**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Karen Barad (1956 – )**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Karen Barad is Professor of Feminist Studies, Philosophy and History of Consciousness at the University of California Santa Cruz and co-director of the Science & Justice Graduate Training Program, funded by the National Science Foundation. As a feminist-physicist-philosopher her influence in the fields of new materialism, new material feminism, science studies, queer studies, and posthumanism has been profound. Barad’s PhD in theoretical particle physics was awarded by SUNY Stony Brook in 1984 with her thesis entitled ‘Fermions in Lattice Gauge Theories’. Her work has received funding from the National Science Foundation, the Ford Foundation, the Hughes Foundation, the Irvine Foundation, the Mellon Foundation, and the National Endowment for the Humanities. In 2016, she was awarded an honorary doctorate in the Arts at Gothenburg University in 2016, and is on the faculty of the European Graduate School.

She is the originator of agential realism as a new and distinct, posthuman and performative approach to knowledge-making practices. Barad’s central thesis with agential realism is that post-structuralism and its theoretical predecessors have placed far too much emphasis on language and representationalism and not enough on the materiality of discourse and the role of matter in understandings of how the world is configured. From her doctoral thesis, through her early work on feminism and science pedagogies, and her subsequent development of agential realism, Barad has been instrumental in intellectual moves to put questions of how matter comes to matter centre stage. Agential realism, based on the insights that nothing exists in and of itself, that everything is always-already in relation, and that matter and discourse are co-constitutive, has been widely taken up as a paradigm-shifting analytical move which works through the challenges posed by quantum physics to Cartesian epistemology and the Humanist ontologies which underpin it. Barad’s lexicon – agencies, intra-action, entanglement, the cut, phenomena, apparatus, diffraction – deriving in part from the language of quantum physics, offers social science researchers a new range of conceptual resources for putting agential realism to work to investigate the world in new ways. Central to agential realism is the necessity of developing an ethico-onto-epistemological stance which entangles what Humanist approaches have illegitimately dis-entangled.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Early Work: Tracing the Contours of Agential Realism**

From the beginning, Barad’s work has been located in feminist philosophy of science studies as an epistemological space from which to critique ‘mainstream’ philosophy of science. However, it would be too easy, to position feminist and mainstream philosophies of science as polar or binary opposites. It is the case that debates around objectivity, the nature of evidence in scientific method, and the relationship between science, truth and values had already been taking place amongst post-positivist science studies scholars, as is evident from the work of Thomas Kuhn and Bruno Latour. Indeed, it was the latter’s emphasis on science activity as social practice which helped establish the field of science and technology studies (STS). What marked out feminist philosophy of science studies was the view that knowledge-making practices are inherently tied to gendered social practices which tended to both reflect and reinforce gender inequalities. Science, as a gendered mode of knowledge production is, according to feminist critiques, constituted in and by the unequal circulation, use and deployment of power in ways which (whether consciously or not) serve both to maintain masculinist forms of domination inside and outside the academy and valorise male-stream accounts of what counts as valuable and useful knowledge. Barad, like other key feminist writers such as Evelyn Fox Keller, Sandra Harding and Donna Haraway, contended that ‘mainstream’ science as a social practice sought to elide the gender-power nexus it rested on by bracketing off ‘epistemological’ questions from sociological questions. While there were always variations amongst feminist positions on science, the shared feminist understanding generated by feminist philosophers of science was that science as social practice constructs epistemology in accordance with masculine modes of knowledge which maintain male authority.

In a 1996 chapter entitled ‘Meeting the Universe Halfway: Realism and Social Constructivism without Contradiction’, Barad carved out an early and particular niche for herself in the feminist philosophy of science field – and found the first half of the title for her book which, 11 years later, cemented her place as a co-founder of new material feminisms. In this and subsequent work, Barad elaborates the main contours of agential realism. Developed from a feminist reading of Bohr’s philosophy of quantum physics, agential realism, she argues, offers an epistemology which works against dualist categorisations of subject/object, nature/culture, and word/world – categories which feminist science scholars see as privileging masculinist ways of knowing to the detriment of women’s (and all other) ways of knowing/being. Instead, agential realism provides a non-dualistic alternative in which there is no separation between ‘objects’ and ‘agencies of observation’. Barad (1996) emphasizes that, as a new epistemological mode of realism, agential realism rejects relativism and builds on the feminist legacies of Haraway and Harding, to offer a standard for robust rational inquiry grounded in knowledge as situated practice and objectivity as a form of strong critical reflexivity.

The radical implications of considering objects and agencies of observation as conjoint becomes apparent in Barad’s (1998) account of how technoscientific practices work to materialize reality, an article which was later incorporated with a few additions as chapter five into *Meeting the Universe Halfway* (Barad, 2007). Barad uses the example of ultrasonography to develop two important theoretical aspects of agential realism: one, that matter is agentic; two, that material apparatuses do not pre-exist but emerge with and are co-constitutive of discursive practices. Her argument is that the piezoelectric crystal, the signal it emits, the ultrasonic waves it produces, and the visual image which appears on screen, all work as active agencies in a technoscientific apparatus that are not only productive in materializing bodies (mother-baby) but do so in ways that have particular consequences for those bodies – that is, the scientific apparatus produces them in ways that matter. Ultrasonography technology, then, is not simply a neutral, scientific observational instrument but an agentic apparatus, which materializes bodies through historically, and culturally-specific practices which are also political practices, as debates about pro-life, pro-choice, population growth and health inequalities show. Barad’s theoretical move indicates that matter is not a passive object or ground which is ‘made to mean’ by social discourses which simply ‘interpret’ it – to think so would be to return epistemologically to ideas about the primacy of nature and its separation from the human. The agential realist point, she asserts, is that what comes to matter *as reality* can only be apprehended as a material-discursive non-dualistic whole in which differential patterns of mattering emerge and come into being.

The implications of this for rethinking agency and causality are clear. First, agency is not a property of individual human bodies but is considered as distributed across humans, material apparatuses and non-human entities alike, all of whom/which have agency. Second, causality does not rely on an A influences B and/or C logic of cause and effect but occurs in, through and by the complex relations between interacting – or, as Barad later writes, *intra-acting* – forms and forces, only some of which are human. While a link with Latour’s Actor Network Theory is apparent, Barad’s feminist/social justice impulse to include non-human agents in an expanded awareness of who/what matters goes beyond an identification of human/non-human relations to encompass a rethinking of power, responsibility and accountability. Such considerations remained central to Barad’s continuing development of agential realism over the coming years.

**Responsible Science Pedagogies: Scientific Literacy as Agential Literacy**

In works written in 1999 and 2000, Barad turns to the problem of science pedagogies in university curricula which, she contends, needed to be better oriented to doing responsible science. In her view, making science more accountable involves encouraging students to think about the connections between scientific and cultural practices. In this she continues to push to the fore longstanding feminist questions about the epistemological and ontological work science does in constituting ‘facts’ as distinct ‘things’ separate from the social contexts which generate them. Her argument is not simply that science has to be put in its historical and cultural context – doing this, according to Barad, keeps the unidirectional relations between science and nature intact, based as it is on the simplistic assumption that science simply acts on, interprets and reshapes a pre-existing and external ‘nature’. Nor is it a matter of teaching a ‘splash’ of science to non-science students. Her suggested solution is to teach science across disciplinary borders in order to shift the disciplinary insularity of science and help promote better attention to the social nature of scientific practices. A refocusing of science pedagogies has to be centred on “something we might call ‘episteme-onto-logy’ or ‘ethico-epistem-onto-logy’” (Barad, 2000, p. 225), an expression she uses here for the first time in relation to the need for a broader notion of ‘scientific literacy’ but which later becomes a central conceptual plank in her elaboration of agential realism and responsibility.

At this point, Barad posits scientific literacy as a mode of agential literacy, a mode of ‘doing’ responsible science – and of doing science responsibly – which recognizes that knowledge is not transmitted (as social constructionist and realist accounts hold) but is embodied, embedded and enacted in material-discursive social-scientific practices which both constitute the ‘nature’ of reality and the conceptual and physical/material apparatuses involved in science practices. It was at this point that Barad’s agential realism began to integrate Bohr’s epistemological view that scientific instruments – or what he called ‘apparatuses’, a term taken up by Barad – are inseparable from the things they are designed to observe. This move throws into doubt the definitiveness of subject-object boundaries and supports Barad developing agential realist contention that phenomena (scientific and social) exist as a non-dualistic whole. Reality, then, is not prior to culture or scientific understanding but is made up of the intra-actions of material-discursive phenomena, where *intra-action* describes the co-constitutive enactment of many different agencies emerging together – a move which shifts agency from an individually-bodied attribute or possession to a distributed force enacted by humans and non-humans. However, Barad also draws in Foucault’s insights that knowledge works via disciplinary practices which entail both enabling and exclusionary forms of power, which allows her to posit knowledge practices as differential patterns of mattering. She gives her ‘diffractive approach’ (derived from Haraway) its first outing to demonstrate how a science curriculum which juxtaposes and interrogates heterogeneous interpretations and understandings of science phenomena, models and practices, would be better at facilitating students’ engagement with science in more responsible ways than a reflection on the linear cultural history of science would allow. And now we have almost all the conceptual baselines in place for the two works which follow and which position Barad and agential realism as a game-changing intellectual intervention across the fields of social sciences, arts and humanities.

**How Matter Comes to Matter: Developing agential realism**

Barad’s 2003 article on enacting posthuman performativity, and her 2007 book, bring to fruition her project of (re)configuring how matter comes to matter. Her development of agential realism occurred at a time when posthumanist thinking, theorising, and enactment were expanding as scholars sought for new critical ways to explore relations between subject/object, nature/culture and word/world. Agential realism can be seen as a strong current within the posthuman turn which has come to include the immanent work of Gilles Deleuze and Felix Guattari, the process philosophy of Alfred Whitehead, Erin Manning and Brian Massumi, Rosi Braidotti’s critical posthumanisms/post-humanities, the ecologically-inflected posthumanisms of Haraway, Anna Tsing and Stacy Alaimo, the affect theory of Patricia Clough, Lisa Blackman, Melissa Gregg and Greg Seigworth, the burgeoning literature on animal studies (Helena Pedersen, Nik Taylor), and the allied field of object oriented ontology (Graham Harman) and speculative realism. Barad’s work in particular has been central in the development of new material feminisms (Stacy Alaimo and Susan Hekman, Diana Coole and Samantha Frost).

Barad’s 2003 article introduced posthuman performativity to explore how both material and discursive practices are performed and co-implicated in the process of mattering. A posthuman performativity questions the acceptance of representational practices, which seek to mediate the relationship between the knower and the world, to order and categorize thinking. These debates had already been problematized by post-structural, feminist, and queer theorists who were seeking different answers to questions on how bodies were produced and how power circulated within and through discourse. Barad takes account of the work of Foucault and Butler which challenged the normative construction and control of the (gendered) body via discursive power formations. However, Barad argues that such discursive iterations remain anthropocentrically-situated and do not sufficiently consider how non-human bodies became materialized via discursive power productions. Posthuman performativity, Barad argues, encompasses both humans and non-human bodies in a relational ontology which, grounded in dynamic agentic intra-active connections, provides a better account of the ongoing, materialization of the world. Apparatus and phenomena feature as units of connectivity which dispute the existence of bounded singular bodies. She suggests that agential cuts produce agential separability through which certain realities (and not others) appear, are materialized, and enacted. She considers that agential separability is intimately tied to ethics in as much as different agential cuts offer new potential realities which may gave rise to conditions of possibility for some bodies, or which may produce exclusions of/for other bodies. Barad’s posthuman performativity reworks cause and effect because both are based in ontological conditions of dynamic and continually emergent material-discursive entanglement. There is no ‘final form’ or stasis – there is only entangled ongoing materializations produced by agential cuts effected by all sorts of human/non-human material bodies. Thus, an agential realist posthuman performativity focuses on practices, doings and happenings, on becomings not being(s), on immanence and emergence not essence.

In *Meeting the Universe Halfway* Barad further conceptualizes agential realism explaining “this book works as a diffraction grating, illuminating important material differences, relationalities and entanglements in the lively dance of mattering” (2007, p. 37). Barad’s earlier theorizations – that in nature nothing is separate, everything is co-determined and entangled in a mutually constitutive ecology of relations, and all things exist in an ongoing dynamism of mattering – continue to be central. Interestingly, while Barad notes that quantum physics is not used metaphorically but is employed to build an agential realist approach, she is clear that her account of agential realism is not a direct enactment of the ‘truth’ and other realities/interpretations might be possible. The core of her non-dualist approach is grounded in Bohr and Feynman’s two-slit diffraction grating experiment, which theorized/demonstrated that sub-atomic particles could exhibit both particle-like and wave-like behaviour depending on the apparatus used to perform/measure the experiment. This is known as ‘the indeterminacy principle’ which shows matter in a state of ‘superposition’, i.e. between two positions (wave/particle). To Barad this demonstrates a lack of epistemological and ontological separability, where the ‘objects of observation’ (wave/particle) and the ‘agencies of observation’ (apparatus to measure wave/particle) could not be theoretically or physically separated. Drawing on Haraway (2004), Barad proposes that this experiment indicates the imprecision of the subject/object divide and provides good epistemological, ontological and theoretical ammunition for moving beyond dualism and representationalism.

Barad pushes forward with an account of agential realism as an alternative to representational accounts of the world. She argues that representation is based in an optical metaphor – geometric optics – which derives from a Cartesian philosophical position and its taken-for-granted ontological gap between subject/object. This, she contents, has produced and privileged socially and culturally contingent (i.e. Western, male, colonial) habits of mind. For her, these frames of reflection and representation simply produce reworkings of ‘sameness’. She uses her physics background to challenge such representational optics, noting that the working of microscopes, particularly the scanning tunnelling microscope, employ different, i.e. *diffractive*, optics in which what is ‘seen’ are patterns of difference not sameness. Diffraction, then, questions representationalist principles and reflective properties of observation derived from the Cartesian legacy of visual sight. Barad poses diffraction as an overarching proposition of agential realism, possessing the potential to recast knowledge-making practices from both methodological and analytical perspectives. Barad was not the first to posit diffraction as an ethical counterpoint to a reflexive methodology; Haraway (2004) and Trinh Minh-Ha had already identified diffraction as a potentially alternative optic of knowledge. Building on this feminist legacy, Barad poses diffractive reading as reading with and through texts/ideas/happenings in ways which allow for new, unexpected and potentially affirmative possibilities to be revealed. In Barad’s agential realism, diffraction accounts for the relational nature of difference, not the different Being (essence) of a body, and for differentiation between modes of relational connections (phenomena) brought about by generative agential cuts.

Barad’s non-dualistic onto-epistemology also calls for a recasting of time and space, which can only, she suggests, be understood as *spacetimemattering*. In an agential realist account phenomena are not discrete identities which exist in physical space at a particular time. Instead, intra-actions occur as non-linear properties which come to matter and reveal the marking and making of time drawing in different connections from the past, present and future. Similarly, space is not a collection of pre-existing points that delimit the boundaries of ‘things’. It is dynamically imbricated in intra-active productions of boundaries and exclusions which are formed and remade by agential separability in an enactment of connections. Barad illustrates these concepts in chapter six via diffractions of Leela Fernandes’ analysis of the structural and ideological workings of power in a Calcutta jute mill, which resulted in women being ejected from the workforce. Her attention to time-space-mattering considers the conjunction of (a) historical practices, policy, perceptions of the women, working conditions, classed, raced and gendered power fluctuations between workers and employers; (b) entanglements with global capitalist modes of production which valorise white heterosexual Man and nature/culture dualisms; (c) agential cuts which enact space via marking women's bodies in classed, gendered and raced ways performativity positioning and materializing them in a deficit position. The example of the Calcutta jute mill is, Barad argues, a complex instance of spacetimemattering articulated simultaneously in emergent processes of material entanglements and differentiations which challenges tying ‘identity’ to fixed, particular bodies. In this, diffractive readings move beyond dialectic or hierarchical modes of critique to account for matter’s dynamism in bodies, spaces, times, practices, doings, and actions.

Agential realism also has the potential to recast modes of knowing and knowledge-making. For Barad, knowing is a material practice but not an exclusively human one and does not, “come from standing at a distance and representing but rather from a direct material engagement with the world” (Barad 2007, p. 49). Knowledge operates as an embodied mode of knowing-in-being which is embedded in material relations through which human/non-human bodies and agencies respond to each other. This has profound consequences for research methodologies as what are usually seen as separate research processes or practices – problem formulation, question design, methods, data collection, results, analysis, findings, dissemination – are, in agential realism, emergent, dynamic and co-implicated in the relational materialities of research and knowledge-making processes. This, of course, begs the question of the role of human agency in research’s emergent spacetimemattering. Barad is clear that humans are not outside observers of the research apparatus but neither do they have a singularly interventionist role, nor do phenomena occur primarily as a consequence of human intentionality. Human practices do play a part as intra-actions reveal “differential constitutions of human and non-human [which] designate particular phenomena” (Barad, 2007, p. 171). In research, agential cuts, enacted as momentary stabilizations of matter constitute phenomena; in this context, responsibility and accountability – research ethics – are reconfigured as the ethico-onto-epistemological ability to relationally respond to these cuts. The ethics of mattering entangles humans along with all other intra-acting phenomena.

**Articulating agential realism**

Barad’s later work concerns empirical illuminations of agential realism. Her central themes revolve around how diffraction allows for different ways to undo traditional conceptions of human subjectivity and agency, and how it becomes impossible to disentangle the subject/object in space and time. These elaborations of agential realism are a continuation of the earlier links she articulated between philosophy and physics based in the theoretical and empirical experiments performed by Bohr and his contemporaries. The articles consider two main themes explored in *Meeting the Universe Halfway*: one, the possibilities offered by agential separability which remake bodies boundaries; and two, the ethical and political impact of the co-implication of the self and Other and how this can be put to work to decolonize knowledge-making practices.

Barad draws on the work of Jacques Derrida (Barad, 2010) and Derrida and Emmanuel Levinas (Barad, 2012b) to question the separation of bodily boundaries. In both these articles dis/continuity (what is included or excluded via agential cuts) allows her to theorize how intra-active phenomena offer a new variety of possible potentials depending on what is in/excluded via the cuts. Barad (2010) diffracts spacetimemattering with Derrida’s hauntology, and the quantum eraser experiment, to propose that the past cannot be erased but becomes materialized in present and future phenomena. Here, Barad’s challenge to binary separation works as a radical questioning of the nature of identity and individualism. She critiques capitalist politics of production which calls for each thing/person to be made anew into a better version of the self, posing instead spacetimemattering and agential separability as means to move beyond the ethics of individuation to an ethics of connectivity (Barad, 2012b, Juelskjær, and Schwennesen, 2012). Her critique ‘queers’ quantum physics to argue for a reconfiguring of “material intra-relatings and differences across, among, and between genders, species, spaces, knowledges, sexualities, subjectivities, and temporalities” (Juelskjær and Schwennesen, 2012, p. 16). Diffractive acts of cutting together-apart (Barad, 2014), she suggests, provide radically new ways to re-think marginalized (classed, raced, homosexual, and gendered) bodies and discourses which contribute to Othering ways of being (Barad, 2008, 2012a, 2014, 2015). These diffractions do not forget, or erase, attempts to Other bodies but allow a situated, feminist, and ethical responses within/through entanglement patterns where dis/continuity (re)makes difference as a material act providing new conditions of possibility.

Barad’s (2017) most recent thinking employs agential realism to challenge colonialism and the exclusions produced by Western knowledge-making practices. Such practices have colonized the expectations of knowledge and marginalized Indigenous voices and ontologies (Tuhiwai Smith et al., 2019). Introducing the term ‘political-ontoepistemological-ethical’ practice, Barad considers how atomic testing was repeatedly performed near/in/on Indigenous land and notes how this is co-implicated in the re-membering of Hiroshima and Nagasaki, and how this then becomes portrayed within official ‘museum histories’. While these diffractive readings powerfully portray how the past cannot be erased and that science is thoroughly implicated in militarisation and capitalism, Barad now focuses on how the political dimension of an agential realist account requires us to pay heed to our (human) obligations and debts, and to take our responsibility and accountability seriously. In this, Barad points to how agential realism might open ways towards a move beyond a geopolitical silencing of Other Indigenous or marginalized voices via attention to the political and ethical potential of mattering.

**Agential realism as a game changer**

Karen Barad’s theorising of agential realism has undoubtedly had a significant influence across a range of theoretical and philosophical disciplines including:

* Education, exploring pedagogies, classroom practices, gendered subjectivities, schooling policies, and the ethics of slow scholarship;
* Organisational studies, where the concept of socio-materiality has been applied to organisational leadership;
* Environmental studies and feminist science studies, where the intra-actions between humans/non-humans and the environment are articulated;
* Feminist and queer studies, with human/non-human entanglements surrounding sexuality, gender and subjectivity are explored.

Broadly speaking, in alliance with recent posthumanist-oriented studies, agential realism has been instrumental for scholars wishing to develop both more affirmative engagements with human/non-human relationalities, and critical, political and ethical accounts of pressing contemporary problems. Interestingly, as yet, there has been a limited engagement in STS and human geography. This may be due to Barad’s rejection of reflexivity which has a long history in STS, and the greater focus on non-representational theories in human geography. Anthropology and physics scholars have questioned whether the scaling up of quantum physics to wider social/material worlds can be successfully achieved asking what might be lost during upscaling.

In addition, work has been done by qualitative researchers interested in what agential realism might offer in terms of new possibilities for developing non-dualistic methodologies, method, and analytical practices. Such scholars envisage research as a materially embodied and embedded thinking/practice/doing and are taking forward innovative debates which question the nature of ‘data’, the apparatuses of its ‘collection’, and the presentation of its ‘findings’. Agential realism is opening new ways for re-thinking/undoing/re-doing anthropocentric research methodologies and methods in ways which pose a radical challenge to traditional research practices (Taylor and Hughes, 2016), and which prompt more diffractive modes of ‘analysis’ (Benozzo et al., 2018).

Many of these methodological contestations challenge the realist foundations which underpin much mainstream empirical work in the social sciences. Realism as a philosophical concept has a long, distinguished and diverse history, which includes the work of Roy Bhaskar and critical realism in sociology employed to challenge causal power in social structures and systems, and methodologies which valorise approaches such as randomized controlled trials. Where does – or, indeed, does – agential realism fit in this tradition, given that intra-action negates the view that the observer and the observed are separate in knowledge-making practices? Perhaps part of the answer lies in the view that it offers an analytical orientation which helps surface critical, ethical and political issues, and poses questions about the most appropriate empirical ways to glean insights into the operations and practices of power within the social world. However, it is worth saying that many non-Western Indigenous and critical race scholars have questioned the political value of agential realism and remain sceptical of its claims to ‘newness’ and of the relational ontologies which underpin it .

In sum, Barad’s advancement of agential realism as an innovative non-dualistic metaphysics allows ontology, epistemology and ethics to be recast as material-discursive phenomena. Interestingly *Meeting the Universe Halfway* was critiqued by Pinch who questioned Barad’s usage of quantum mechanics without exploring some of the genealogical nuances that surrounds physics. He thought Barad needed to consider more carefully the link between science and science studies in order to avoid “a form of scientism” (Pinch, 2011, p. 440). Barad’s response re-turned to feminist science studies as a means to consider responsible science practice without erasing feminist politics, and she reaffirmed both her, and Bohr’s commitments to what she entitles philosophy-physics (Barad, 2012a). What makes Barad’s work so important is that, although agential realism is theorized from a scientific basis in quantum physics and the behaviour of sub-atomic particles, it offers a set of methodological and analytical tools, flexible and comprehensive enough to be taken up by a range of disciplines, including social sciences, humanities and arts. Theoretically, her work problematizes traditional accounts of structure-agency, promises new ways of relating the micro to the macro, and proposes new accounts of agency, relationality and situatedness. Most importantly, her ethico-onto-epistemology calls humans to account in urging them to “meet the universe halfway, to take responsibility for the role that we play in the worlds differential becoming” (Barad, 2007, p. 396).

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*.*

**Further Readings**

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

Taylor, C. and Ivinson, G. (Eds.). (2016). *Material feminisms: New directions for education.* Abingdon: Routledge.

van der Tuin, I. and Dolphijn, R. (2012). *New materialisms: Interviews and cartographies.* University of Michigan: Open Humanities Press.

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**References**

Barad, K. (1996). Meeting the universe halfway: Realism and social constructivism without contradiction. In L. H. Nelson and J. Nelson (Eds.), *Feminism, science and the philosophy of science* (pp. 161-194). Dordrecht: Kluwer.

Barad, K. (1998). Getting real: Technoscientific practices and the materialization of reality. *Differences:* *A Journal of Feminist Cultural Studies*, *10(2*), 87–128.

Barad, K. (1999). Agential realism: feminist interventions in understanding scientific practices. In M. Biagioli, *The science studies reader* (pp. 1–11). New York: Routledge.

Barad, K. (2000). Reconceiving scientific literacy as agential literacy, or learning how to intra-act responsibly within the world. In S. Traweek and R. Reid (Eds.), *Doing science + culture* (pp. 221–258). New York: Routledge.

Barad, K. (2003). Posthumanist performativity: toward an understanding of how matter comes to matter. *Signs,* *28(3)*, 801–831. DOI:10.1086/345321.

Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Durham, North Carolina: Duke University Press.

Barad. K. (2008). Queer causation and the ethics of mattering. In N. Giffney and M . J. Hird (Eds.) *Queering the non/human* (pp. 311-338)*.* Abingdon and New York: Routledge.

Barad, K. (2010). Quantum entanglements and hauntological relations of inheritance: Dis/continuities, spacetime enfoldings, and justice-to-come. *Derrida Today*, *3(2)*, 240-268.

Barad, K. (2011). Erasers and erasures: Pinch's unfortunate 'uncertainty principle'. *Social Studies of Science, 43(3),* 443-454.

Barad, K. (2012a). Nature’s queer performativity (the authorized version). *Women, Gender & Research*, *1(2),* 25-53.

Barad, K. (2012b). When two hands touch, how close are they? On touching the inhuman that therefore I am. In K. Stakemeier & S. Witzgall (Eds.), *Power of Material/Politics of Materiality* (pp. 153-164). Zurich, SW: Diaphanes.

Barad, K. (2014). Diffracting diffraction: Cutting together-apart, *Parallax*, *20(3)*, 168-187.

Barad, K. (2015). Transmaterialities: Trans\*/matter/realities and queer political imaginings. *A Journal of Lesbian and Gay Studies, 21(2-3)*, 387-422.

Barad, K. (2017). Troubling time/s and ecologies of nothingness: re-turning, re-membering, and facing the incalculable. *New formations: A journal of culture/theory/politics, 92*, 56-86.

Benozzo, A., Carey, N., Cozza, M., Elmenhorst, C., Fairchild, N., Koro-Ljungberg, M. and Taylor, C. A. (2018). Disturbing the academicconferencemachine: Post-qualitative re-turnings. *Gender, Work and Organization*, online <http://dx.doi.org/10.1111/gwao.12260>

Haraway, D. (2004). *The Haraway reader*. New York, NY: Routledge.

Juelskjær, M. and Schwennesen, N. (2012). Intra-active entanglements—An interview with Karen Barad. *Kvinder, Kon & Forskning,* 1-2(2012), 10-23.

Pinch, T. (2011). Karen Barad, quantum mechanics, and the paradox of mutual exclusivity. *Social Studies of Science, 41(3),* 431–441.

Taylor, C. A. and Hughes, C. (Eds.). (2016). *Posthuman research practices in education.* Basingstoke: Palgrave MacMillan.

Tuhiwai Smith, L., Tuck, E. and Yang, K. W. (2019). *Indigenous and decolonising studies in education.* Abingdon: Routledge.

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*