

NEW MATERIALISM IN SOCIOLOGICAL THINKING: BARAD'S QUANTUM VIEW ON THE WORLD'S MATTERS

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What if we were to recognise that differentiating is a material act that is not about radical separation, but on the contrary, about making connections and commitments?

(Barad 2010, p. 266)

ABSTRACT

Barad's interpretation of quantum physics expands the sociological debate beyond the classical context of interrelated pairs of opposites, i.e. culture-nature, spirit-matter, subject-object, that have dualised Western civilisation and enabled the emergence of systems of dominance and exploitation. Barad's body of work is a call to account for the constitutive exclusions that have differentially constituted the 'other' as inferior to the self. This paper offers an overview of Barad's onto-epistemological framework of agential realism with an emphasis on the essential relationality-quantum entanglement—it supposes between "I" and "thou", between all material (ising) entities. It introduces the framework to readers in the social sciences and invites a critical reconsideration of the question of how things / bodies come to matter, and what the consequences are. For a profound understanding, it offers an account of Barad's methodology of diffraction and the reworked notions of responsibility and ethical accountability that this framework entails. Finally, it argues that Barad's contribution is relevant, across the hard sciences scientific and humanistic disciplines, due to its invitation to think of ourselves and our knowledge practices as entangled within the world, ontologically inseparable from its flow of materialisation, and ethically responsible for the discursive and material practices we are enacting.

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In this paper, I argue that Karen Barad's interpretation of quantum physics has the potential to expand the sociological debate by infusing ethics into each material(ising) entity and phenomenon as it unfolds. Barad problematizes the Cartesian-Newtonian conception of knowledge and materiality which, in its separation of mind-matter, culture-nature, human-nonhuman, has enabled the emergence of systems of dominance and exploitation. This paper offers an overview of the ontological and epistemological implications of agential realism and describes its key terms, namely quantum entanglement, diffraction, intra-action, and spacetime-mattering. It considers the framework's ethical consequences, seeing as notions of responsibility and ethical accountability are reconfigured in a world where all bodies, human and nonhuman, are entangled. By exemplifying the cross-disciplinary influence of Barad's work, I will illustrate the transferability of these principles across fields of study that shape the social construction of knowledge and, as a result, pave the way for new social practices and changes. The shift in perception suggested by agential realism invites us to move beyond dualism, discover new spaces for ethical relating between "I" and "Thou", and take responsibility for the discursive and material practices we are enacting. In this, I argue, lies the contribution offered by agential realism to the social sciences.

Keywords: Karen Barad, new materialism, agential realism, entanglement, diffraction.

INTRODUCTION

Working to understand reality from the quantum level on, we see that all infinite and indefinite sorts of impossibilities are, in fact, possible. This is Karen Barad's invitation into a new way of grasping and conceptualising ontology, epistemology, and the kind of ethics that their entanglement entails. A feminist writer with a Ph.D. in particle physics and a Distinguished Professor of *History of Consciousness Studies* at the University of California in Santa Cruz, Karen Barad offers agential realism as an ontological and epistemological framework for engaging with(in) the world, a framework that is relational at all levels. This framework opens up for investigating the world's entangled phenomena of materialisation: the way the world *matters*. It has been described as a "new materialism", in essence "allowing for the conceptualization of the traveling of the fluxes of nature and culture, matter and mind, and opening up active theory formation" (Dolphijn & van der Tuin, 2013, p. 48).

JUSTICE MATTERS

Agential realism is an interpretation of quantum physics interwoven with contemporary theories of social justice. Quantum physics unhinges dualistic patterns of exclusion – inherently, of discrimination – that run across micro and macro scales of social and political life (Barad 2014, 174). It makes visible the

fluid liminal spaces where the one and the other intra-act, cut across differences without inducing false sameness. Within this framework, the subject is not master over the object; rather, the two are ontologically entangled with-in the material world in a co-constitutive process of becoming, of coming-into-being.

In tackling complex questions of ontology – indeed, in recognising that questions of ontology are inseparable from, and woven through, intellectual inquiry itself, since matter entails discourse and discourse entails matter –, Barad’s work has sparked reconsiderations of how knowledge is made and made useful (see Hinton, Treusch 2015; Ringrose *et al.* 2019; Murriss, Bozalek, 2019). Through discourse and the construction of meaning, we are always already actively “sedimenting out the world in certain kinds of ways and not others” (Dolphijn & van der Tuin 2013, p. 68), Barad argues, hence the performative nature of her framework and its ethical implications. Agential realism is “a plea, a provocation, a cry, a passionate yearning for an appreciation of, attention to the tissue of ethicality that runs through the world” (Dolphijn & van der Tuin 2013, p. 70). Being, in Barad’s account, is “threaded through with mattering” (*ibid.*). Barad articulates the questions of ethics and justice that are threaded through all bodies in their entangled reconfiguration, that are threaded through matter in its agential emergence. Questions of ethics and justice make of her agential realism, in essence, an *ethico-onto-epistemology* (Barad 2007, p. 185).

Through her work, Barad articulates the indeterminacy of identity, influencing critical strands of posthumanist thought (see Gladden, 2018) and helping re-imagine the philosophy of science. Her body of work, most extensively articulated in *Meeting the Universe Halfway* (from here on cited as *Meeting*), is opening up into a new paradigm that transcends the dualist pairs of opposites that have hindered social movements in their affirmative political mission. Barad’s work to date is a call to account for the systematic, constitutive exclusions enacted by Western civilisation that has constituted the nonhuman as completely exterior, strange, and outer – *other* – to the human. Constitutive inclusions and exclusions choose what matters, what materialises, shaping behaviours, perspectives, and discourses. According to Barad, the aim of this approach is not to blur all distinctions between “I” and “thou”, human and nonhuman, nature and culture, but to enable us to be accountable for the agential cuts enacted: the cuts that shape the processes of materialisation (*Meeting*, 394). With reference to bibliographical sources, this paper will introduce Barad’s notions to the readers, as well as place an emphasis on the way agential realism may help us critically approach the issue of how some things come to matter, while others don’t (Aigner, Čičigoj, 2014).

AGENTIAL(LY) REAL(ISM)

Matter is not some givenness that preexists its interactions. Matter is always already caught up with nothingness. Bodies, space, time, and the void are not ontologically separate matters. (Barad 2017, p. 110)

Agential realism accounts for the cosmic forces at work in the materialisation of (all) bodies, human and nonhuman. Its ontological framework is not “new” in that it has just emerged, but in that, throughout the past few decades, the field of quantum physics has brought to light the fundamental uncertainty of all particular (particle-level) matters. Quantum reality shows us that “matter is [...] an open field” (Barad 2014, p. 168). What does this open field entail, and how might we, with Barad, reimagine ways of conceptualising the epistemological and methodological practices that shape our society, of conceptualising (in)equality and social justice?

In tandem with Nobel laureate physicist Richard Feynman, Barad puts *mystery* at the heart of quantum mechanics (Barad 2014, p. 174). Reality, perceived through the quantum ontological lens, is shot through with phenomena which are impossible to explain in terms of classical Cartesian thought and Newtonian physics, where subject and object are split and everything is “one or the other,” with little accounts of relationality involved. Quantum physics undoes the traditional Newtonian notions of metaphysical individualism and the notions of separation and separability that emerge therefrom. Space, time, and matter, ontologically inseparable, are reconfigured by Barad as *spacetimemattering*: the “dynamic ongoing reconfiguration of a field of relationalities among ‘moments,’ ‘places,’ and ‘things’” (Barad 2017, p. 111). For agential realism, all material(ising) entities are *agentially real*, i.e. real in their ability to reconfigure the world’s process of becoming.

As such, Barad gives a quantum explanation of a world of distributive agency where none of the actors are separate from the other, but are entangled in, and always changed by, their constructive discursive practices. Lightning bolts, stingrays, and dinoflagellates are only three examples given (Barad, 2012) of the world worlding in strange acausal ways, inherently connected as though no definite boundary existed between one (electron, cell, critter) and the other. Quantum entanglements are “a calling into question of the very nature of two-ness, and ultimately of one-ness as well” (*Meeting*, 251). We are threaded through a “*strange topology*” of spacetimemattering (discursive materiality) where each of us is “*contained inside the other*” (Barad, 2017, p. 109, original emphases) – always in relation with the “other” in its myriad forms: although exterior to us and different from us from a “macro-level” perspective, entangled with us and tangled through us on the level of the quantum field. According to Barad, this is not a matter of moving to deeper levels of meaning and completely abandoning classical principles. Rather, classical principles are woven through, accepted as given, while leaving dualistic prejudices behind and moving deeper into the quantum realms of nondual *ontology – being* (see also Alaimo, Hekman, 2009).

Where space and time seem to collapse in one field of always shifting probabilities, notions of causality, and of the actual meaning of matter and matter of meaning, are imagined anew.

We find, thus informed, that[m]eaning is not an ideality; meaning is material. And matter isn't what exists separately from meaning. Mattering is a matter of what comes to matter and what doesn't. Difference isn't given. It isn't fixed. Subject and object, wave and particle, position and momentum do not exist outside of specific intra-actions that enact cuts that make separations – not absolute separations, but only contingent separations – within phenomena. (Barad, 2014, p. 175)

Barad emphasises the contingency of separations that marks the domains of interiority and exteriority, of one and the other, the known and the mystery: the world *mattering*. Within such a fluid, relational ontology, the primary ontological units are not individual entities that interact as separate actors, but phenomena where entangled entities intra-act, *act-within*:

Phenomena are entanglements of spacetime mattering, not in the colloquial sense of a connection or intertwining of individual entities, but rather in the technical sense of “*quantum entanglements*”, which are the (ontological) inseparability of agentially intra-acting “components.” (Barad, 2012, p. 32, my emphasis)

The beings that relate – the *relata* – emerge through the process of intra-acting, lending meaning to material articulations. Ontology emerges “*through relationality*” (Kirby 2011, p. 76, original emphasis). Independent entities are not objective referents; the phenomenon is the referent. The classical ontological split between seer and seen is relinquished: “*differentiating is not a relation of radical exteriority, but of agential separability, of exteriority-within*” (Barad, 2012, p. 32, original emphasis). Subject and object, then, are not separate entities. They are rather born *of* the phenomenon within which they are entangled, their ontologies threaded through, responsive to one another: they “emerge through and as part of the specific nature of the material practices that are enacted” (*Meeting* 359). Differentiation is about agential separability, born of an “agential cut” enacted between determinately bounded entities within a phenomenon (*Meeting* 140). The made cuts that produce distinctions are not foundational and set in stone: they are subject to intra-active iterations. Differences are not without: they are not marks of exteriority. They are within, marking interiority in intra-active forms that *differ*, but are always entangled.

REWORKING ACCOUNTABILITY AND RESPONSIBILITY

“If we see ourselves as always already entangled with, not separate from or superior to matter, our responsibility to being becomes urgent and constant” (Adams St. Pierre, 2013, p. 655). The relational ontology at the core of Barad's agential realism subverts the interdependent pairs of opposites that have constituted

the backbone of Western civilisation, i.e. man-woman, subject-object, culture-nature, mind-matter, and the systems of dominance and exclusion entailed and justified by these standards. Agential realism states that, as subjects, “we know because we are *of the world*” (*Meeting* 185, original emphasis) – we, with all other entities, animate and inanimate, are the world *worlding*, making itself *matter*.

Hence [t]aking account entails being accountable, for *all ac / countings are from within*, not without. [...] Accountability cannot be based on a mathematics of identity. Simple substitutions, equivalence relations, or transitivities among individual elements are undone. (2012, p. 47, my emphasis)

The boundaries of interiority and exteriority are constantly shifting within phenomena as co-constituted agential actors intra-act with each other – but the ‘other’ is not set in stone. The ‘other’ (other species, other race, other gender, other creature, other form of being, other consciousness) is defined as wholly “other” only through fixed, determinate notions of identity which are not accountable to the totality of being, the unity and continuity of the unfolding world of matter. Perhaps, from this standpoint, there is no other:

The key is understanding that identity is not essence, fixity or givenness, but a contingent iterative performativity, thereby reworking this alleged conflict into an understanding of difference not as an absolute boundary between object and subject, here and there, now and then, this and that, but rather as the effects of enacted cuts in a radical reworking of cause/effect. (Barad, 2014, pp. 173–174)

We return, with Barad, to the responsibility inherent within the quantum-given reality of entanglement:

Entanglements are relations of obligation–being bound to the other–folded traces of othering. Othering, the constitution of an ‘Other’, entails an indebtedness to the ‘Other’, who is irreducibly and materially bound to, threaded through, the ‘self’ – a diffraction / dispersion of identity. ... Ethicality entails noncoincidence with oneself. (Barad, 2010, p. 265)

It has been argued that to be responsible to / for others “invokes and embeds colonial logics that position researchers as capable of agency and systematically excludes Others” (Country *et al.* 2019), tying the locus of knowledge to the human being, to the subject. However, the kind of responsibility raised by agential realism is not a unique appropriation of agency, but an ontological givenness: in agential realism, responsibility is *agentially real*. In making visible the co-constitution of mattering and meaning, Barad calls our attention to our ontological responsibility for “the others with whom or which we are entangled, not through conscious intent, but through the various ontological entanglements that materiality entails” (*Meeting* 393). If agency is the ability to reconfigure space-time-matter relations

(*Meeting* 178), then an agential realist account of responsibility entails the ability to *respond*. We can speak of our responsibility, as a human species, to develop our response-ability with-in the configurations of the world – the ability to respond to the world’s entities not as strangers, but as kin, from *within* its continuous unfolding and enfolding, aware of the flow of intra-actions that co-constitute us and all others (see also Country et al. 2019; Ringrose *et al.*, 2019). Response-ability is demanded of us not by reason, but by virtue of sheer *being* in the world, enfolded with(in) its intra-active becoming: “[i]t is an iterative (re)opening up to, an enabling of responsiveness”. (Barad, 2010, pp. 265–66)

DIFFRACTION AND LIGHT: BEYOND REFLECTING

Truthful to her onto-epistemology, Barad conceptualises and applies a methodology that also subverts dualising geometries: that of diffraction. Donna Haraway (1992) was the first to recognise diffraction as a counterpoint to the standard practice of reflection. By using diffraction as metaphor, Haraway invited us to see difference and alterity creatively, with visionary openness and commitment (Dolphijn, van der Tuin, 2013, p. 50); to understand knowledge-making beyond the classical attitude of detached reflection upon binary opposites.

Barad not only adopts the diffractive methodological approach as a practice of “reading insights through one another” (*Meeting*, 25), but also extends Haraway’s concept by adding insights from quantum physics, thus generating a profound understanding of the phenomenon. It is interesting, Barad (1996, p. 187) notes, how quantum physics modifies our perception of light in a way that undermines Newtonian physics, a driver at the heart of Enlightenment, with its asserted hegemony over knowledge. If we conceive knowledge as a harbour of light illuminating dark terrains of ignorance, we enact the self-reflection of the same. But if we, with quantum insights, conceive knowledge as a material practice of engaging with-in the world, we enable our *knowing* to emerge by way of diffraction patterns: patterns which make entanglements and their effects visible by revealing resonances and dissonances among discursive and material articulations (Dolphijn, van der Tuin, 2013, p.50).

If diffraction as a physical phenomenon illustrates the downfall of classical metaphysics (*Meeting* 72), diffraction as a knowledge-making practice reveals the shortcomings of reflexivity as theory and method in the social sciences. Reflexivity entails reflecting upon representations of social-natural reality while still holding the world at a distance, unable to bridge the epistemological gap between knower and known. As Barad argues, “to see your image in the mirror there necessarily has to be a distance between you and the mirror” (in Dolphijn, van der Tuin, 2013, p. 52). The result of disengaged reflection is a play of mirrors, an “iterative mimesis” (*Meeting* 87–88) where the knower never enters into a relationship with the known; there is little will to engage there, much less a will to commit and care.

While reflection perpetuates and analyses the same, keeping the Other at constant bay, diffraction invites the Other in to make itself heard through a methodological attitude of profound openness to alterity, and to alteration. Indeed, diffraction without alteration is not possible. As Mazzei (2014) phrases it, “knowing is never done in isolation but is always effected by different forces coming together” (p. 743). Diffractions are “attuned to differences – differences our knowledge practices make and the effects they have on the world” (*Meeting* 72).

With Haraway, Barad wants to “figure ‘differences’ as a ‘critical difference within, and not as special taxonomic marks grounding difference as apartheid” (Haraway, 1992, p. 299). Interiority materialises in tandem with exteriority, as differences emerge *within* phenomena. Diffraction maps interference: it maps not differences themselves, but rather “where the effects of difference appear” (ibid. 300). A diffractive reading does not blend separate parts together, but follows the threads of material historicities and how their differences come to matter in the unfolding of matter (Barad, 2014, p. 176). Without alteration, “the deadly image of the Same” (Haraway, 1992, p. 297) that seeks to engulf the world in its dualistic assumptions perpetuates itself with little avenues left for change; with few possibilities for dimensions of accountability outside of existing paradigms; with reduced potential for creative knowledge-making that recognises the continuity between self and other.

The will is to move away from reflecting upon the world as entities exterior to it (as in representationalism) towards an understanding of the world “*from within*” (*Meeting* 88, my emphasis), distinguishing identities and differences as part of an entangled state. Barad invites us to consider knowing as “a direct material engagement” (Dolphijn, van der Tuin, 2013, p. 52); hence the relinquishing of the ontology-epistemology binary and the creation of an onto-epistemology, where “knowing is a matter of part of the world making itself intelligible to another part of the world” (Barad, 2014, p. 185).

With its relational approach, diffraction cuts through the veil cast by reflection. A diffractive methodology challenges these alienating dichotomies – “troubles the very notion of *dicho-tomy*” – including some of the most “stabilized / stabilizing” binary pairs that run through the web of our society, all underpinned by the Cartesian subject-object split (Barad, 2014, p. 168, original emphasis). These “lines drawn” to further crystallise the notion, “are power-laden epistemological moves with stakes” (Barad, 1996, p. 186). Alternatively, diffraction implies agential responsibility in the world’s reconfigurations. A diffractive methodology is “a critical practice of engagement” with the world as part of its becoming: as responsible for our performed ways of knowing, thinking, measuring, theorising, and observing, all of which are material practices that participate in the iterative material (re)configuration of the world (*Meeting* 91).

In the shifting landscape of the world in all its co-constitutive dimensions (technological, political, cultural, scientific), diffraction acts as a ‘subject-shifter’ (Kaiser, Thiele, 2014, p. 165) which can serve us to reconsider the world, and develop sensible literacies about it, in ways that are open to alterity, adaptable to paradigmatic shifts, and available for commitment and responsibility with-in the world’s becoming: willing to engage in affirmative practices that acknowledge the mattering of our discourses ‘*here-and-now*’, as they are in the making / performing, and not as mere ‘after-the-fact’ recording (ibid. 166, my emphases). With the knowledge that the measuring apparatus changes the nature of measured phenomena (*Meeting* 106), Haraway and Barad argue for a need to make our material-semiotic practices *matter* differently – and, they propose, *diffractively*. Through close observation of the diffraction phenomenon becomes apparent the inseparability of matter and meaning, the need for a relational ontology that will account for, and count as meaningful, the co-constitution of epistemology and ontology – of knowing and being, discourse and matter, of the word and the world.

Instead of straight-cut differences between worldly entities, we may think with *differentiation*, malleable and enacted in patterns; instead of interactions between separate entities, we may think of phenomena wherein all actors are entangled, co-constitutive, always conceived together even as they are agentially cut apart (“cutting together-apart”, Barad, 2014); instead of the self-contained identity which perceives the other as a threat and asserts its sovereignty through dominance, excluding the strange influence of the other, we may conceive of identity as a part of that totality of the world in which all matter *matters* – makes itself manifest (with)in the world, irreducibly entangled and enfolded upon itself, without allowance for clear-cut divisions.

Here, “I” and “thou” can finally see eye to eye; not exactly the same, yet not separate either (Trinh, 1988). We see that the very nature of matter – of nature, the nature of the “material” must be grasped as iteratively constituted through a multiplicity of force relations (Barad, 2017, pp. 110–111). The nature of *difference*, the very question of it, is addressed in a counterintuitive manner that allows for renewed creative acts of discursive materiality.

Seeing, through the quantum prism, that the self and the other are “co-constituted and co-constitutive” (Hinton, Treusch, 2015, pp. 12–13), equally agentially real in the world’s becoming, we recognise again the cross-border implications of such a reconfiguration of knowing and being:

The point of challenging traditional epistemologies is not merely to welcome females, slaves, children, animals, and other dispossessed Others (exiled from the land of knowers by Aristotle more than two millennia ago) into the fold of knowers but to better account for the ontology of knowing (*Meeting* 378).

CONTRIBUTIONS ACROSS BORDERS

In feminist materialist debates and feminist science studies, Barad emerges as a prominent voice. Borrowing Barad's term, Revelles-Benavente (2019) has described the movement of new materialism as "an ethico-onto-epistemological framework" whose ethico-political dimensions "helps to diagnose, infer, and transform gendered, environmental, anthropocentric, and social injustices from a multidimensional angle."

The affirmative and transformative character of Barad's framework, her proposal for a relational ontology of knowing and of being, permeates across fields of sociological thought. In their coordinated volume *Teaching With Feminist Materialisms*, Hinton and Treusch (2015) report a varied portfolio of voices and research approaches that illustrate the transformations of pedagogy following the influence of materialist feminism. According to them, Barad's work has been central to "rethinking the nature of concepts and conceptual work" (p. 13), showing that "the very nature of intellectual inquiry is the work of ontology in its complex mappings, splittings, and transversals" (ibid. pp. 13–14). The lesson drawn is that "there is no primary separation of teacher or student, or space or knowledge. They remain, at all times, entangled" (ibid. p. 12.). In underscoring the relational nature of being, knowing, and mattering (Ringrose *et al.*, 2019, p. 2), Barad helps rethink the nature and dynamics of the pedagogical process. Similarly, the collection edited by Jessica Ringrose *et al.* (2019) highlights innovative educational research that troubles the binary pair of theory-methodology, arguing instead for the formation of "response-able theory-practice-methodology." The authors embody the stance of posthuman performativity in the following question: "what if we locate education in doing and becoming rather than being?"

Further, Anna Hickey-Moody *et al.* (2016) emphasise "the disruptive and generative potential" of "diffractive pedagogies" – pedagogies which, in their appreciation of materiality, discourse, and entanglement as co-constitutive, offer possibilities for realising "the potential to produce, embody and theorise simultaneously." We can see how the methodology of diffraction opens gateways for new understandings of the continuous configuration of the learning process, of interpersonal intra-action. On the part of students and teachers, a diffractive pedagogy requires "a degree of unlearning" (Ringrose *et al.*, 2019, p. 8) and a recognition of the profound interconnectedness between students and their learning environment.

Across disciplines, Barad's work has helped scholars and practitioners question traditional paradigms and anthropo- / ego-centric assumptions, and has offered new tools for conceptualising (1) the dynamism and meaning inherent in the material world and (2) the ongoing intra-actions between humans and nonhumans, culture and nature, which are co-constituted and co-constitutive in a world that is ontologically entangled and infused with ethical value. In this, it has opened up new avenues for thinking about social justice and the sense of

responsibility that its achievement entails. For example, Aigner and Čičigoj (2014) uncover agential realism's potentialities for political change and for generating a potentially collective feminist identity, while Marshall and Alberti (2014) explore the implications of agential realism in archaeology and its ability to shift our understanding of archaeological bodies. Diffraction as a metaphor has also inspired innovative readings of literature in the academic field (Mazzei, 2014) as well as in works of fiction (Sehgal, 2013, Preda, 2018).

The breadth and depth of Barad's contribution is possible because an agential realist approach "produces difference in a new way; a difference which facilitates analyses conceptually unthinkable in conventional representationalist terms" (Marshall, Alberti, 2014). Barad invites the academic world to rethink scientific, cultural, and social paradigms by arguing for the inseparability between ethics, knowing, and mattering, and enriches posthumanist theory by asserting our responsibility to being (Dernikos *et al.*, 2019, Ringrose *et al.*, 2019).

CONCLUSIONS

Where do we start in regarding the other as alive and well with-in us, as fellow earth-travelers and quantum mirrors? With Karen Barad, we may make our conceptual and methodological apparatuses sensible to the underlying entanglement of all matter with-in itself: a continuous dynamism of being-through-becoming in which material actors come together to come apart, differently and anew, yet always already "*entangled inside all others*" (Barad, 2017, p. 110, original emphasis) through each materially-discursive articulation. This article has offered an overview of the key concepts in Barad's agential realism. In this, its hope is to inspire new ways of thinking about matter, agency, and responsibility across disciplines. The state of quantum entanglement between entities invites us to critically reconsider questions of ethics and, centrally, the concept of relationality itself. For a poetic rendition of the matter:

The conversation is ongoing. The redwoods, the ocean, the paths taken and those which may yet have been taken hold the memory of these explorations by foot and by mind. We are being churned by the soil, the wind, the foggy mist. A multiplicity, an infinity in its specificity, condensed into here-now. Each grain of sand, each bit of soil is diffracted / entangled across spacetime. Responding – being responsible / response-able – to the thick tangles of spacetimematterings that are threaded through us, the places and times from which we came but never arrived and never leave is perhaps what re-turning is about. (Barad, 2014, p. 184)

In re-turning, what we are after is a "double movement": outwards, opening *toward* the other as part of the same unity of life, and inwards, maintaining the *self*

as an actor that shifts, changes, becomes, and allows the other, through each interaction, to maintain its differential significance. With Barad, we find that “there is no ‘I’ that exists outside of the diffraction pattern, observing it, telling its story” (Barad, 2014, p. 181). The observer is part of the phenomenon observed, intra-actively producing space, time, and meaning: “‘I’ am *of* the diffraction pattern” – ‘I’ am “always already multiply dispersed and diffracted throughout spacetime(mattering)” (ibid., original emphasis).

Problematising the I – the *one* – this way, we are discursively articulating a dynamism of becoming which is always in tandem / in tune with the world, in which responsibility is an interior affair:

... to respond, to be responsible, to take responsibility for that which we inherit (from the past and the future), for the entangled relationalities of inheritance that ‘we’ are, to acknowledge and be responsive to the noncontemporaneity of the present, to put oneself at risk, to risk oneself (which is never one or self), to open oneself up to indeterminacy in moving towards what is to-come. (Barad, 2010, p. 264)

To do the work of dismantling egocentric assumptions is to put one’s centrality at risk in order to enable the “other” to respond (Barad, 2012, pp. 27–28). Then, bodies are able to manifest their performative agency.

What happens when we are not in a position of dominance, but of enabling response? What happens when we do not blindly exert our influence upon the world, but are willing to be influenced by its matterings? This might be an essential question posed by agential realism. To question the line that demarcates the *one* from the *other*, to re(con)figure it in the sand, deranges the ethics we have accepted as given and leaves us uncertain (just like *quanta* are) as to how to move forward. This, Derrida (2003, p. 128) argues, is the inescapable objection against such nondualised diffractive thinking. And to this, Derrida himself responds: “casting doubt on responsibility, on decision, on one’s own being-ethical, seems to me to be – and is perhaps what should forever remain – the unrescindable essence of ethics: decision and responsibility” (ibid.).

Perhaps we can speak not only of diffractive reading as a methodology, but of diffraction as a perceptual attitude that sensitises our responsiveness within the world. Perhaps such an attitude is urgently needed, in our practices of meaning-mattering, if we are to tackle issues of coexistence in the present era (Coole, Frost, 2010, p. 2). Perhaps our knowledges must come not from separate sites delimited by fixed boundaries, but “from the ‘between’ of nature-culture, object-subject, matter-meaning” (Barad, 1996, p. 188), where the world is iteratively reconfigured in its becoming. “All bodies come to matter” (Barad, 2012, p. 32) within such a conceptual framework. We return, then, to the pre-conceptual nature of entanglement: it is given in the nature of phenomena. Barad reworks foundational notions of ontology and rethinks (with) causality itself. The concept of

spacetime-matterings – unlike that of polarised binaries – offers opportunities for radical openness, reconfigurations of meanings, and possibilities for materialisation in a space of “no where,” as if it were the new morning of the world and all future entangled possibilities were made available.

Posthuman performativity moves beyond dualism in an attempt to open up new spaces for ethical relating between “I” and “thou”, where “ecologies of difference” have a chance to flourish (Barad, 2012, p. 30). Such an analysis must not start after the boundaries are already in place (i.e. after self-other have already been defined as opposites); it must start instead as an exploratory account “of all matter(ings),” all materialising practices of differentiation (ibid.). If agency, as Barad argues, is not merely about the ability to act, but about responsibility within (and integral to) the world’s becoming, then every agential cut and every material-discursive intra-action between “one” and the “other” can be examined as a locus where we engage in, produce, rework, interpret, and negotiate, in a flow of continuous change, our relationship with all forms of being:

And injustices need not await some future remedy, because ‘now’ is always already thick with possibilities disruptive of mere presence. Each moment is thickly threaded through with all other moments, each a holographic condensation of specific diffraction patterns created by a plethora of virtual wanderings, alternative histories of what is / might yet be/have been. Re-membering, then, is not merely subjective, a fleeting flash of a past event in the inner workings of an individual human brain; rather, it is a constitutive part of the field of spacetime-matterings. (Barad, 2017, p. 113, original emphasis)

With this proposed shift in perspective, which appreciates the world as profoundly and essentially relational, new sensibilities are made available which cut across conceptual dualisms, previously defined identities, and axes of domination and exclusion that hinder critical thought. In this sense, Barad’s work contributes to an emergent interdisciplinary endeavour for social and scientific practice that is ethically accountable to all worldly beings, and responsible for its discursive and material effects. To make knowledge is to make worlds, to make them matter by discursively – materially articulating the world. The point made by agential realism is that our theories ought to describe the agential reality within which we intra-act, where everything matters. Because “[w]e are in reality, we must be in our theories” (Barad, 1996, p. 175, original emphasis). This framework presupposes epistemological and ontological considerations made from the standpoint of entities ontologically entangled within it, and it involves ‘situated knowledges’ (Haraway 1988) emergent *from within* this ontology of nondualised phenomena. Here, *realism* is about “the real consequences, interventions, creative possibilities, and responsibilities of intra-acting within the world” (Barad 1997, p. 188, original emphasis).

In mapping material entanglements in their intra-active specificity, Barad's agential realism is responsive to the world's full and mysterious liveliness (*Meeting* 91). The purpose of thinking with quantum physics, with entanglement, with diffraction, is to open perception to new articulations that emerge *relationally*, from the interference of meaning-mattering patterns. In this, the effort is "to *make a difference* in the world" (Haraway, 2018, p. 16, my emphasis). Our ways of knowing are not artless, our knowledge are not passive; they act as part of the materialising world. Can we aim to be responsive to – responsible within – the world's matters? Because, as Barad affirms, "knowledge is about meeting the universe halfway" (Barad, 1996, p. 189). Knowledge is about meeting the "other" halfway.

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