Apparatus and Its Uses: 'Ecologising' Diffraction As A Materialist-Epistemological Practice

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Abstract

This paper addresses the problem of how to 'do' theory without implying "that theorizing is outside the world" (Barad & Gandorfer, 2021, p. 16) by elaborating a particular, ecological use of the apparatus. Tracing Foucault's use of the dispositif (Foucault, [1977] 1980, p. 194), I argue that his key invention is identifying the generative capacity of the apparatus in terms of its constraints, which coincide with its situatedness as part of the world. By diffractively reading this invention through Barad's posthumanist use of the apparatus, their agential realist practice of diffraction is re-iterated as a specifically 'ecologising' technique. Rather than following Barad in grounding this technique ontologically, Foucault's "author-function" (Foucault 1969) leads me to ground such theorising an ongoing, materialist-epistemological engagement with the environment.

Keywords

Apparatus; Diffraction; Foucault; Author Function; Ecology.

I would have preferred to be enveloped in words, borne way beyond all possible beginnings. At the moment of speaking, I would like to have perceived a nameless voice, long preceding me… There would have been no beginnings: instead, speech would proceed from me, while I stood in its path — a slender gap — the point of its possible disappearance.

— Michel Foucault, The Order of Discourse ([1970] 1981, p. 51)

How should we understand the theory we produce; what is its place in our world? It is, perhaps, a question as old as philosophy itself, yet one that seems doubly pertinent in times of growing climate and environmental chaos. With this paper I seek to address the problem of how to 'do' theory without implying "that theorizing is outside the world" (Barad & Gandorfer, 2021, p. 16). As a matter of practice, I seek to define a materialist epistemology capable of functioning beyond the remit of modernity, entangled as it is with the collapsing climatological and ecological systems that defined the Holocene era. To this end, the following elaborates an ecologising technique that is accountable and response-able to conditions of possibility beyond our current Anthropocene boundary event (Haraway 2016, p.100). As an ethics, it is a response to the challenge Michel Serres posed for a posthuman society: "Will we become democrats? I believe that even the language of our ancient reason, which was once supreme, is tottering as it confronts the multiple and scattered voices of the things of the world" (Serres, 2015, p. 57). With the following, I explore the apparatus as both a writing -and a living practice; not in opposition to, or separateness from the world, but as a generative mode of habitation.

The apparatus is of particular interest because of its capacity to address the self-constitutional relation between entities and their environments without recourse to a prior assumed representational gap. Rather than a use that "captures the world" (Barad & Gandorfer, 2021, p. 16), the apparatus might be used to open up a space for the topological organisation (materialisation) of diverse analytics and sense-making practices in nested consistencies. Such a use is, to my mind, critical if we are to develop practices and institutions capable of following—rather than attempting to

determine or exploit—processes of life. The use of the apparatus elaborated here should be approached as a particular application of a constitutional problematics of thought, as raised by Isabelle Stengers in terms of how we "give to the situation the power to make us think," even as we "participate in its own enaction" (2005, p. 187).

In the following, I seek to articulate an ecological use of the apparatus by diffractively reading Foucault with Barad. The technique of diffraction builds on both feminism and quantum physics, where "diffractively engaging with texts and intellectual traditions means that they are dialogically read 'through one another' to engender creative, and unexpected outcomes" (Geraerds & van der Tuin, 2020). This entails building on my reading of their respective epistemological inventions. Reading the analytic technique of Foucault's dispositif through the careful rigour of Barad's quantum procedures allows me to trace a particular, ecological application of knowledge production as a non-representational technique of materialist epistemology. In this, I follow Barad's effort "to understand 'oneself' and the apparatuses that constitute 'oneself' as being *of* the very material-discursive entanglements of which one is intra-acting" (Barad & Gandorfer, 2021, p. 39). Such a relational capacity is elusive, and can be contrasted with the dualistic clarity of Agamben's "modern anthropological machine," which arrests at the outset the play of interiority and exteriority at stake in the use of an apparatus (Agamben, 2004, p. 37). To grasp this interruption of play in modern uses of the apparatus, I will focus on the functioning of a priori's in Foucault's author function to demonstrate an 'ecologising' use of the apparatus that is both accountable and response-able in terms of its environment. This performative reading allows me to conclude that an ecologising use of the apparatus entails a 'rerouting' of theory, displacing-by-circumventing the grounding of text in an interior category of thought, because this necessarily, incessantly re-inscribes the Cartesian separation of theory and world in the very gesture that entails its use. The alternative, ecologising, entails an environmentalising gesture of diffractive self-constitution, where interiority as an a priori condition for knowledge is displaced into a situated, epistemological resolution that both emerges from, and iteratively (re)configures our lifeworlds.

Heterogeneous Ensembles

The story of the apparatus and its uses starts with Michel Foucault's famous articulation of the *dispositif* in a 1977 interview. With the dispositif, he provides a cypher for his work as an authorial machine, developed in his research over the preceding decade. In the following, I will trace the dispositif's constituent elements in his work prior to its 1977 definition, arguing that Foucault's core innovation is to grasp the apparatus in terms of its generative constraints, which coincide with its situatedness as part of the world. With this innovation, Foucault is able to coherently address quizzically broad, yet specific ensembles,

> [...] consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions–in short, the said as much as the unsaid. Such are the elements of the apparatus. The apparatus itself is the system of relations that *can be* established between these elements (Foucault, [1977] 1980, p. 194; italics added)

The dispositif offers Foucault the capacity to order relations among wildly diverse materialities. Moreover, the dispositif holds out the possibility of a diversity of ensembles that one *might* establish across diverse taxa. Tracing such discursive formations of power-knowledge qualifies, Foucault suggests, "neither a theory or a method," but rather the possibility "to create a history of the different modes by which, in our culture, human beings are made subjects" (1982, p. 777). In terms of its use, it is the dispositif's procedural capacity to establish diverse relations, more than its specific deployment by Foucault "with reference to a fundamental experience: madness, illness, death, crime, sexuality, and so forth," (1982, p. 779) that comes to matter, as a question of technique.

In articulating this procedural capacity as a dispositif, Foucault responds to a structural, or rather material challenge of the human sciences that he earlier identified in *The Order of Things* in relation to language, which:

> [...] cannot represent thought, instantly, in its totality; it is bound to arrange it, part by part, in a linear order...If the mind had the power to express ideas 'as it perceives them', there can be no doubt 'it would express them all at the same time'... It is in this strict sense that language is an analysis of thought: not a

> simple patterning, but a profound establishment of order in space (Foucault, [1969] 1994, p. 82).

In a distinction crucial for the work of this paper, Foucault takes the material conditions of language seriously, fundamentally situating speech among the varied elements of the apparatus to be analysed. This "profound establishment" enables the dispositif to incorporate the necessarily sequential logics of language as *one mode of analysis among others*, without submitting the overall analytic capacity of the dispositif to the material logics of language. In this way, rather than maintaining the primacy of language, the dispositif provides theory with a 'proto-topological' possibility space for the "simultaneous comparison of parts" (Foucault, [1969] 1994, p. 83). The invention of the dispositif therefore provides the materialist grounds for an epistemological position that is open by virtue of the distance between thought and language, with which Foucault seeks to "acknowledg[e] the reality of discourse… restoring [it] to its status as an event" ([1969] 1994, p. 82).

According to Giorgio Agamben, the roots of the materialist analytic proposed by Foucault are to be found in the problem of designating "the historical element," raised by one of Foucault's teachers, Jean Hyppolite, in relation to religious practice (Agamben, 2007). Hyppolite discusses this historical element in relation to Hegel's parsing of natural and positive religion, where the natural is "concerned with the immediate and general relation of human reason with the divine," and positive, or historical religion "encompasses the set of beliefs, rules, and rites that in a certain society and at a certain moment are externally imposed on individuals;" entailing, in Hegel's own words, "feelings more or less impressed through constraint upon the soul" (Hegel, as cited in Agamben, 2007, p. 5). With the latter, Hyppolite establishes the "knot of questions implicit in the concept of positivity," thereby outlining the stakes involved in the use of the apparatus: "To investigate the positive elements of a religion, and we might add, of a social state, means to discover in them that which is imposed through a constraint on man, that which obfuscates the purity of reason" (Hyppolite, as cited in Agamben, 2007, p. 6). In construing these historical elements, or "positivities," and their associated "threshold of epistemologisation" (Foucault, [1969] 2002, p. 206) in terms of a dispositif, Foucault moves the locus of analysis away from

pure reason and towards discourse as a material phenomenon. Fundamentally, this generates a heuristic in which language, bound to its material constraints ("part by part, in a linear order" (Foucault, [1969] 1994, p. 82), is distinguished from thought by means of a material analytic procedure. The consequence of this move is that theory becomes materially comparable to other elements of the apparatus. By placing language qua discourse on an equal footing with any other elements of an apparatus, Foucault's dispositif manages to displace statements which prioritise rationality (notably the Hegelian concept of pure reason) as a grounds for analysis. Incorporating these grounds, also known as a priori's, or "god tricks" (Haraway, 1988), among the heterogeneous ensembles of the apparatus, materially grounds Foucault's theoretical work, opening up the possibility for more diverse and responsive ways of thinking the "system[s] of relations that can be established" (Foucault, 1980, p. 194), while simultaneously putting at stake the ordering principles of such ensembles.

Succeeding Hyppolite at the Collège de France, Foucault articulates the principle that allows the historical element to be grasped in his inaugural lecture, *The Order of Discourse* ([1970] 1981). In it, he stresses the interplay of critical (displacing) and genealogical (marking) methods according to the principle of exteriority. With it, Foucault outlines the particular movement that will enable him to mark and displace the essentialism of modern reason, providing the basis for what I seek to elaborate as an 'ecologising' technique, simply by directing analysis away from interior meaning and towards its constitutive environment:

> We must not go from discourse towards its interior, hidden nucleus, towards the heart of a thought or a signification supposed to be manifested in it; but, on the basis of discourse itself, its appearance and its regularity, go towards its external conditions of possibility, towards what gives rise to the aleatory series of these events, and fixes its limits (Foucault, [1970] 1981, p. 67).

Moving from discourse towards its "external conditions of possibility," rather than towards its "hidden nucleus," constitutes the basic *generative principle* of Foucault's epistemology. This deeply materialist logic, in reversing the initial direction of analysis, fundamentally shifts the basis of theory towards its environment. The environment is defined in Foucault both in terms of the conditions of possibility for a dispositif, while

simultaneously "fix[ing] its limits". That which gives rise to a dispositif, to its appearance and regularity in relation to its environment, simultaneously makes specific its capacity to encounter discontinuities and chance, in what is otherwise an "aleatory series" of events. Grasping the simultaneity of possibility and limit demonstrates how the dispositif requires a highly specific technique, by which to reverse the foundational modern gesture of obfuscating materiality among the essentialised necessities of language. With the dispositif, Foucault proposes to, so to speak, 'meet the historical element halfway', describing a movement where the particularities of the environment constitute both the grounds and boundaries of an apparatus in terms of a non-representational, materialist space. Given that human sciences rely on language to convey thought and research, grasping such a constitutively relational movement is a tricky affair:

> The result is that the narrow gap which is to be set to work in the history of ideas, and which consists of dealing not with the representations which might be behind discourse, but with discourses as regular and distinct series of events – this narrow gap looks, I'm afraid, like a small (and perhaps odious) piece of machinery which would enable us to introduce chance, the discontinuous, and materiality at the very roots of thought (Foucault, [1970] 1981, p. 69)

By identifying a "narrow gap" of dealing with discourses as regular and distinct series of events in the face a world "that is not complicit in our knowledge" (Foucault, [1970] 1981, p. 54), Foucault side-steps the dualistic logic that is dominant in the modern history of ideas. The gap is "odious" exactly insofar as it affords its outcomes the same epistemological position as its apparatus, flattening the epistemological conditions of appearance of knowledge. Foucault cannot overstate his materialist intent with this: it serves to introduce *materiality at the very roots of thought*. With this particular materialist manoeuvre, the dispositif opens up in specific, procedural terms the possibility of situated knowledges, proposed by Donna Haraway as "technologies of positioning" that activate "the potent politics and epistemologies of embodied, therefore accountable, objectivity" (Haraway, 1988, p. 588). And so the ecologising

capacity of the dispositif starts to come into focus: a principle of generative constraint grasped as a technique of necessarily partial engagement with an environment.

Yet, the agential locus of a partial engagement with an environment, as implied by use of a dispositif, remains elusive. How should engagements with this 'environment', as a displaced grounds for theory, be understood? An essential definition will not do, as this is exactly what Foucault seeks to avoid with his technique. In The Subject and Power (1982), he elaborates this point in relation to power, asserting that, "[s]ince a theory assumes a prior objectification, it cannot be asserted as a basis for analytical work" (Foucault, 1982, p. 778). The question of power, understood as a constitutively relational feature that structures the conditions of possibility of Foucault's analysis, retains its openness, as a matter of generative principle, at 'the cost' of redirecting the question of its agential status to the text.

In the aptly titled lecture *What is an Author?*, Foucault inquires after the relation of agency and environment in terms of "the author function" ([1969] 1992), p. 299). In posing this "slightly odd question," Foucault seeks to define "the functional conditions of specific discursive practices" ([1969] 1992, p. 299), showing what Isabelle Stengers calls "the relationship of relevance between the situation and the tool" (2005, p. 185). With the author function, Foucault seeks to define "the singular relationship that holds between an author and a text, the manner in which a text apparently points to this figure who is outside and precedes it" ([1969] 1992, p. 300). The invocation of this slightly odd figure, both external and prior to the text, allows us to perceive the dispositif as a response to a question of authorial technique, in line with Foucault's commitment, evidenced in his work from the late 1960s onwards, to employ an epistemological praxis that acknowledges its own conditions of appearance. The human aspect, famously effaced in the sand, therefore nonetheless circumscribes the relations between apparatus and environment, and its specific operations are key to properly understand the situated and partial quality of generative constraint that characterises Foucault's technique.

Responding to the question of authorship, Foucault contrasts his use of the apparatus to the modern deployment of the author function, which, we recall, "go[es] from discourse towards its interior, hidden nucleus" (Foucault, [1970] 1981, p. 67). The

modern function sustains "the privileges of the author through the safeguard of the a priori; the play of representations that formed a particular image of the author is extended within a gray neutrality." (Foucault, [1969] 1992, p. 303). Here, Foucault identifies the a priori as the lynchpin of the modern author function, which is situated representationally in a generic environment of "grey neutrality". The a priori safeguards a privileged position according to a highly particular operation whose "essential basis… [is] primarily concerned with creating an opening where the writing subject endlessly disappears" (Foucault, [1969] 1992, p. 301). The pivotal operation offered by the modern a priori is that the "disappearance of the author… is held in check by the transcendental" (Foucault, [1969] 1992, p. 303). Thus, in its modern operation, the a priori establishes a transcendental anchor for the author to assign meaning while themselves disappearing in a dualistic play that essentialises the rationality of the hidden nucleus by representation in a neutral environment. In order to "go towards its external conditions of possibility" (Foucault, [1970] 1981, p. 67), Foucault seeks to renegotiate the position of the author by explicating their function as part of their environment: "the subject (and its substitutes) must be stripped of its creative role and analysed as a complex and variable function of discourse" (Foucault, [1969] 1992, p. 314).

According to Foucault, to displace the modern a priori and thereby reposition the author as an element of the environment, we need to understand the author function, with reference to Michel Serres, in terms of a "nonaccidental omission" (Foucault, [1969] 1992, p. 311) in the text, which "must be regulated by precise operations that can be situated, analysed, and reduced" (Foucault, [1969] 1992, p. 311). Instead of anchoring it to a transcendental a priori in a space of pure ratio, Foucault positions the author as a function of their environment, and whose deployment of a generative constraint is a decisive, necessarily omitted agential practice: "the barrier imposed by omission was not added from the outside; it arises from the discursive practice in question, which gives it its law" (Foucault, [1969] 1992, p. 311). In a subtle play of dis/placement, Foucault makes the non-accidental omission of the author accountable by the operation of the a priori, opening up the possibility to situate the apparatus in terms of its author function among the material environments it engages. What this shows, is how there is a double omission of the subject at play in Foucault's

use of the apparatus. This omission is both highly particular and foundational to his technique: the subject can only be understood as an element of its environment if the author occupies a formally equal position. With this, Foucault demonstrates the (proto-)diffractive character of his practice, as this omission can only be identified in terms of its situated authorial practice, and therefore iteratively, by returning to the material specificity of a text:

> [t]he phrase, 'return to,' designates a movement with its proper specificity… If we return, it is because of a basic and constructive omission, an omission that is not the result of accident or incomprehension… this return… is not a historical supplement… Rather, it is an effective and necessary means of transforming discursive practice" (Foucault, [1969] 1992, p. 311).

It is in our return, therefore, to Foucault, that it becomes apparent how the question of the subject, in relation to power, is operative simultaneously as a mode of analysis and as an authorial positioning that includes itself in the terms of analysis; these are the coordinates of the small gap by which Foucault's little machine manages to operate beyond the remit of modernity. Removing the necessarily implicit privilege of the author to posit a transcendental a priori as a basis for his analysis, this slightly odd figure, being both external and prior to the text, is accounted for as a non-accidental omission. This omission is secured textually by an a priori that establishes a generative constraint in relation to its environment, thereby allowing the dispositif, and indeed any apparatus, to operate as a bridge between words and things.

With the dispositif, Foucault defines a mode of discursive practice that prefigures diffraction, engaging with "an extremely complex configuration of realities" (Foucault, 1982, p. 786), while simultaneously opening up a self-reflexive timespace that allows for the ethical repurposing, rather than logical superseding, of the rationalist a priori. The epistemological invention I have pursued in Foucault therefore consists in redeploying the omission secured a priori as a generative constraint that both arises from the authorial position and structures their analysis, allowing the inscription of an apparatus among the relations it describes. This deployment of the principle of generative constraint opens up the ethical quality of a text as a technology of positioning, which Felix Guattari later describes as "that existential taking on of

context [that] is always brought about by a praxis which is established in the rupture of the systemic 'pretext'" (Guattari, 2000, p. 36). To the possibility of theory relating to the world, it therefore seems to me that, following the use of the apparatus pioneered by Foucault, 'the world', qua environment, must always remain at stake.

Measurement and Marks

Thirty years after the interview that first relayed Foucault's dispositif, Karen Barad's agential realist use of the apparatus extends its procedural scope into the quantum realm. Their apparatus extends the epistemological threshold of what, in Foucault's work, is still deployed essentially as a literary machine, where "discursive practices are the material conditions that define what counts as meaningful statements" (Barad, 2007, p. 63). While Foucault establishes a generative epistemic reversal by qualifying the regularities of an exterior in the diagrammatic terms of power-relations, Barad's agential-realist reworking of exteriority mobilises quantum measurement to expand the range and quality of agential relations that an apparatus can establish with its environment. In this section I will trace Barad's apparatus as an elaboration of Foucault's particular epistemological technique, or use, showing how it marks itself with/in an environment through the relational quality of measurement procedures.

Foucault's definition of discursive practices, Barad asserts, is "limited to the domain of human social practices" (Barad, 2007, p. 145). Where Foucault established the dispositif in terms of material-discursive relations that "connect the history of systems of thought to the practice of historians" (Foucault, [1970] 1981, p. 58), Barad defines the environment of the apparatus in terms of physical measurement. The conditions of possibility this generates follow a specific, procedural understanding of objectivity: "for one system to have properly measured some property of another system requires a correlation of the properties of the two systems" (Barad, 2007, p. 337). Moreover, in agential realism, correlation is understood intra-actively, meaning correlations constitute entanglements of systems. Therefore, Barad's use of the apparatus engages with Hyppolite's erstwhile "historical element" (Agamben, 2007, p. 3) as situated, entangled phenomena, or "spacetimematterings" (Barad, 2017, p. 179).

By introducing measurement as a privileged technique of relating with conditions of possibility, Barad continues Foucault's move away from a modern mode of accounting that emphasised the interiority and reflexivity of thought. Barad includes both knowledge practices of the human sciences with their "low epistemological profile," as well as the (quantum) physical sciences, which Foucault judged "excessively complicated" to apply his invention to, as, he wrote, "this [would] set the threshold of possible explanations impossibly high" (1980, p. 109). Barad moves beyond the humanistic limitations that Foucault readily admitted constrain his deployment of the dispositif, pointing to a continuity of use between him and Barad that is consistent with the latter's definition of objectivity derived from Niels Bohr (Barad, 2007, p. 120). Therefore, rather than "exclu[ding] nonhuman bodies" whose existence Foucault presumably "takes for granted" (Barad, 2007, p. 169), we can understand Barad's use of the apparatus as an extension of the dispositif. By elaborating its use from within the domain of quantum physics, Barad's careful treatment of measurement practices extends the material scope of the apparatus:

> Apparatuses are the material conditions of possibility and impossibility of mattering; they enact what matters and what is excluded from mattering… The apparatus specifies an agential cut that enacts a resolution (within the phenomenon) of the semantic, as well as ontic, indeterminacy. Hence apparatuses are boundary-making practices (Barad, 2007, p. 148).

The consequences of the extension by the agential realist use of the apparatus can hardly be overstated. Beyond a 'simple' accounting for how discursive statements come to matter, this extension means that any discursive formation enacts its material conditions. This enaction by agential cuts means agency is, in practice, *embodied in its apparatus*: the material specificity of any "boundary-making practice" means that it "enacts a *local* resolution *within* the phenomenon of the inherent ontological indeterminacy" (Barad, 2008, p. 133). This "resolution" enacted in the apparatus is both irreversible and situated, because the specifically ontological indeterminacy prior to such a resolution prevents any one ordering of causal relations to structurally take precedence over any other. In a stunning reversal of modern logic, correlatives of measurement between two systems, or "causal relations," no longer "preexist but rather are intra-actively produced. What is a 'cause' and what is an 'effect'

are intra-actively demarcated through the specific production of marks on bodies" (Barad, 2007, p. 236). With the intra-active measurement-qua-marking of bodies, agential realism broadens the range of the dispositif, binding the apparatus to the particularities of the material-discursive environment of its enactment. This procedure aligns closely with Donna Haraway's notion of objectivity as "situated knowledge", where it "is precisely in the politics and epistemology of partial perspectives that the possibility of sustained, rational, objective inquiry rests" (Haraway, 1988, p. 584).

Counter to representationalist notions of objectivity, the agential realist cut does not merely 'enact a resolution' in the classical sense of focussing on a pre-existent object. Rather, it is itself situated, in the strong sense that the apparatus includes the phenomenon it encounters; it "enacts a causal structure that *entails* the 'causal agent,'" i.e. the "measured object" (Barad, 2007, p. 337). This reversal implies that the concepts we posit as causes of measurements are brought, in a very material sense, into focus ("entailed") by the very apparatuses we deploy. Here, moving towards its environment in reverse, the agential realist apparatus is defined according to a principle of generative constraint. One that, moreover, puts its authorial position qua agential practice at stake: "[e]ntangled practices are productive, and who and what are excluded through these entangled practices matter: different intra-actions produce different phenomena" (Barad, 2007, p. 58). Here, the material specificity of entanglements are both the productive and constraining factor. This leads Barad to return to Bohr and reiterate his complementarity principle in terms that recall how a non-accidental omission relates to its author function: "the subject cannot fully characterise itself without splitting… Only part of the world can be made intelligible to itself at a time, because the other part of the world has to be the part that it makes a difference to" (Barad, 2007, p. 432/42). With this, the apparatus is specified in terms that correlate to the epistemological threshold of quantum physics, whereby discursive practices can be incorporated as materially constitutive agencies:

> [d]iscursive practices are causal intra-actions—they enact causal structures through which one "component" (the "effect") of the phenomenon is marked by another "component" (the "cause") in their differential articulation" (Barad, 2007, p. 335).

More precisely, by enabling the dispositif to mark its quantum physical environment, its "high epistemological profile" is included in a use of the apparatus that is consistent with Foucault's dispositif. In relation to quantum physics, the performative agency of both discursive and material practices are no longer described as a given exteriority, but instead come to *entail* the causal agents they posit. In my words, this means analysis brings contingent conditions of possibility into *situated resolutions*, understood as an agential realist principle of generative constraint. Situated resolutions describe conditions that are intra-actively part of the apparatus-phenomenon qua measurement, as "the intra-active marking of one part of the phenomenon by another" (Barad, 2007, p. 338). The materiality of situated resolutions, incorporating an environment in terms of its material specification in the apparatus, opens in a flash the potential range and heterogeneity of ensembles that might be marked across highly diverse taxa, extending "the productive role of apparatuses in linking issues of natural philosophy, political economy, and human and nonhuman forms of agency" (Barad, 2007, p. 231).

Given this posthuman understanding of discursive practices, the question remains how Barad relates to their Foucauldian heritage. Responding to it entails a return to Barad's contention with Foucault, insofar as it revolves around their respective engagements with exteriority as a generative limitation. Barad asserts that Foucault "honor[s] the nature-culture binary," (Barad, 2007, p. 146) arguing that he "does not tell us in what way the biological and the historical are 'bound together' such that one is not consecutive to the other" (Barad, 2008, p. 127). Barad is right to point out how Foucault's *analytic practice* does not escape its humanist orbit qua environment. As he himself acknowledges, it is precisely this constraint that enables a situated resolution of the human sciences, as it circumscribes the field that is the generative constraint at the basis of his analysis of subject-power relations. I would therefore argue that his authorial practice, or use of the apparatus, establishes the conditions by which relations between the historical and the biological can be, and indeed are, articulated without causal ordering; these conditions are the core epistemological capacity of the apparatus. To analyse the subject as an effect of a dispositif, the agency of any subject—and therefore of the author—must be included in the environment they analyse, necessitating the author's non-accidental omission in the

text. The generative constraint deployed in Foucault's work (on the relation between a humanistic subject and their environment in terms of power-knowledge), should be read as a particular application of his authorial technique, a technique that indeed opens up the possibility for Barad's more "thoroughgoing genealogy" (Barad, 2007, p. 146) of the nature-culture binary. Radicalising the "historical element" of Foucault's teacher Hyppolite, Barad is therefore able to show how "[m]atter is always already an ongoing historicity" (Barad, 2008, p. 139). In doing so, they highlight a continuity with Foucault in their use of the apparatus, centred on the fact that "intra-actions are constraining but not determining" (Barad, 2008, p. 143).

In diffracting the Foucauldian inheritance in Barad, the apparatus, as a specific relation of thought and its outside, is shown to function according to a principle of generative constraint, "going towards its external conditions of possibility" as it "fixes its limits" (Foucault [1970] 1981, 67) in one move. In the Baradian apparatus, this movement entails agential cuts that are accounted for through measurement procedures as the marking of environments. This iterative process, constituting both its conditions of possibility and its material-discursive limits, is the basis of the ecologising of agential realism. With its intra-active mode of correlation, the apparatus is constitutively placed among the 'things of the world', allowing, in principle, a non-representational accounting of theory-in-action. Thus, seen in continuity with Foucault, the significance of Barad's invention is to specify the apparatus as a heuristic for posthuman knowledge production, whose uses are account-able and response-able as physical machines that form complex material topologies.

It follows that, as a technique, using such an apparatus 'puts the position of the author at stake' in terms of a non-representational practice: the tracing (measure/marking) of phenomena is not merely descriptive, occurring in a space of grey neutrality, but situated agentially—thus opening the door to a non-symbolic response-ability of thought. This reiterates the need to locate Barad in the ongoing historicity of their own authorial procedure, the "(iterative re)making" (Barad, 2017, p. 109) by which they themselves "enact a causal structure that entails the causal agent" (Barad, 2007, p. 337).

Instrumental Collapse

The situated resolution of the Baradian apparatus allows for a material accounting of the apparatus as part of its environment, in principle. The question remains how the relationship between environment and author is resolved in Barad's practice, as a thinker whose entanglements seemingly admit no outside. In attempting to situationally resolve the generative constraint of Barad's technique, the goal of this next section is not to critique Barad's work, but rather to pinpoint the author function in agential realism, 'cutting together/apart' their posthuman use with Foucault's invention, to trace the boundaries between theory and the world implied by Barad's 'non-accidental omission'. This will involve turning to the indeterminacy of quantum environments that intra-actively constitute the Baradian apparatus "to be productive of (and part of) phenomena" (Barad, 2007, p. 142). In doing so, I must part ways with Barad's ontological grounding of the indeterminacy at play between macroscalar (classical) and microscalar (quantum) environments, as these grounds are secured by an a priori that, ultimately, con(s)t(r)ains its author function *within* the text.

Barad broadly positions the environment of their apparatus when they stress "the point is to understand that 'humans' are themselves natural phenomena" (Barad, 2007, p. 336). Being *of* nature, rather than in it, is indeed foundational to Barad's posthumanism. "What is at issue," and indicates the stakes involved in Barad's use of the apparatus, "is the nature of reality; not just how the body is positioned or understood in reality but the nature of materiality of the body itself. Matter entails entanglements—that is its nature" (Barad, 2007, p. 132). The Baradian apparatus is positioned in relation to the materiality of quantum environments to grasp how bodies become marked intra-actively. Such quantum environments are qualified as states of "semantic, as well as ontic, indeterminacy" (Barad, 2007, p. 148), where the apparatus "enacts a *local* resolution *within* the phenomenon of the inherent ontological indeterminacy" (Barad, 2008, p. 133). Because entanglement is "a generalisation of a superposition to the case of more than one particle" (Barad, 2007, p. 270), and superpositions are indeterminate in the sense that "[t]he principle of quantum superposition states that any given physical system simultaneously holds all of its possible states at once" (Moran, 2019, p.1051), indeterminacy constitutes a material

boundary condition for the Baradian apparatus. Yet, in terms of ongoing historicity, "what matters is 'contextuality'—the conditions of possibility of definition—rather than the actual measurement itself" (Barad, 2007, p. 306), suggesting that indeterminacy always relates to an apparatus under particular conditions.

Stacy Moran formulates this threshold as a question of emergence, with decoherence as the key dynamic that "intervenes on superposition's indeterminacy and localizes it" (Moran, 2019, p. 1052). With decoherence Moran proposes a material interruption of Barad's ontological resolution of indeterminacy:

> While all physicists agree that entanglement and superposition are "normal" functions of quantum mechanics, the question of how (and whether) localizations emerge from quantum phenomena remains a mystery… What new materialism calls "emergence" remains in question for physics, and decoherence is central to the question of what physicists call the "collapse" or "transition" from the quantum to classical realm (Moran, 2019, p. 1057)

Quantum decoherence brings into focus the point at which indeterminate quantum environment and apparatus meet. This involves "the practically irreversible and practically unavoidable disappearance of certain phase relations from the states of local systems by interaction with their environment," which is a long-overlooked relation of entanglement, according to Moran, that "stirs up and 'makes trouble' for quantum feminism" (2019, p. 1060) because it questions the givenness of entangled phenomena. Specifically, decoherence "intervenes on superposition's indeterminacy and localizes it" (2019, p. 1060). In so far as "the agential cut enacts a resolution within the phenomenon of the inherent ontological (and semantic) indeterminacy" (Barad, 2007, p. 334), decoherence provides a dynamic to grasp the relation of phenomena and indeterminacy that is at the heart of the Baradian apparatus-environment dynamic:

> Superposition is deemed the natural state of things until a system comes into contact with an experimental setting and the surrounding measurement apparatus is said to "cause" the system to "decohere," or become a determinate particle—in a word: matter. In a certain sense, the decoherence of

a quantum system is due to its becoming entangled with the environment. (Moran, 2019, p. 1052)

Decoherence shows the quantum physical environment to be *differentially indeterminate*; measurement procedures mark environments in always-already particular material configurations. Decoherence forces the situating of ongoing relational processes of mattering, making measurement matter iteratively with/in particular scalar and temporal sites of spacetimemattering. For Barad, however, decoherence does not situate (their) resolutions, but rather attests to the generic problem of isolating the essential qualities of quantum behaviour in measurement procedures; this is solely due to "interactions with its 'environment', which continually fluctuates in an erratic fashion in such a way that a superposition is 'randomized' into a mixture 'for all practical purposes' (but not in principle)" (2007, p. 279). Following Bohr's definition of objectivity, where measurement apparatuses must be articulated in macroscalar, classical terms to be communicable, Barad finds "no indication that measurements entail any kind of physical collapse, only cuts" (2007, p. 343). Yet these cuts entail decoherence, creating a circular logic that can only be arrested *in principle*. Thus, the ontological environmental characteristic of indeterminacy is maintained at the cost of ignoring environmental particularities, whereas *in practice*, decoherence entails phenomena are always-already resolved with/in given spacetimematterings. This exclusion of particular environments in principle is all the more pertinent given Barad's posthuman tenet that we are situated as part of the living world, which empirically traverses quantum and macroscopic scales (Jianshu et al., 2020).

Thus we return to the "question of emergence" stirred up by Moran, and find ourselves aligned with Barad to the extent that "[a]pparatuses enact agential cuts that produce determinate boundaries and properties of 'entities' *within* phenomena" (Barad, 2007, p. 148; emphasis added). As we have seen, decoherence means any cut necessarily entails a particular environment, with which it co-constitutes a phenomenon. Agential realism however, posits the existence of phenomena per se, seen from the hypothetical vantage point of an indeterminate environment that is, in principle, not subject to decoherence. Barad illustrates this a priori unity by asserting that "no observer inside the universe can see all of what is in the universe" (Smolin, 2001, quoted in Barad 2007, 351), thereby presuming a givenness of the universe that

astrophysicists find doubtful (Davis & Lineweaver, 2004). With this presumption of a neutral space, expressed in terms of ontology, it seems that Barad's use of Bohr does not yet 'escape the laboratory' (Barad, 2007, p. 140); following the resolution of the measurement problem of quantum physics in terms of generic cuts, Barad defines phenomena as "ontologically primitive relations—relations without pre-existing relata" (Barad, 2007, p. 333), leading to the ultimate claim that "[p]henomena are constitutive of reality" (Barad, 2007, p. 140). With this definition, Barad secures the relationship of the apparatus and its environment outright, as an ontological a priori that is subsequently applied 'in' the (macroscopic) world. By positing phenomena as ontologically prior, the author function is resolved. Yet, it is resolved in such a way as to make phenomena an essential category correlated with an indeterminate quantum environment. In a discursive sense, the Baradian apparatus is unable to disentangle from Bohr's statement that "the word reality is also a word" (Bohr, as cited in Barad, 2007, p.125), because Barad's resolution, qua ontology, is limited to the discursive sphere, missing the double inversion at play in Foucault's authorial technique, where both the author (as a final grounds) and the subject (as a presumed object) must both be omitted from the text to remain at stake, even though they occupy different (complementary!) positions vis a vis the apparatus. By presuming the status of the environment as an ontological given, the Baradian apparatus becomes unable to account for its own emergence, effectively precluding its ongoing situatedness as part 'of' the world. In doing so, Barad contradicts the sufficient, epistemological remit of their own apparatus, which stipulates that cuts can only be made *within* phenomena in terms of agential separability, which presumes concrete environments and accounts for decoherence. In confronting the Baradian apparatus with its own conditions of possibility, therefore, a curious collapse occurs, which seems to involve—schematically—an ontological premise collapsing into an epistemological practice, by the inclusion of a living environment according to the boundary condition of decoherence.

Interrogating forms of knowledge with their own objects of interrogation—which in discursive terms means interrogating their author functions—causes a curious collapse to occur in the modern apparatus. Barad mischievously describes this point of collapse in a passage that I read as an encounter with an otherwise omitted author

function: "[a]pparently, touching oneself, or being touched by oneself—the ambiguity/undecidability/indeterminacy may itself be the key to the trouble—is not simply troubling but a *moral* violation, the very source of all the trouble" (Barad, 2012b, p. 5). Touching oneself—in a flash, this gesture connects the apparatus to itself while simultaneously constituting it as part of a particular, living environment. This simultaneity short-circuits any a priori that is tethered to a transcendental, generic space, by collapsing the structural indeterminacy of the latter. It also troubles the complementarity principle, as, at any given instance, "a 'measuring instrument' cannot characterize (i.e. be used to measure) itself" (Barad, 2007, p. 347). Moreover, according to this principle, an ontological a priori structurally omits its complementary position (that of the author positing it) in an apparatus. Barad qualifies the resulting situation as "pre-ontological… it is difficult to express and use words, especially because sense-making is also dynamic and part of the dynamics" (Barad & Gandorfer, 2021, p. 19). Indeed, without accounting for that which comes before ontology, namely the "figure who is outside [the text] and precedes it" (Foucault, [1969] 1992, p. 300), a potentially infinite question of prior cause is triggered: "[…] what I mean by 'prior,' it is not temporarily prior, but ontologically prior, and prior, and prior…" (Barad & Gandorfer, 2021, p. 19). Omitting the author by securing the text a priori to an ontological relation, the Foucauldian principle of generative constraint as an environmental relation is broken, and with it, a potentially endless question of prior cause comes to haunt theory. Asserting this generative principle therefore causes a collapse of ontology into epistemology, in the sense that an a priori, securing the discursive position of the author in a generic environment, collapses into the ongoing question of their situated resolution as an authorial practice.

Thus, the movement implied by ecologising comes into view: the ongoing, particular question of the environment collapses the presumed a priori positing of an apparatus ahead of its phenomena. The trouble triggered by self-touching is that of emergence, a question that cannot be denied outright, but is redirected via the apparatus towards its non-accidental omission. The choice, as I see it, is whether this mechanism is directed towards ontology, evoking the eternal return of questioning those essential grounds, or towards epistemology, generating particular material engagements that remain continually at stake. Decoherence underscores how the constitutive, or a priori

seizure of the environment by human logos cannot sustain a living, material relation to the world. Once the author, maintaining the text-as-world, becomes apparent, the neutral space supporting this seizure collapses, opening up a material question of ethics that Foucault (1982) describes as "a constant checking" (p. 778).

Diffractive Ethics

By diffractively reading Foucault's invention of the dispositif and Barad's posthumanist apparatus through one another, I try to take seriously the inescapable situatedness that being part of the world implies for theory. Specifically, it is an attempt to elaborate a technique for ecologising theory in the face of modern epistemologies—living testimonies to centuries-old destructive practices—that today pose an existential threat to most macroscopic lifeworlds on the planet (Trisos et al., 2020). Indeed, the unfolding collapse of climate- and ecological systems stresses existential entanglements with our own lives, as Jem Bendell suggests (2018). As discussed above, such living engagements are precluded by securing the author function by ontological a priori, because it opens a representationalist gap between text and world, triggering modernity's tendency to "explicate itself by endlessly applying itself onto itself" (Serres, 2019 [1969], p. 3). This tendency motivated my parting of ways with Barad and their ontological resolution of indeterminacy. Nonetheless, our paths reconvene in the practice of diffraction, a technique that I contend is able to accommodate decoherence as a generative constraint, enabling an ecologising use of the apparatus as an epistemological materialist practice.

To conclude, I will therefore re-turn to diffraction, a technique that has been employed from the outset in this inquiry. Diffractively, an "ecology of practice" (Stengers 2005, p. 185) has been traced among Foucault, Barad and myself in alignment with Haraway (and others), "cutting together-apart" (Barad, 2014, p.176) a use of the apparatus that positions theory as part of the world by securing the author function as an ongoing relation to their environment, necessarily omitted from the text and therefore always at stake. Re-turning to diffraction, this practice can be reiterated as an ecologising capacity—as a use of the apparatus that acknowledges (with Foucault) its conditions of possibility in terms of generative constraint, specified (with Barad) as an intra-

active, material-discursive practice, constituting (with Haraway) situated resolutions with/in a posthuman, epistemological threshold—that enables response-ability both to and in (i.e. of) the world.

As a shorthand for this complex manoeuvre, I have proposed the term ecologising. This particular diffractive use of the apparatus adds decoherence as a generative constraint to Barad's posthuman technique. This has two important consequences. Firstly, it entails a vital principle for theory, because it explicates the author function as a non-accidental omission secured a priori to their living environment and its irreversible processes (Stengers & Prigogine, [1984] 2017). The environment is thereby constituted as a "threshold of epistemologisation" (Foucault, [1969] 2002, p. 206) that always-already given, yet simultaneously always at stake in the text. This principle specifies an immanent and practical ethics, with the author "tracing the entanglements of this strange topology (where each is inside the other)" (Barad & Gandorfer, 2021, p. 22) as a use of the apparatus that is adaptive in a non-representational sense to processes of life. Simultaneously, ecologising entails diffraction as a demodernising technique because this use collapses the neutral environment in which a transcendental a priori was able to secure the modern author function, collapsing the premise of non-accountability and irresponse-ability that is arguably prevalent among modern patriarchal, colonial and capitalist machines.

If the modern author function's "essential basis… [is] primarily concerned with creating an opening where the writing subject endlessly disappears" (Foucault, [1969] 1992, p. 301), then an ecologising mode of diffraction is primarily concerned with maintaining an opening where the writing subject is continually manifested in terms of the simultaneous possibility and limit afforded by their living environment. This position is accountable non-analogously in the situated resolution of an apparatus. Thus, ecologising follows the small opening that Foucault employed: "[s]ince a theory assumes a prior objectification, it cannot be asserted as a basis for analytical work. But this analytical work cannot proceed without an ongoing conceptualization. And this conceptualization implies critical thought—a constant checking" (1982, p. 778). By displacing ontology into epistemology—collapsing the givenness of phenomena into their situated resolutions—relationships of interior-exterior are presumed to remain at stake. However, the intra-active quality of any diffractive relationship, as an

ongoing adaptive capacity, begs the question of its enactment, i.e. its response-ability. Situated resolutions are not static events, but iterative, material-discursive intra-actions of generative constraint. Echoing *What is an Author?*, Barad defines this temporal quality of diffraction as a matter of re-turn:

> Re-turning as a mode of intra-acting with diffraction—diffracting diffraction—is particularly apt since the temporality of re-turning is integral to the phenomenon of diffraction… Diffraction is not a set pattern, but rather an iterative (re)configuring of patterns of differentiating-entangling. (Barad, 2014, p. 168)

Diffraction, understood in terms of its encounter with its own operation, cannot be univocally defined. Hence "a constant checking", the necessity of which is materially underscored by decoherence, which entails any situated resolution diffractively enacted in an apparatus is irreducible to a more general principle of ordering, as such an ordering in turn triggers decoherence, thereby constituting a further situated resolution. As I've argued, with/in conditions of decoherence, diffraction's iterative boundary-making becomes an epistemological materialist practice of collapse; this applies not only to subsequent iterations, but is constitutional to an ecologising use of an apparatus. Questions of emergence cannot be resolved a priori, but rather re-assert themselves materially with every cut, making response-ability an engagement with generative constraint that precedes accountability. Ecologising diffraction collapses prior distinctions between interior and exterior into an intra-constitutional movement that is environmentally response-able wherever we (re-)turn. This 'collapsing together-apart 'of the ethical and the epistemological in the material specificity of an environment goes to the heart of ecologising diffraction, where diffraction environmentalises itself in a material-ethical gesture. Such collapse, and the agency it implies, does not entail a purposive breaking apart, but rather a non-violent, sensitive touch that is response-able to its intra-active consequences. This use radicalises the causal reversal pioneered by Barad, expanding Foucault's ethics beyond self-care (Foucault, [1984] 1990): ecologising collapses agency as a self-referential category into an ongoing, situated resolution that both emerges from, and iteratively (re)configures our lifeworlds. Such a use of the apparatus allows agency to

be understood as an ongoing response-ability to particular environmental engagements, and with it, theory a generative mode of inhabiting the world.

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