



# Need help blurring the boundaries of your process archaeology? Don't use agential realism. Try playing with clay

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## Abstract

Over the last twenty years, archaeologists have used various process-oriented modes of enquiry to undermine the belief that humans are special. Barad (2007) developed Bohr's indeterminist interpretation of quantum mechanics into *agential realism* which offers an ontological basis for distributing agency away from humans and plays a crucial role in underwriting some posthumanist archaeological agendas. But its origins in quantum physics make agential realism difficult to understand and evaluate. Despite the challenge, the first two parts of this paper are devoted to each task in turn, with limited success. Part three turns to the archaeological literature, where the evaluation of agential realism turns out to be even more inadequate and so I advise against its use in support of process-oriented approaches in archaeology. The final section turns to the activity of an art workshop and introduces a playful approach to working with clay. *Clayful phenomenology* is a way of investigating the relationship between gesture, material and ideation. During sculpting, phenomenological experience is not subjective, stable and external but is generated within a transient creative system where entities, ideas and agency reciprocally, emerge as ephemeral manifestations. Clayful phenomenology and agential realism are ontologically similar and both are controversial but agential realism has a wall of quantum conceptual complexity standing between it and a judgement about credibility whereas playing with clay can be assessed directly, through experience.

**Keywords** Ontology · Material\_engagement\_theory · Agential\_realism, clayful\_phenomenology · Process\_archaeology

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## 1 Introduction

Bohr believed that behaviour at atomic scales is intrinsic to context, not matter. Barad claims that Bohr's proposition, that the measuring apparatus determines that we can ascribe either the position or the momentum of an electron but not both, goes beyond Heisenberg's uncertainty principle. She takes the implicit ontological indeterminacy of Bohr and develops its implications into a metaphysical position she calls, *agential realism* in which matter and agency are co-constituted. She coins the term *intra-action* to describe how agency and matter arise from within the event that brings them both into existence.

Some archaeologists have enthusiastically seized upon agential realism to undermine substance-based accounts and develop processual descriptions of the archaeological record. Agential realism enables them to inform and enrich the exploration of archaeological artefacts by transforming them into dynamic sites of ephemeral materialisation. Given Barad's assertion that agential realism is consistent with evidence from experimental, quantum physics, it lends enormous weight to any argument made in its name but, despite its detailed ontological framework, I will argue that, in an archaeological context, agential realism complicates matters rather than enriching them.

Quantum mechanics is incomprehensible unless you are fluent in numbers and, even for those who can follow the logic of equations, its paradoxical implications are difficult to reconcile with human experience. It is tricky therefore for archaeologists to make an informed decision about whether agential realism makes any sense. Nevertheless, in part one I do my best to try and understand Barad's interpretation of Bohr's version of quantum mechanics.

Even if I succeed in making some sense of the activity of the quantum world, Barad's interpretation of Bohr is far from universally accepted and there is doubt about whether the behaviour of atomic particles can be scaled up to apply either to macroscopic things or ephemeral materialisations the size of archaeological artefacts. In section two I consider the arguments, I try to get to grips with the conundrum of scaling up and I end up still being unsure.

Parts one and two leave the credibility of agential realism hanging in the balance. In part three I turn to the archaeological literature to review the reception it gets there and find no critical evaluation in any of the archaeological papers that use agential realism as their ontological backdrop. I explore the consequences of this omission and conclude that archaeologist should avoid using agential realism to support accounts based on emergent assemblies.

In the final section I argue that taking a playful approach to modelling clay gives access to a process-oriented mode of experience and an approach to making knowledge that, like agential realism, blurs the division between the knower and the known. Called *clayful phenomenology*, its methods are imprecise and not altogether coherent but the context of an art workshop is sensorially and conceptually more accessible than the quantum backdrop to agential realism. I describe how the process of sculpting in clay, when understood from the perspective of *Material Engagement Theory* (MET), offers a way of revealing an ontology of macroscopic activity during which ideas, agency and material transformation emerge indivisibly as polysemous or con-

tradictory phenomena. Sculpting clay offers an indeterminate, metaphorical, non-linguistic and materially inclusive way to dismantle the boundaries between matter and agency, one that does not rely on having a background in physics.

## 2 Part one. Barad, Bohr and quantum uncertainty

To understand Barad's interpretation and redevelopment of Bohr's ontological position, I begin with Heisenberg's (1983) uncertainty principle which states that we cannot ascribe a particle's position and momentum simultaneously because the measurement of one state disturbs (changes unpredictably) the other. Barad notes that although Heisenberg couches the uncertainty principle as epistemological, according to Bohr (1928) particles do not have simultaneous and determinate properties of momentum and position. The idea that they do is predicated on Newtonian, not quantum mechanics, leading Barad to argue that, in contrast to Heisenberg, Bohr understands the basis of quantum indeterminacy to be ontological rather than epistemological.

To illustrate the difference between the quantum and Newtonian universe, I begin in the latter. Imagine a breakwater with two gaps in it. Waves approach the breakwater such that the line of the wave and the breakwater are parallel (the wave's movement is perpendicular to the breakwater line). When a wave reaches the breakwater, it continues through the two gaps and the waves describe two, distinctive circular patterns as they exit the other side which interfere with each other and create diffraction patterns on the surface of the sea. Now imagine that a frigate arrives on the seaward side of the breakwater, firing cannonballs towards the land beyond the breakwater. The cannonballs would fly through the gaps hitting the cliff face beyond - directly opposite each slit. The cannonballs would not interfere with each other after having passed through and we would see no diffraction pattern engraved across the cliff face. Waves behave like waves, cannonballs like particles.

I now turn to quantum mechanics and the behaviour of very small entities, such as electrons. Unlike cannonballs, when electrons pass through two (appropriately scaled) slits, they *do* leave interference patterns, called superpositions. A context in which electrons behave like waves is called a quantum coherence state and in it diffraction patterns appear even if the electrons are not sent through simultaneously, suggesting that the superpositions are not caused by electrons interfering with each other.

To clarify Bohr's position let us take the two-slit paradigm described above and imagine that we can adapt the apparatus to indicate the slit through which an electron passes. This *which-path* apparatus was originally evoked in a thought experiment by Einstein (Bohr, 1949). Bohr proposed that the *which-path* apparatus would constrain electrons to behave as particles and, like cannonballs, would produce no evidence of superposition. With the which-path arrangement disabled, the apparatus reverts to a normal two-slit grating and Bohr predicts that electrons will then exhibit superposition once again. However we arrange the system, we are always left with one indeterminate variable. To entertain a complete account of experience it is necessary to accommodate (but not combine) information from the two, mutually exclusive

experimental conditions. Bohr refers to the ambiguity of this dual state as *complementarity* (Bohr, 1950).

Seventy years after Bohr's proposition, Scully et al. (1989, 1991) produced a real which-path device. The team assembled an experimental condition in which each slit has a micromaser cavity attached to it. A micromaser is a device that reduces the content of the cavity to less than one atom at a time (Scully and Zubairy, 1997). A collimated (aligned) stream of rubidium atoms in a heightened energy state is directed towards the two cavities. As an atom enters the cavity, it drops an energy level and, in so doing, emits a single, detectable photon. Scully et al. demonstrated that the loss of energy does not disturb the atom's centre of mass and so has no appreciable effect on position or momentum. Exactly as Bohr predicted, with the which-path device switched on (which detects the photon) the atoms behave like particles. When off (using a shutter), atoms behave like waves. Remarkably, the apparatus gives the same result even when the decision to switch-off the which-path information is made *after* the atom has already passed through the apparatus (delayed-choice mode). Although the outcome of the delayed choice mode appears to suggest that the experimenter has the power to change the past, Barad argues that this inference is based on the Newtonian conception of time and space as dimensions that exist independently of the system of entanglement that associates electron and experimental apparatus. Barad argues that, rather than creating a determinate condition for the future, past and future are "iteratively reworked and enfolded through the iterative practices of spacetime-mattering." (page 315). Bohr calls the system of entanglement a *phenomenon* and so what Barad means is that the spatial and temporal conditions of a specific experimental arrangement emerge as part of that phenomenon.

Heisenberg's uncertainly principle cannot account for the results on the delayed-choice mode because the atom was not disturbed by an act of measurement as it passed through the apparatus. We are thus left with Bohr's argument that the unit of consideration cannot be reduced to the individual behaviour of an atom. Instead, the atom, coupled dynamically to the apparatus, is a single indivisible phenomenon.

*We are just faced with the impossibility, in the analysis of quantum effects, of drawing any sharp separation between an independent behaviour of atomic objects and their interaction with the measuring instruments which serve to define the conditions under which the phenomena occur.* (Bohr, 1949, page 210, emphasis in original)

Confronted with "the inseparability of objects and agencies of observation." Barad (2007, page 308) takes the term *phenomenon* and gives it an explicitly ontological spin. Rather than being pre-existing entities whose *interaction* (Bohr's word - see above quote) entangles them into a single phenomenon, Barad views the phenomenon itself to be ontologically antecedent, not as matter but as a process she calls *intra-action* during which specific material entities come into being as quantum entanglements. For Barad, agency is not a property of a real entity because agency and entity emerge together, "...matter is substance in its interactive becoming — not a thing but a doing, a congealing of agency. Matter is a stabilising and destabilising process of iterative intra-activity." (Barad, 2007, p.151).

Barad points out that, if apparatus and electron are joined as an intra-action rather than an interaction then this turns indeterminacy from epistemological to ontological and she claims that the ambiguity of complementarity derives from the fact that it is impossible to separate the subject from the object, the knower from the known, "... phenomena are the ontological entanglement of objects and agencies of observation. Hence it is the ontological inseparability or entanglement of the object and the agencies of observation that is the basis for complementarity" (Barad, 2007, p. 309).

Whether ontological or epistemological, we cannot make sense of quantum state inferences using the Newtonian assumptions that are consistent with our quotidian sense of the world around us. Generally, we experience matter as stable and time as linear and unidirectional. Particles cannot also be waves and the names (nouns) we assign to electrons and atoms strongly suggest that they are things rather than energetic instances. Concepts like *waves* and *particles* describe the world as we see it but, as they do not apply to the quantum world, we find it a difficult place to inhabit phenomenologically. If it were possible to move away from classical concepts and replace the stability of objects with the flux of process as our primary experience of the world, then we must expect to enter a state of confusion as a consequence.

We can get a sense of the emerging confusion by considering the implications of Barad's epistemological collapse. If a phenomenon is not the dynamical coupling between a sub-atomic entity and an apparatus but an energetic encounter that brings two entities into being then this means that "we are a part of that nature that we seek to understand" (Barad, 2007, p. 67); an inference that begs the following questions. Are not Scully et al. therefore part of the quantum entanglement? And, if they are entangled, do they report the results from inside the entanglement or have they stepped out to do it? In response, when Barad looks at examples of the illustrations of apparatuses in Bohr's papers, she finds the human is literally and figuratively absent. More generally, Bohr does not explicitly define the limits of phenomena. Is the electricity supply part of the apparatus? the people who make the apparatus? the cables and computers, connected to the apparatus? the light that shines on the apparatus? Barad claims that Bohr's failure to delineate boundaries implicitly allows for the intra-active generation of apparatus and electron within a phenomenon while the experimenter and his/her knowledge of the system remains outside. Barad ascribes Bohr's blind spot to his humanist sensibilities.

The liberal humanist conception of the subject and the taken-for-granted static and bounded apparatus that are embodied in Bohr's theoretical apparatus get in the way of his efforts to provide a deeper understanding of the nature of scientific practices and ultimately cut short the profound ontological implications of his ideas. (page 145)

Barad means that Bohr takes the existence of autonomous, human sentience for granted and, to release their ontological implications from Bohr's anthropocentric assumptions, Barad takes Bohr's principles of indeterminacy and complementarity and gives them a "post-humanist performative" (p.146) re-interpretation based on Foucault's notion of discursive practice and Butler's re-working of the human body from fact of nature to constructed phenomenon. This allows for the intra-action of

agential realism to turn pre-existing human experimenters into an emergent process of human becoming, continuous with the construction of apparatus within an experimental event. Barad wants to place human and apparatus on the same ontological footing but Foucault and Butler do not quite get her there. Despite arguing that humans are constructed by and through culture, they are both more entity-realist when it comes to nature and this maintains a nature-culture divide which prevents an ontological description based upon the emergence of human-world entanglement. Barad sets out to remedy this by diffracting (which she opposes to reflecting) the discursive practice and performativity of Foucault and Butler through the radical, ontological implications of quantum mechanics. She does this by extending her interpretation of Bohr's phenomena beyond the realm of experiments with electrons and generalises the generative capacity of intra-actions to all matter and things, including humans. "...no *a priori* privileged status is given to the human - and that is precisely the point. "Humans" are emergent phenomena like all other physical systems and agency is not exclusive to living matter." (page 338).

In her posthumanist formulation, human brains are not the repositories of knowledge. Meaning is distributed across the world and intelligibility is an emergent property of Bohrian phenomena, irrespective of whether there is human engagement; "knowing is a distributed practice that includes the larger material engagement... not an ideational affair, or a capacity that is the exclusive birthright of the human..." (Barad, 2007, page 342). For Barad, knowledge does not encode some aspect of the workings of the world. It is the adaptive process of a knowing system rather than a representation of something that lies beyond the knower. What is not clear, however, is whether her concept of knowing includes a phenomenological quality and whether she believes that "distributed practices of knowing" that have no human involvement still experience knowing.

To summarise, agential realism presents agency as a diffuse and emergent quality of quantum entanglements and proposes that entanglements self-create the conditions for their own appearance. This delineates the ontological context in which it is impossible to separate knower from known. Intra-action begins with a world devoid of objects with defined boundaries and stable properties that can be known and represented in abstract form, separate from the process by which those properties came to be known (Barad, 2022). In part two I consider the merits of Barad's case, starting with the claim, crucially relevant to archaeology, that the behaviour of quantum entanglements can be extended to macro-atomic situations.

### 3 Part two: does agential realism make sense in the macro-world?

While there is nothing about quantum theory that suggests it applies only to micro-phenomena, larger things nevertheless appear to us to behave in more classical ways, showing no sign of quantum superposition. We usually perceive things around us as definite and dependable rather than probabilistic and dynamically entangled and the world presents itself as a stable, enduring platform on which to live life. Barad gives three reasons for the stability. First, the visibility of quantum effects depends

upon the ratio of Planck's constant<sup>1</sup> to the mass of the object. For a mass as small as that of an atom, the ratio is large, and the quantum effects are proportionally significant. For larger masses, like prehistoric artefacts, quantum effects exist but are proportionally insignificant. Second, Quantum effects respect neither human perceptual boundaries, nor the way we categorise objects. So a large thing like a clay pot, which for us has a clearly perceptible perimeter, nevertheless expresses within, across and beyond its perimeter any number of quantum entanglements which cancel each other out in, around and across the pot's edge in a process called *environment-induced decoherence*. (of which more later). Third, Barad points out that we must overcome the difficult task of locating and measuring the correlations necessary to identify an entanglement.

Despite portraying them as discrete, self-effacing and difficult to spot at macro-atomic scales, Barad insists that quantum effects are ubiquitous and that the ontological consequences of quantum indeterminacy applies to visible things like prehistoric artefacts. For Barad, agential realism is not a metaphor for the indeterminism of materials, she means it literally - with direct consequences for the interpretation of quantum mechanics.

My focus is on the development of widely applicable epistemological and ontological issues (which) ...are not circumscribed by the size of the Planck's constant." (2007, page 70).

The conceptual shifts derived from my diffractive methodology not only reconfigure our understanding of the nature of scientific and other material-discursive practices but also are significant and robust enough to actually form the basis for a new interpretation of quantum physics. (page 36)

We can get a better idea of the influence of quantum effects on the macro-world by briefly examining the notion of *decoherence* (see Camilleri, 2009 for a more detailed analysis) Quantum coherence is achieved when an entity behaves like a wave, a situation that requires a closed environment (low temperature and a vacuum). In an open system the quantum state interacts with the energetic entities surrounding it which causes coherence to collapse and the quantum state becomes a particle, or at least appears to behave like one. The question is whether the wave-like function disappears from existence or only from view. In Zeh's (1970) original formulation of decoherence, he argued the former. But he later changed his mind, arguing that decoherence and interference were not necessarily mutually exclusive. Along with Joos, he put forward a revised view that decoherence masked but did not destroy interference. "The interference terms still exist, but they are not there!" (Joos & Zeh, 1985, p. 224). Likewise, Zurek (1993) thought that, although the environment appeared to cause de-coupling of phenomena, there was in fact no fundamental collapse of coherence. If true, this is important because it suggests that the classical world, as

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<sup>1</sup> The energy of a photon changes by a discreet amount called the Planck's Constant which is here being used comparatively to indicate that quantum effects are detectable in systems where individual photon activity is also detectable.

we experience it, is not an approximation of a truer quantum world. Instead, as Joos explains, quantum activity brings forth the classical world.

‘Particles’ appear localised in space not because there are particles, but because the environment continually measures position. The concept of a particle seems to be derivable from the quantum concept of state” (Joos, 1986, page. 12).

The controversy is therefore not about whether quantum effects exist in the macroscopic world nor why they create a single, macroscopic result, there is little argument about either among physicists. As Laloë (2022) puts it, the mystery is

...why a single macroscopic result emerges from a quantum measurement process, while the dynamical equations of quantum mechanics seem to indicate that several results occur simultaneously. The real problem is therefore, not to explain why a coherent superposition of these possibilities does not occur (which is indeed explained by decoherence), but why no superposition at all subsists, coherent or not. (page 10)

In Faye and Jaksland (2021) view, Barad substantially misconstrues Bohr’s position on this, so-called measurement problem, questioning “whether the agential realist account of this problem is even coherent.” (pages 8251-2) Their overall critique of Barad can be summarised by considering their analysis of her reinterpretation of Bohr’s term *phenomenon*. As we have seen, Barad portrays a *phenomenon* as the auto-generated entanglement between a quantum object and the apparatus of observation but Faye and Jaksland argue that Bohr never meant *phenomenon* to imply an ontologically generative potential, nor that apparatus and object emerge from an “ontologically primitive object” (Faye & Jaksland, 2021, page 8240) Instead, they understand *phenomenon* to describe how the experimental context determined the appearance of a quantum object.

For Bohr both atomic objects and instruments are real, and as such they figure as relata in a sentence like “... is recorded to have position  $p$  in relation to ...”. It is from this perspective that we warn against Barad’s ontologically realist interpretation of Bohr. (page 8241)

They interpret *phenomenon* to suggest an epistemological, not an ontological interaction between object and apparatus and they therefore argue that Bohr did not believe an observer to have any influence on the outcome of the experiment beyond that found in a classical (Newtonian) experiment.

To summarise, Faye and Jaksland’s analysis turns the relationship of knower and known back from an intra-action into an interaction, thus undermining the legitimacy of agential realism’s central concept. In addition, despite diffracting complementarity to macro-atomic proportions, Barad does not address the phenomenological effects of scaling up and so the experiential world emerges from her diffraction grating unchanged. It is therefore unclear whether or how agential realism can be applied to



the macro-world. In part three I consider how archaeologists approach agential realism and its controversies.

#### 4 Part three: archaeology and agential realism

I review 11 articles that use agential realism either to critique the process of research in archaeology and/or to inform an archaeological analysis of artefacts. Of the 11, only three (Fowler, 2013; Marshall & Alberti, 2014 and Jones 2014) introduce agential realism in relation to quantum theory. Not one paper gives a critical evaluation. There is no consideration of whether Barad's uses *phenomenon* in ways that are consistent with Bohr's theoretical stance, nor whether agential realism is a reasonable ontological extension of his views. Turning to Barad's argument that quantum effects hold at all scales, although Marshall and Alberti note that, "For her, and for the application of her work in archaeology, this point is crucial." (page 27) they accept her contention without question or comment. Fowler and Jones do likewise. The other eight papers offer neither general introduction nor critical review. Ironically two papers use a credulous understanding of agential realism to critique archaeological concepts: Govier and Steel (2021) over Witmore's version of New Materialism and Govier (2019) on the concept of creative thinging (Malfouris, 2014).

Five authors (Steel, 2020; Joyce, 2021; Goldhahn, 2019; Govier, 2019 and Fredengren, 2021) make no mention of agential realism's quantum origins and, although Immonen (2012) does refer to "theories on quantum physics" (page 8), she completely misconstrues Bohr's indeterminism by suggesting it inhabits "the swamps of the absoluteness of scientific realism." (page 8). Two authors cite Barad discussing Bohr's notion of *phenomenon* but they omit the quantum context and elide the quotes directly with archaeological practice.

Matter becomes active through what Barad (2003, 815) calls an apparatus, which 'enacts an agential cut... between "subject" and "object"... a local resolution within the phenomenon of the inherent ontological indeterminacy'. The apparatus is itself an agential performance (Barad 2003, 816–817). The apparatus of archaeology congeals the site, through the intra-action of humans (present day and previous) and nonhumans related as subjects and objects in this process. (Joyce, 2021)

For Barad (2007, 128), the smallest analytical unit are phenomena, which are the 'specific intra-action of an "object"; and the "measuring agencies"; the object and the measuring agencies (apparatuses) emerge from, rather than precede, the intra-action that produces them'. What is of importance to bring home to scientific practices in archaeology is that the object that is researched entangles with the ways we examine it and, in that sense, there are no pure archaeological objects or no pure bodies to be studied, but only phenomena in the making. (Fredengren, 2021, page 527)

Not mentioning the quantum origins of agential realism means that the authors can sidestep the scaling-up problem and seamlessly re-brand the macro-world interac-

tions of archaeological artefacts as *intra-actions* – seamless but for the fact that the decontextualization of agential realism turns their final sentences into oxymoronic statements: “the intra-action of humans...and nonhumans”, followed immediately by an explicit evocation of them as separate, pre-existing entities, “subjects and objects” (Joyce, above). And, “the object that is researched entangles with the ways we examine it.” Fredengren, above). My point is that separate entities cannot intra-act, they interact. I am not word-picking here. Whether or not it is valid, the distinction between intra-act and interact is central to Barad’s ontological position. Using intra-action when interaction makes more sense is commonplace throughout the papers. Here is one more example that concerns phenomena, “...the physical properties of which, and how they intra-act(ed) with the surrounding archaeological matrix, account for their ongoing presence.” (Govier and Steel, 2021, page 309) An Intra-action happens within a phenomenon, not between a phenomenon and its surroundings – that is an interaction.

Perhaps the authors are using intra-action metaphorically, ignoring Barad’s insistence that it should be taken literally. Metaphors work because they take a simple, familiar situation and apply it to a similar but obscure and complicated context. It is foolhardy to take a term derived from the complexity of quantum mechanics, remove the context and then use it as a metaphor for clarifying anything. According to Jones (2014), if we “take seriously Karen Barad ...we are adopting a quite different philosophical standpoint: a standpoint that assumes a monist perspective, rather than a dualist perspective.” (page 334). In the papers reviewed here, I found no sign of serious, critical engagement with agential realism. I therefore hold little hope of archaeologists finding a credible and informed monist perspective through its application. It is worth noting that failure to grapple with the complexities of quantum mechanics is not unique to archaeologists. Faye and Jakslund (2021) find an “explosion” (page 8232) of references to quantum mechanics in the social sciences, most of which express “idiosyncratic interpretations...often extended well beyond the regime where their application is empirically justified.” (page 8234). Add to this the concerns over its philosophical credentials and application to the macro-world and the case for abandoning the application of agential realism in archaeology is mounting. There is one final argument.

The 11 papers are drawn to agential realism for its iconoclastic effect on Newtonian metaphysics and its promise of a more fluid ontological basis for archaeological research. Most of the time our sense of agency separates us from a world of clearly defined, passive objects and subjective experience objectively defines things as not-self. A bounded sense of self and the dualism of classical physics mutually reinforce each other. Agential realism gives archaeologists a way to dissolve the distinction between a subjective observer and the object of study, transforming knowledge-making into an emergent property of an entangled system. Earlier I argued that a shift from subjective knowledge to a distributed practice of knowing will have confusing phenomenological consequences. So, if the above authors have moved from a classical ontology into the domain of agential realism then they should enter a world in which subjectivity dissolves into a sense of being that has no clear experiential boundaries; a world where intention is affectively enacted and experienced by the path taken by a murmur of transient agential exchanges. But such a fundamental

transformation into a system of extended sentience goes unnoticed and unremarked in the accounts. If the authors are providing descriptions of auto-generative assemblages (whether Baradian or otherwise) the absence of reported phenomenological disruption suggests that the perspectives do not come from the membership of those assemblies but from an external observer, which means their use of intra-action is, by its own terms, incorrect.

I conclude that agential realism is an unsuitable ontological framework for archaeological process accounts and for archaeological research in general. I conclude this with regret. There are obvious parallels between agential realism and the various enactive ontologies currently under development within archaeology, anthropology and the cognitive sciences and the implications of agential realism strongly resonate with those reformulations of agency that have taken place over the last twenty years or so. Indeed, it was these parallels that lead me to investigate agential realism in the first place, where I hoped to find a quantum explanation for the uncertain sense of agency that arises when sculpting clay. Perhaps agential realism beguiles archaeologists for the same reason - the indeterminism with which it undermines the restrictive, academic requirement for a linear narrative. And it can get away with it because its quantum credentials make credible the incoherence it creates. Whereas I think it is important to find ways of knowing in archaeology (and elsewhere) that are imprecise, polysemic and which tolerate contradiction, such fragile states of doubt are not achieved by tangling up the macro-world of archaeology with quantum mechanics.

In the final section I argue that if we put phenomenology at the centre of research into transient knowledge-making assemblies then we do not need to turn to agential realism for an ontology of process. We can replace the obscurity of quantum mechanics with the more mundane activities of mind-matter experience, activities that take place in plain view, which can be recorded, analysed and discussed. Clayful phenomenology: a playful attitude toward modelling clay offers a way to make knowledge provisional and uncertain and provides a means by which the boundaries between subject and object, knower and known can be blurred or even dissolved. And I turn to that next.

## **5 Part 4. Clayful phenomenology**

I begin with a brief introduction, followed by a case study that exemplifies its practice. I am an artist who works with clay and I use sculpting to explore the phenomenology of creative cognition. Phenomenology usually concerns the study of consciousness and the nature of experience from a subjective perspective. Clayful phenomenology in contrast directly articulates the activities of a contemporary art workshop as it is expressed through playful engagement with and through the plastic qualities of clay, hence the neologism clayful. The case study follows a project that eventually developed into the installation shown in Fig. 1. (Welcoming down the blessings) and which consists of 80 ceramic sculptures, each taking the form of an unknown species of tuberous flowering plant that appears to have undergone a process of petrification.

A sculpture is normally understood to be the realization of an artist's vision, a belief based on two claims. The first is hylomorphism, Aristotle's notion that it



**Fig. 1** Close up of the installation Welcoming down the blessings ©P.March

is possible to separate the form (*morph*) a sculpture takes from the matter (*hyle*) of which it is made. (Ingold 2010; Malafouris, 2014). The second claims that our minds are in our brains and that we use our brains to impose our will on the world. Clayful phenomenology reformulates sculptural development so that gestural engagement and a body of clay become a single transient, diffuse, knowledge-producing assembly, replacing subjective experience with a proposal for extended sentence. I have coined the term *systemive* to refer to such experiential systems and to distinguish them from subjective consciousness. I explain systemive in more detail below.

The principles of clayful phenomenology are derived from *Material Engagement Theory* (MET). For a detailed introduction, see Malafouris (2013), with further developments in Malafouris, (2014), (2015), (2018a), (2018b) (2019), (2020), (2021a), (2021b). Malafouris (2013) proposes three, interconnected hypotheses: *the extended mind*, *material agency* and *enactive signification*. Taken together they present a theory of mind, not in hylomorphic and Cartesian terms, but, as an ongoing process of becoming. (See Fig. 2). Like Barad, Malafouris presents knowing as a process of relating rather than as a product of the human brain. Clayful phenomenology turns material engagement theory into practice. It explores and extends the phenomenological implications of MET by providing an experiential account of the process of gestural engagement with clay (March 2019, 2021, 2023; March & Malafouris, 2023; March & Vallée-Tourangeau, 2022a, b; March and Glăveanu, 2020; Vallée-Tourangeau & March, 2020). Below I describe how the three guiding principles of clayful phenomenology are derived from the three MET hypotheses.



**Fig. 2** Knowing is a relational matter. Human and material, hand and clay make sense together  
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### 5.1 Systemive experience

The Extended Mind proposes that ideas establish themselves through gestural activity in the workshop rather than neural activity in the brain. This suggests that, during sculpting, we can consider a lump of clay to be like a sensory organ that explores the world of which it is part. Whereas a subjective viewpoint suggests that we have ideas about things, from a systemive perspective, ideas and things bring each other about. By emphasising what goes on between human and clay we transform the unit of phenomenological enquiry from personal to relational and from subjective to systemic, or *systemive*. A Clayful Phenomenological approach turns material culture from an object of study into a method for investigating its own creative becoming.

### 5.2 Sculpting as curious intent

If ideas emerge systemically through interaction between gestures, tools and clay then this infers *material agency*, which in turn has implications for the formation of intentions. The extended mind undermines the concept of agency as a unique human characteristic and situates it in the manner by which an emergent system intends itself towards the future. It transforms, what Searle refers to as, *prior intention* into, what Malafouris (2013) calls, *intention-in-action* (Fig. 3). Phenomenologically speaking this means that an artist's subjective emotional state does not determine the arc of intention-in-action. Neither does the action-of-intention create an affective response in the artist. Instead, from a systemive perspective, feelings and agency co-generate



**Fig. 3** Freeze-frame of intention-in-action. The image shows a flower stem from Fig. 1. in the making. A length of nichrome steel wire has just been placed along a strip of clay-fibre and is being gently pushed into the composite clay. The action, the materials and the arrangement of the workshop are determined, not by an artist's will but by the ongoing requirements of the creative system ©P.March

themselves into an attitude of *sculpting as curious intent* during which, gesture, emotion and purpose are inseparable. The point I wish to stress here is that affect is intentional, and intention-in-action is emotionally motivated.

### 5.3 Polyherent research

Rather than seeing a sculpture as the representation of a pre-existing concept, I want to suggest that the sculpture and the concept it signifies materialize each other (see Fig. 4). In this way, knowledge-making becomes literal and the knower and known are joined in and by gestural activity as a sculpture learns itself into existence through manipulative exploration of the sculptor's hands (ambiguity intended). Malafouris (2013) refers to this learning process as *enactive signification*. It means the signification of sculpting is not univocal but simultaneously indeterminate and overdetermined. Such material expression lacks the clarity of linguistic or numerical accounts and the coherency of representational symbols. But crucially what it does offer is a way of simultaneously entertaining inconsistent and contradictory ideas and this enables artistic endeavour to proceed in directions proscribed by more coherent methods. My contention is that, what I am calling, a *polyherent* approach need not be restricted to making art but may be helpful more generally for research into material culture.

Detailed accounts of clayful phenomenology can be found in March (2021, 2024), an introduction to extended sentience and its possible mechanisms in March (2023a) and a review and further development of systemive phenomenology in March (2023b) and March (2024). Here, given space constraints, I move straight to the ecological landscape of a case study and an account of the project, Welcoming down the blessings. I have previously described how a clayful phenomenological approach makes



**Fig. 4** Enactive signification. The lefthand drawing means much the same as the word ‘flower’. Word and icon are bound by a concept. But to say the photo on the right means “five flowers” misses the point. Whatever meaningful experience is possible in the presence of the sculptures, it is not captured by the phrase “five flowers.” Enactive signification is an overdetermined and indeterminate moment of conceptualisation that is beyond words ©P.March

links between sculpting and a prehistoric artefact, a Jōmon flame pot (March 2021, 2023a). The project featured in the case-study (Welcoming down the blessings ) also associated itself with Jōmon culture but, as my aim here is to give a sense of what it feels like to be part of systemive experience, I limit the account to a contemporary context.

When sculpting I routinely mix a small amount of fibre with the clay to improve its strength and drying profile. One day, out of curiosity, I significantly increased the proportion of fibre to clay - by a factor of 1000. The resulting composite material exhibited qualities, as expressed through the relationship with sculptural gestures, that were quite unlike ordinary clay. It resisted and undermined all my overtures to engage with it and so I put it to one side where it rested on a window ledge until, two years later, I picked it up once again and marvelled at its papery lightness.

At this point in the story, I could continue with a subjective account by recalling how I mixed up another batch of fibre-clay, how I found it impossible to sculpt with, that I felt de-skilled, etc. But instead, I will switch to a systemive perspective and describe how the sensorial quality of the process of fibre-clay malaxation simultaneously brought into existence a transient creative system and an attitude of curious intent (the two being existentially inter-dependent). The labour of melding fibre and clay, necessary for realizing the composite (Fig. 5), also realized, directly through labouring, that this novel material was offering itself as a medium for exploring the phenomenological development of emergent agency. I mean that the discovery of



**Fig. 5** A new composite material ©P.March

the epistemological possibilities of fibre-clay and the intention(-in-action) to explore them were brought into being through and by the fibre-clay itself, through and by replacing traditional but ill-adapted modelling gestures of normal clay with a hand-clay relationship that manifests as an open gesture (the equivalent of an open mind) a hesitant, uncertain attitude of curious intent. It is this gathering of purpose around and through the composite material that I am calling systemic. The fibre-clay constitutes and is constituted by a transient extended sentient system, whose changing form is not the result of an artist's thoughts and feelings but is feeling and thinking incarnate. The entanglement between goal-oriented activity and specific environmental conditions is like an affective niche (Colombetti & Krueger, 2015)<sup>2</sup>. A niche is onto-

<sup>2</sup> However, I understand the word *niche* to describe the dissolution of organism and environment. This differs from Colombetti and Krueger's use of the term *affective niche* in which agent and environment remains ontologically separate "agents engineer their affective environments-that is, create affective niches-and in so doing let these environments influence their affective states in an ongoing way." (page 1160).



logically labile, coming into existence and coalescing around unfolding events - in this case the task of turning a new amorphous material into epistemological activity. The sentience of an affective niche is ecologically emergent rather than personality centred. In sum, the project set itself the goal of exploring the enactive signification possibilities provoked by an apprenticeship with fibre-clay.

I recorded the project through photos, videos, drawings and notes. I have previously described how the composite material found the form of a flower (March, 2021, 2024). Here, I take up the story as the flower-elements struggle to find their final form, a struggle associated with the metamorphic consequences of the firing process. Transforming clay to ceramic means bringing the material close to melting – a point when it becomes liable to sag. The desiccated raw state of clay gives the flowers a wretched air and although their stems stand tall, the flowers reach skywards with an afflicted animus that risks being compromised by the wilting consequences of heat and gravity, leaving pity in the place of purpose. Therefore, to prevent the flowers drooping, they were fired horizontally. Although they survived in one piece, not only did the flower-heads flatten themselves onto the kiln shelf but the fired stems became so fragile that it was impossible to transport the flowers beyond the workshop. A length of nichrome-steel wire was hopefully incorporated into the stems (see Fig. 3) so they could be fired vertically but at 1250°C even nichrome steel was too pliable to bear the weight of the flowerhead. Figure 6 shows the stem crying out for more support which it gets in the next iteration, Fig. 7. Even so, the flowerhead still droops over its brick prop (Fig. 8). Several other unsuccessful strategies followed.

Before continuing you may have noticed that, since my account swapped to a systemic one, the turns of phrase have become awkward. The trouble is, I am struggling against the enforced subjectivity of language which, if left unchecked, assigns agency to me and passivity to everything I touch. What I am trying to communicate through periphrasis is that these problem-solving strategies are not hylomorphically



**Fig. 6** The consequences of the metamorphosis from clay to ceramic ©P.March



**Fig. 7** Flowers supported by grooved bricks ©P.March

preordained, that the desire for the flowers to stand tall is not imposed on them by me. Rather, the various elements of the firing apparatus: kiln, temperature, gravity, supports, my actions, all jostle with each other as they coalesce around the flower-making-intention. Each iteration of jostling activity produces a different response, (e.g., Figs. 6 and 8). It is not me, but the formation of an apparitic coalition, in which the known and the knower are inseparable, that specifies the unique curvature of each fired stem.

The latest batch of wilted flowers lying mournfully in the kiln. My head turns sorrowfully away and the movement takes my gaze, first to the shelf in Fig. 9A, containing more wilted flowers and then across the wall of the workshop to a photo of an electricity pylon in the green of a forest, a photo I had taken a few years earlier for another art project. It hung on the wall becoming gradually invisible until this moment. (Fig. 9B). The image of the pylon surrounded by vertical tree-trunks juxtaposed itself with the pile of wilted flowers. Together they created a contrast that configured the solution shown in my notebook drawing (Fig. 9C). A flower finds the support it needs inside a clay version of a pylon (Fig. 9D-G). Such an intuition is often represented by a lightbulb switching on inside a head and is understood to be an internal mental phenomenon in which the mysterious processes of reformulation are relegated to the unconscious (e.g., Gilhooly and Webb, 2018). But here, the synthesis of clay and pylon took place, not in the mind's eye, but in plain view and so *outsight* (Vallée-Tourangeau & March, 2020) describes the moment better than insight. *Outsight* realises itself in the sweep of a gaze across the workshop wall that gathers erstwhile disparate entities polyherently together to make an idea that is both



**Fig. 8** The flowerhead drooped above its brick support ©P.March

matter and mind. This process of assembly and the feeling “aha, a clay pylon!” are one and the same, an affective union of apparitic intention.

## **6 Discussion**

The case study presents the systemive experience of an art workshop so why begin in the first person before switching to a systemive account? I began this way to emphasize the contrast between the straightforward subjectivity of the start and the systemive circumlocutions of what followed. I did this to point out the extent to which the English language is ill-adapted to talking about emergent agency and how difficult it is to describe an emotional intention that belongs neither to the subject nor the object of a sentence. I wanted to show how much more natural it would have felt for me, the author and you, the reader if I had continued the story in the first person. I wanted to



**Fig. 9** How the clay pylon developed. **A.** Wilted flowers stored on a shelf. **B.** Photo of an electricity pylon in a forest. **C.** Notebook drawing. **D.** Photo on wall, with template (right) for making the clay pylon (below left) **E.** Uncooked flowers in pylon. **F.** Loaded kiln. **G.** Fired flower in pylon ©P.March

make the point that the language we speak is stacked against the expression of systemic experience. All that may go some way to explaining why none of the papers I reviewed on agential realism referred to supra-personal experience despite it being a consequence of an intra-action. On the other hand, maybe there is no mention of supra-personal experience because there is no such thing, something I return to at the end. For now, I ask you to suspend your incredulity while I consider another reason why systemic accounts may be absent from archaeology papers on agential realism and from scholarship in general.

Perhaps, whenever systemic experience begins to emerge, it is automatically and immediately interpreted as, submerged by, and subsumed under personal experience. Bateson, for example, spent his career developing an ecology of mind (1972) and yet struggled to accept its phenomenological implications. He argues that the subjective mind is only a sub-system of a pan-environmental *psyche* and that the modern, anthropocentric failure to feel part of this system of sentience and the disinclination to recognize our subjective insignificance threatened humans with extinction. To survive, he believes that humanity must change its concept of what it is to be human and yet he admits that he, Bateson is unable to let go of his own subjectivity.

Intellectually, I can stand here and I can give you a reasoned exposition of this matter; but if I am cutting down a tree, I still think “Gregory Bateson” is cutting down the tree. I am cutting down the tree. “Myself” is to me still an excessively concrete object, different from the rest of what I have been calling “mind.” (1972, page 101).

Maybe exposure to extended consciousness places Bateson in one of his double binds. He believes that our collective refusal to enter into supra-personal experience threatens the survival of humankind and yet, if he, Bateson begins letting go of subjective experience, the associated sense of dissolution feels a more imminent mortal danger than the threat to humanity. He, but not humanity, is saved from the double bind because existential anxiety is paradoxically self-affirming and, as it rises, the threat of dissolution immediately recedes, returning Bateson to the comforts of subjectivity. Behind all this is an assumption that our feelings belong to us. Which means that, when another sentience arrives on the scene, one that shares some of the same sensory and information pathways to experience, it threatens our sense of ownership. In contrast, a systemic perspective presents feelings, not as property but as affective intentions, as motivating in-betweening phenomena. Affect is not the product and property of extended sentience, the two are reciprocally generative.

By now, you may be wondering how I am able to tolerate threats to my subjectivity whereas Bateson could not. There are two reasons. First, I have practiced art for over twenty years and I have learned that tolerating the dissolution of the self into a transient system of creativity is integral to art-making. (March 2019, 2021, 2023, 2024; March & Malafouris, 2023; March and Vallée-Tourangeau, 2022b; Vallée-Tourangeau and March, 2020). In a workshop setting, the existential threat of extended sentience is held, stabilized and mitigated through a long-standing relationship with clay. In addition, creative material engagement holds the capacity to tolerate and explore apparent inconsistencies and contradictions, such as those implied

by the existence of two, parallel sentient systems. As we have seen, if signification is enacted rather than encoded, it can be overdetermined and indeterminate - which prevents the creation of the double binds that can arise from the categorial nature of language.

Other artists also testify to the occupational need to confront existential fears. Engelfriet describes how: “Clay can give you the feeling of being pulled into it, sucked away out of existence. It can go as far as an experience of death.” (Higgin 2016, 110). Such accounts are not limited to clay. In his book, *Make to Know* Buchman (2021) talks to artists about the creative process and the interviews provide a number of descriptions couched in systemic terms of which I give you four. Méndez, a video artist, describes how artistic engagement dissipates subjective consciousness.

When I find myself waiting in this very quiet being, what I’m looking for is a dissolution of my sense of self, the sense of my identity, the sense of my boundaries. So, I end up ‘becoming with’ right? Becoming with a landscape, becoming with the wind, becoming with the birds, becoming that which I study. So, waiting, waiting, being there, I dissolve...” (Buchman, 2021, page 59).

Thater creates video installations using the 3D modelling program, SketchUp. She says of one work, *As Radical as Reality* (2017) “I had no idea I was going to do that in the installation... The thing that is there that I never plan to be there and, in turn, produces a new idea in the making”(page 61). Tan is a novelist “You don’t know what’s operating but something is operating there... It seems like it is happening all the time. You think there is a sort of coincidence going on, serendipity in which you’re getting all this help from the universe.” (page 50). And finally, Arceneaux, an installation artist, “When you’re making something... you’re having a conversation with the thing in relation to you and to other things. It’s telling you what it wants to be. Sometimes that could be in absolute defiance of what you wanted... the material manifestation emerges only from that process.” (pages 89–90) Similar examples from painters are described by Rawlings and Barnaby, (2007). Reinders, (1991) Sylvester (1975) and see also Milner, (1950). And reports of the dissolution of sense of self are not limited to art. Csikszentmihalyi (2014) calls it *flow* and identifies the phenomenon during play and during sport. He cites a rock climber, “You are so involved in what you are doing, you aren’t thinking of yourself as separate from the immediate activity... you don’t see yourself as separate from what you are doing... (page 139).

The second reason why letting go of the self is tolerable when working artistically is that subjectivity waxes and wanes over the course of a few minutes or hours and it is reassuring to learn that dissolution is reversible and, once accepted, that letting go can be a euphoric experience, as this composer described to Csikszentmihalyi (2014).

You yourself are in an ecstatic state to such a point that you feel as though you almost don’t exist. I’ve experienced this time and time again. My hand seems devoid of myself, and I have nothing to do with what is happening. I just sit there watching it in a state of awe and wonderment. And it just flows out by itself.” (page 142).

The ebb and flow of personal and supra-personal experience undermines the subjective belief that the two modes of sentience are mutually exclusive, it reduces the subjective conviction that feelings are belongings, to be jealously guarded, and it increases confidence that the two modes can coexist. And so, to end, I return to the question of whether another mode of sentience really does exist alongside personal experience. After all, if it did, you would think we would all be familiar with it, that, at least sometimes, we would all feel part of it. I have argued that engagement with an artistic method - an open-ended, playful mode of enquiry - does facilitate feeling part of it. I have also suggested that language, cultural assumptions, and existential threat all discourage the attribution of sentience to a supra-personal system. Whereas I accept that this does not amount to an unassailable argument for extended sentience, given its important ontological implications, I think that what I have presented does give cause to scrutinize the matter further. Extended sentience and agential realism share an uncertain legitimacy, making them both controversial. However, the evidence suggests that a critical evaluation of agential realism is probably an unattainable conceptual challenge for archaeologists. By contrast, due consideration of the existence or otherwise of extended sentience does not depend upon being familiar with quantum mechanics. The challenge it presents is not conceptual but phenomenological and the resolution over its credibility will be found in feelings - which makes the task accessible to everyone.

## Declarations

**Competing interests** I declare no competing interests.

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