agency that has become geological in scope and scale. In many cases humans and qualitative researchers are tracking solely traces, always following incomplete parts of mountain ranges, rock formations, and layers of sedimentation. Mountain scales may offer endless time perspectives which may be actualized only in pre-apprehension and virtual modes.

Finally, scaling can offer a productive between-space where thinking, living, theorizing, and methodological activations may happen differently. Furthermore, relationality between disciplinary scales creates sites for the political exploration of these values. Ng and Mirchandani (2008) proposed that critical scholars, including feminists and critical geographers, have been interested in developing alternative forms of scale in the light of a more iterative relationship between local and global. These forms of methodological activation and world- and knowledge-building operate between and within different scaling (e.g., digital, transrelational, and movement scales) multi-directionally and simultaneously. All scales are human constructions and perspectival; they are not 'views from nowhere'. Following Stengers (2018) we note that other sciences and ecological ways to co-habituate the world are possible. Scales, like other techniques and research tools, should be approached with hesitation, attentive scrutiny, and situated knowledges. Scales and scale-building could build more on slowness and attentiveness. Zooming in and out reminds us about layered perceptions and situated yet multidimensional realities that qualitative scholars and our participants live. This process can work against simplified and singular representation by contextualizing relations, affects, and experiences from multiple angles simultaneously.

References

Asadullah, M., Mirza, S., Haq, M., Yaqoob, T. & Hussain, S. (2023) A qualitative inquiry of doctoral students' herding in education and validation of "herding in educational decisions" scale. *Higher Education Quarterly, 77(1):* 102–120. https://doi.org/10.1111/hequ.12372

Barad, K. (2007) *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning.* Duke University Press. https://doi.org/10.2307/j.ctv12101zq

Braidotti, R. (2013) *The posthuman*. Polity Press.

Brenner, N. (1998) Between fixity and motion: accumulation, territorial organization and the historical geography of spatial scales. *Environment and Planning D: Society and Space 16:* 459–81. https://doi.org/10.1068/d160459

Boydell, K. (Ed.) (2020) *Applying body mapping in research: An arts-based method*. Routledge.

Burgess, S. (2020) On a Different Scale: Movement (s) in a Pandemic. *Philosophy & Rhetoric*, *53*(3): 232-238. https://doi.org/10.5325/philrhet.53.3.0232

Chakraborty, A. (2021. Mountains as vulnerable places: a global synthesis of changing mountain systems in the Anthropocene. *GeoJournal,* 86 (2): 585-604

Cohen, J. (2015) *Stone: An ecology of the inhuman*. University of Minnesota Press. https://doi.org/10.5749/minnesota/9780816692576.001.0001

Condie, K. (2016) *The Earth as an Evolving Planetary System.* Elsevier.

Courtheyn, C. (2018) Peace geographies: Expanding from modern-liberal peace to radical trans-relational peace. *Progress in Human Geography, 42(5):* 741–758. https://doi.org/10.1177/0309132517727605

Deleuze, G., & Guattari, F. (1987). Introduction: rhizome. A thousand plateaus: Capitalism and schizophrenia, 2, 3-25.

Dobzhansky, T. (1964). Biology, molecular and organismic. *American Zoologist, 4*: 443-452. https://doi.org/10.1093/icb/4.4.443

Egholm, D. (2013) Erosion by Cooling. *Nature, 504:* 380–381. https://doi.org/10.1038/504380a

Fuchs, T. (2012) The phenomenology of body memory. In S Koch, C Müller, M Summa & T Fuchs (Eds.), *Body memory, metaphor and movement* (pp. 9–22). John Benjamins Publishing Company. https://doi.org/10.1075/aicr.84.03fuc

Fuchs, T. (2020) Time, the Body, and the Other in Phenomenology and Psychopathology. In C Tewes & G Stanghellini (Eds.), *Time and Body. Phenomenological and Psychopathological Approaches* (pp. 12–40). Cambridge University Press. https://doi.org/10.1017/9781108776660.002

Fullagar, S. (2020) Re-turning to embodied matters and movement. In *Navigating the postqualitative, new materialist and critical posthumanist terrain across disciplines* (pp. 117-134). Routledge. https://doi.org/10.4324/9781003041177-7

Gore, J., Clift. B., Gustafsson, S., Bekker, S., Batlle, I. & Hatchard, J. (2021) Introduction: Of time and qualitative research. In *Temporality in qualitative inquiry* (pp. 1-21). Routledge. https://doi.org/10.4324/9781003083504-1

Hacking, I. (1983) *Representing and Intervening: Introductory Topics in the Philosophy of Natural Science.* Cambridge University Press. https://doi.org/10.1017/CBO9780511814563

Hadfield-Hill, S., & Zara, C. (2020). Children and young people as geological agents? Time, scale and multispecies vulnerabilities in the new epoch. Discourse: Studies in the Cultural Politics of Education, 41(3), 407-426. https://doi.org/10.1080/01596306.2019.1644821

Haraway, D. (2016) *Staying with the trouble: Making kin in the Chthulucene*. Duke University Press. https://doi.org/10.2307/j.ctv11cw25q

Harris, P. (2012) Seafloor Geomorphology—Coast, Shelf, and Abyss. In *Seafloor Geomorphology as Benthic Habitat* (pp.109-155). Springer. https://doi.org/10.1016/B978-0-12-385140-6.00006-2

Halofsky, J. & Peterson, D. (Eds) (2017) *Climate Change and Rocky Mountain Ecosystems.* Springer. https://doi.org/10.1007/978-3-319-56928-4

Hammersley, M. (2008) *Questioning Qualitative Inquiry: Critical Essays.* Sage. https://doi.org/10.4135/9780857024565

Herod, A. & Herod, A. (2010) *Scale.* Taylor & Francis. https://doi.org/10.4324/9780203641095

Hoorani, B., Plakoyiannaki, E. & Gibbert, M. (2023) Understanding time in qualitative international business research: Towards four styles of temporal theorizing. *Journal of World Business, 58(1):* 101369. https://doi.org/10.1016/j.jwb.2022.101369

Jackson., A. & Mazzei, L (2012) *Thinking with theory in qualitative research: Viewing data across multiple perspectives*. Routledge.

Johnson, M. & Harley, S. (2012) *Orogenesis: The Making of Mountains.* Cambridge University Press. https://doi.org/10.1017/CBO9781139023924

Jones, K. (1998) Scale as epistemology *Political Geography, 17*: 25–8. https://doi.org/10.1016/S0962-6298(97)00049-8

Kidder, T., Adelsberger, K., Arco, L. & Schilling, T. (2008) Basin-scale reconstruction of the

geological context of human settlement: An example from the lower Mississippi Valley, USA. *Quaternary Science Reviews, 27(11-12):* 1255-1270. https://doi.org/10.1016/j.quascirev.2008.02.012

Leopold, A. (1949). *The Land Ethic. In Sand County Almanac: Sketches Here and There.* Oxford University Press.

Levitan, J. (2018) The legacy of postmodernism in popular thought and the emergence of "Inter/trans relational" -isms in educational theory. *Educational Philosophy and Theory, 50(14):* 1498–1499. https://doi.org/10.1080/00131857.2018.1461412

Lozny, L. (2015) *Continuity and Change in Cultural Adaptation to Mountain Environments: From Prehistory to Contemporary Threats*. Springer.

Macfarlane, R. (2003) *Mountains of the mind.* Granta Books.

Manning, E. (2013) *Always more than one*. Duke University Press. https://doi.org/10.2307/j.ctv11smsmz

Manning, E. (2020) *For a pragmatics of the useless*. Duke University Press. https://doi.org/10.1515/9781478012597

Manning, E. & Massumi, B. (2014) *Thought in the Act: Passages in the Ecology of Experience*. University of Minnesota Press. https://doi.org/10.5749/minnesota/9780816679669.001.0001

Marston, S., Jones, J. & Woodward, K. (2005) Human geography without scale. *Transactions - Institute of British Geographers (1965), 30*(4): 416-432. https://doi.org/10.1111/j.1475-5661.2005.00180.x

Mazzei, L. (2016) Voice Without a Subject. *Cultural Studies <-> Critical Methodologies, 16*(2): 151-161. https://doi.org/10.1177/1532708616636893

Ng, R. & Mirchandani, K. (2008) Linking global trends and local lives: Mapping the methodological dilemma. In K Gallagher (Ed.), *The methodological dilemma* (pp. 34-45). Routledge.

Owens, P. & Slaymaker, O. (Eds) (2004) *Mountain Geomorphology.* Routledge.

Pachepsky, Y. & Hill, R. (2017) Scale and scaling in soils. *Geoderma, 287*: 4-30. https://doi.org/10.1016/j.geoderma.2016.08.017

Pernecky, T. (2016) *Epistemology and metaphysics for qualitative research: constructing knowledge*. SAGE Publications. https://doi.org/10.4135/9781473982956

Rousell, D. (2021) A map you can walk into: Immersive cartography and the speculative potentials of data. *Qualitative Inquiry*, *27*(5): 580-597. https://doi.org/10.1177/1077800420935927

Simpson, T. (2019) Modern mountains from the Enlightenment to the Anthropocene. *The Historical Journal, 62 (2):* 553-581. https://doi.org/10.1017/S0018246X18000341

Shach-Pinsly, D. (2019) Measuring security in the built environment: Evaluating urban vulnerability in a human-scale urban form. *Landscape and Urban Planning, 191,* 103412. https://doi.org/10.1016/j.landurbplan.2018.08.022

Shroder, J. & Price, L. (2013) Origin of Mountains. In Price M, Byers A, Friend D, Kohler T & Price L (Eds). *Mountain Geography: Physical and Human Dimensions* (pp.11-40). University of California Press. https://doi.org/10.1525/9780520956971-006

Spencer, L., Radcliffe, L., Spence, R. & King, N. (2021) Thematic trajectory analysis: A temporal method for analysing dynamic qualitative data. *Journal of Occupational and Organizational Psychology, 94:* 531-567. https://doi.org/10.1111/joop.12359

Springgay, S., & Truman, S. E. (2017). Stone walks: Inhuman animacies and queer archives of feeling. Discourse: Studies in the Cultural Politics of Education, 38(6), 851-863. https://doi.org/10.1080/01596306.2016.1226777

Stengers, I. (2018) *Another science is possible: A manifesto for slow science*. Polity.

Strong, D. (1995) *Crazy mountains: learning from wilderness to weigh technology.* SUNY Press.

Taylor, P. (1981) Geographical scales within the world-economy approach. *Review, 5*: 3-11.

Timmreck, C., Graf, H-F., Zanchettin, D., Hagemann, S., Kleinen, T. & Krüger, K. (2012) Climate

response to the Toba super-eruption: Regional changes. *Quaternary International* 258. https://doi.org/10.1016/j.quaint.2011.10.008

Vannini, P. (2015) Non-representational research methodologies: An introduction. In P Vannini (Ed.), *Non-representational methodologies: Re-envisioning research* (pp. 1-18). Routledge. https://doi.org/10.4324/9781315883540

Vaccaro, I. & Beltran, O. (2010) *Social and Ecological History of the Pyrenees: State, Market, and Landscape.* Routledge.

Yuan, S., Pa, G., Wang, L., Jiang, X., Yin, F., Zhang, W. & Zhuo, J. (2009) Accretionary Orogenesis in the Active Continental Margins. *Earth Science Frontiers, 16(3):* 31-48. https://doi.org/10.1016/S1872-5791(08)60095-0