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Roundtable:

The future of culture in more-than-human worlds of being

Culture and the much-more-than-human: the case of colloids

BRONISLAW SZERSZYNSKI

Lancaster University, United Kingdom; email: bron@lancaster.ac.uk, 0000-0002-6546-1479

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Abstract: In this paper I try to identify a minimal definition of culture that might be applicable in the much-more-than-human realm that extends beyond organic matter and human involvement. I speculate that culture conceived in this broad way might be a metapattern or 'machinic solution' available to matter of diverse kinds, organic and inorganic. I explore how this idea might apply this to colloids – hybrid forms of matter such as sols, foams and gels that are mixtures of matter in different phase states, some continuous and some discontinuous, and which can behave in complex ways that mix features of solid and fluid behaviour. I conclude by suggesting that attending to both the similarities and differences between 'culture' in the organic and in the inorganic realms might force us to rethink our understanding of both.

Introduction

There has been much discussion in recent decades – and arguably for centuries – of whether, how, and to what extent one can usefully apply terms we use to describe human subjectivity to the non-human world – for example, consciousness, sentience, semiosis, memory, agency and purpose. But there has arguably been insufficient systematic attention to what it might mean to add culture to

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that list – whether this addition might add important new dimensions to our understanding of the powers of the more-than-human world, but also whether it might involve distinctive conceptual challenges. Thus it was very exciting to read that the new, headline mission of Cultural Science is 'the study of more-than-human culture', defined as 'a semiotic medium integrating creative processes in the biosphere, anthroposphere and technosphere as constitutive layers in the life of planet Earth'. It will be fascinating to see this topic explored in the pages of the journal over the years to come.

In my own contribution to this Cultural Science roundtable, I start off in relatively shallow waters by discussing some applications of 'culture' to nonhuman animals. I then introduce the idea of the much-more-than-human, to see if we can stretch our thinking about culture not just beyond animals, but beyond the organic and into 'matter as such'. In doing so, I am interested not just in inquiring whether and which kinds of matter, organic and inorganic, can manifest culture, and how – but also whether some such manifestations might be entirely independent of human culture. I make a tentative attempt to define culture in a sufficiently neutral way to make it as widely applicable as possible, without making it so broad as to be meaningless. Then I take as an example for its application 'colloids' – hybrid forms of matter in different phase states that typically involve populations of large numbers of similar entities – in order to test the idea of applying the category 'culture' to the much-more-than-human realm far beyond biological matter.

Animal culture

Surely the most obvious application of the idea of 'culture' beyond the human occurs in the study of 'animal culture'. Here, culture is generally theorised as a form of inheritance dependent on, but crucially distinct from, genetic inheritance. Animal culture is thus seen as what allows for variation in behaviour amongst members of the same species. But rather than this merely involving the independent emergence of new conditioned behaviours, animal culture, like human culture, involves behaviours which spread from individual to individual – by individuals 'learning' from each other in some sense of that word (for a review, see Whiten, 2021) – perhaps to the extent that constitutes 'distributed cognition'.

Another significant aspect of human cultures is the forming of traditions – of groupings of individuals whose behaviours, while not constrained by biological factors nevertheless only occupy a narrow region of all the possibilities theoretically open to them, a pattern that persists over time even as individual members depart the grouping and others join. In a sense, culture itself becomes an environment, with its own constraints shaping the behaviour of individuals that belong to and inhabit it. In the literature, this aspect of animal culture is often described as a form of niche construction, where organisms physically alter their environment, and this in turn alters selection pressures on them (Odling-Smee et al., 2013).

But culture as understood in human and animal sciences is arguably more than variation in behaviour, more than the material alteration of the environment, more than the cognitive and practical skill to do so, and more than the transmission of these behaviours and skills from individual to individual. Amongst theorists of animal culture, this extra criterion might be described (going along a rough gradient from narrow to broad) using terms such as 'adaptative benefit', 'teleonomy' (goal-directedness), 'function', or perhaps 'semiosis' (meaning).

Hannah Arendt can be helpful here: she suggested that the historical (and one might say 'cultural') context in which the Western concept of culture arose is indispensable for understanding its distinctiveness. According to Arendt (1961: 212 ff), 'culture' is Roman in origin. The word derives from the Latin word colere, 'to care' – an etymology that Arendt suggests reveals an important

contrast with the predominant instrumentality of Greek culture. This new, Latin concept of culture is closely related to values, taste and beauty – to making the world a dwelling place for humans. Some later versions of niche construction theory seem more in tune with this conceptualisation of culture, emphasising as they do that niches are not just material but also semiotic, informational, relational and processual. As Agustin Fuentes (2017: 5) puts it, '[t]he human niche, then, is the context for the lived experience of humans and their communities, where they share "kinship" and social and ecological histories'.

But this idea of culture becoming a second, material and semiotic environment has another twist, that recalls Edward T. Hall (1971) description of what he calls the 'paradox of culture'. Hall pointed out that while humans (and, we can add, at least other animals) can use culture to liberate themselves from immediate determination by their environment, and thus to adapt in a more indirect way, they then have to adapt to culture itself. Culture enables behavioural plasticity, and also where needed a faster adaptation to environmental change – but it also canalises thought. Elizabeth Grosz makes a similar observation about 'habit', but uses the term 'skeletalises', a metaphor that (in what we might call a second, apparently paradoxical twist within Hall's paradoxical twist) draws attention to how, although – like a skeleton – culture might constrain action to a smaller possibility space, it thereby can make it more effective. Citing Félix Ravaisson, but echoing Hall, she calls habit 'an "acquired nature" that we give to ourselves' (Grosz, 2013: 221, 222) – one that opens up the possibility for new actions, by 'skeletalising' it, constraining its degrees of freedom.

How far might such ideas be applied to the more-than-human? Before I tackle that question, in the next section I want first to see if we can stretch the concept of the more-than-human a bit further – to the 'much-more-than-human'.

The much-more-than-human

The adoption of the term 'more-than-human' (Abram, 1996; Whatmore, 2002), and other parallel moves to blur nature and culture, such as 'socio-natures' (Swyngedouw, 1996) and 'naturecultures' (Haraway, 2003), has been enormously generative for the environmental humanities and social sciences, allowing sensitive attention to be paid to phenomena exhibiting mental or quasi-mental processes outside the human (for useful summaries, see Isaacs, 2020; Lorimer and Hodgetts, 2024). However, in this literature there has been a tendency to privilege relationships in which one set of participants is human, thus neglecting planetary processes and regions of matter where humans have no or negligible presence (see also Clark, 2011: xv–xvii). Even where the human is not involved, what counts as 'nature', 'the Earth' or the 'more-than-human' is generally confined (explicitly or implicitly) to biological matter, and to the slender envelope at and around the planet's surface where biological organic life is a dominant presence. Relatedly, in more-than-human thought there has also been a persistent emphasis on symmetrical and reciprocal relationships between earthly entities, partly grounded in the understandable desire to articulate more hopeful visions of possible planetary futures, resulting in a lack of attention to ways in which planetarity often involves fundamental asymmetries or more radical forms of irrelation.

These thoughts led Nigel and me to try to find ways of more fully realising the potential of Abram's formulation – by sketching an idea of what we called the much-more-than-human (Clark and Szerszynski, 2024). As in our book Planetary Social Thought (Clark and Szerszynski, 2021), in this we drew on the thought of philosophers Gilles Deleuze and Felix Guattari, who see the interaction between human agents and the stuff of the Earth as but one of many articulations and points of transition in a much vaster realm of creative material existence. In writing about this vaster realm,

Deleuze and Guattari repurpose art historian Wilhelm Worringer's identification of a 'morphological law of inorganic nature', in their concept of 'nonorganic life' – 'a life proper to matter, a vital state of matter as such' (1987: 411). In his further development of their concept, Manuel DeLanda emphasised that, ultimately, even organic life is just a secondary form of nonorganic life, in that it draws on and canalises a range of solutions that pre-exist it (DeLanda, 1992: 136, 148). There is a sense, then, in which we are all inhabited by processes of 'nonorganic life' (1992: 153).

Deleuze and Guattari also use the related term 'machinic phylum' (see also DeLanda, 1992: 135-6; 1987: 335) to describe a set of general solutions to problems that are available to entities and assemblages in the Earth across many different material substrates. The structures we observe around us – both enduring and transitory, such as whirlpools, flames, rivers, bubbles, geological strata, astronomical bodies, living beings, and machines can all be seen as expressions of this generalised machinic phylum – relating to the idea of the idea in mathematical physics of 'universality classes' of fractals and power laws that can be found across phyla and kingdoms, living and non-living (Buchanan, 2000). The machinic phylum concept also relates to the idea of metapatterns first discussed by Gregory Bateson (1979), and more recently developed by Tyler Volk (1995) and others. Volk el al. (2007) define metapatterns as 'large-ranging, overarching patterns exhibited by systems' on a range of scales and in a range of domains – for example spheres, tubes and sheets; centres, borders and pores; gradients and breaks; layers, binaries, clonons and clusters.

Might culture, appropriately conceptualised, be another metapattern, another machinic solution, available to matter of very different kinds, including the much-more-than-human realm embracing inorganic matter? In his contribution to this Roundtable, Thomas Hünefeldt (2022: 45) proposed his own 'basic and broad concept of culture that allows for both human and non-human … forms of culture', within a Piercean semiotic framework. On the basis of my above discussion of human and nonhuman animal culture, I want to tentatively suggest my own list of features that might be required for the term 'culture' to be also applicable to the much-more-than-human realm of inorganic matter. As a very provisional suggestion, I want to propose that for a system or assemblage to have the potential to exhibit 'culture', it needs:

1. to consist of or contain a population of separate but in some ways equivalent entities that can behave relatively autonomous but also interact (thus opening up the possibility of teaching, learning, imitation and other forms of influence);
2. to possess a certain internal 'gratuity' or arbitrariness of form (Monod, 1972; Szerszynski, 2019b) that allows the same 'matter' to adopt different states (corresponding to the non-genetic nature of cultural inheritance);
3. to at least partially liberate itself from being causally determined by its environment (and thus the possibility of final causation, function, purpose and creativity); and
4. to be capable of producing subsets of its population of entities adopting different dynamic behaviours, and remembering and actively sustaining these behaviours over time.

In the rest of the paper I'll focus on seeing how one might apply these criteria to a family of hybrid states of matter known collectively as colloids. This choice is partly because colloids – such as granular flows, clouds of mist or dust, dough and foam, paste and gels – are a form of matter I have thought about a lot (see especially Szerszynski, 2022), but also because – as involving distributed forms of matter capable of diverse, complex and unpredictable forms of behaviour – I think they are promising candidates, if there are any, for much-more-than-human culture.

Solid, liquid, colloidal

Colloids in the broadest sense include such forms of matter as foams (continuous liquid/dispersed gas), aerosols (gas/solid), gels (solid/liquid) and sols (liquid/solid), each of which is a combination of two or more substances in different phases of matter, in a specific topological configuration at a scale intermediate between that of molecules and macroscopic bodies in which typically one substance is continuous and the other dispersed.

Some colloids such as foams and gels are relatively frozen into an enduring, 'solid' spatial arrangement of parts; others (typically solid particles in a fluid medium) are dynamic colloids, more 'fluid' in that they have a more-or-less instant response to applied intensive forces. In reference to a definition of the social originally published by Tim Ingold in 1986 (Ingold, 2016: 184-241), I suggested that in especially dynamic colloids, at least sometimes the behaviours of individual iterations within the colloid are not simply individually determined (bottom-up), but neither is there a pre-existing order that 'regulates' the actions (top-down) of the individual iterations; instead, order emerges from a meshwork of causal interactions amongst discrete and continuous matter, solids and fluids, and spatial scales. I concluded that such colloids can be described as 'social' in Ingold's sense – and conversely that the social is itself colloidal; that both what we call colloids and what we call societies share the feature that their dynamic evolution is shaped by how multiple (and thus countable) entities interact with each other and with the continuous (and uncountable) medium in which they immersed. 'Human social life,' I suggested, can be seen as 'a sol of human bodies and nonhuman objects and substances suspended in a material and affective atmosphere' (2022: 147).

In that 2022 paper I did not address explicitly the idea of culture, but the behaviour of colloids cries out for concepts like that to clarify the relation between the behaviour of individuals and the collective. One way to see this is through the work of Ricard Solé and colleagues on what they call 'liquid minds': distributed forms of cognition such as that of ant colonies, 'sets of agents that exchange, store and process information but without persistent connections or [that] move relative to each other in physical space' (2019: 1). As Solé et al. acknowledge, agents in a liquid brain are only 'largely autonomous' (2019: 5, emphasis added). This suggests the need to add ideas of 'culture' to accounts of distributed cognition – but also to extend the physical terminology for distributed cognition beyond mere 'liquidity'. These might involve 'fluidity' (defined as the free, independent movement of parts), but as we have seen culture is far more than gratuity, indeterminacy and change. To extend the use of physical terms, culture could be said to also exhibit 'viscosity', in that each agent does not act independently, since their actions and perceptions affect and are affected by those around them. And – to extend into more solid phenomena – culture could be also said to exhibit 'plasticity' (openness to change) and 'elasticity' (tendency after deformation to return to a preferred shape). So perhaps a better physical analogy for distributed cognition might be found in forms of matter that are neither classically solid nor classically fluid – colloids.

Colloidal culture

In the last section I suggested that when theorising culture in humans and other animals, physical analogies with hybrid forms of matter such as colloids, complex fluids or non-Newtonian fluids might be more useful than those with pure, Newtonian liquids. But is this more than an analogy? Can my minimal definition of culture also be usefully applied to colloids? I previously suggested that culture required: (1) a population of separate but interacting entities; (2) capable of adopting different metastable states; (3) that involve forms of causation that are more than mere determination by

external forces; and (4) that involve groupings of entities actively maintaining a particular metastable state over time. Let us see how these criteria might apply – even if only sometimes – to colloids.

Applying the first criterion is more straightforward– the typical colloid involves a mesoscale topological folding of two material substances in different phase states in such a way that one is continuous and the other dispersed – for example foams (continuous liquid/dispersed gas), aerosols (gas/solid), gels (solid/liquid) and sols (liquid/solid). It is this internal topology that makes something a member of a particular colloidal species. Colloids, like 'assemblages' (DeLanda, 2006: 16) involve populations of discontinuous entities of the same class – whether these are grains of suspended dust or drops of water, or bubbles of gas in rock or water or animals moving and interacting in shared space. In terms of Volk and Bloom's (2007) categorisation of metapatterns, these individual, discontinuous entities are 'clonons' – but not isolated clonons , since they behave in ways appropriate to the colloid of which they are a part. As well as their dynamic behaviour being affected by interactions with the continuous medium within the colloid, they also interact with each other in diverse ways, directly or mediated through the continuous medium.

Secondly, colloids with exactly the same material composition can adopt very different states. Colloids can shift state from one colloidal 'species' (foam, sol, gel etc.) to another simply by a change in topology. For example, in granular flow, an aerosol of solid particles (discontinuous) in air (continuous) can collapse into a solid foam of packed solids (continuous) with air pockets (discontinuous). Furthermore, each colloidal species can also shift between different 'subspecies' – different metastable states or rheological (flow) regime, triggered by a change in intensive forces such as temperature, agitation, pressure or density (Szerszynski, 2022: 145).

Thirdly, although applied intensive forces can trigger changes in colloidal states, colloids are not merely at the mercy of environing forces, but can exhibit subtle, entangled forms of causation. I argued in 2002 that colloids 'are not merely aggregations, networks or assemblages of separate, externally related iterations, but entangled "lines" of activity (Ingold, 2015) or "gatherings" (Ingold, 2020)' (Szerszynski, 2022: 143). This is in part because any forces applied to a colloidal substance produces reactions in its components, which then changes the balance of intensive forces at different points within the colloid, producing further changes in the 'extensive' variables of position, volume and velocity, which then affect the intensive dimension, and so on. Colloids exhibit moments of creativity in finding 'solutions' to their forward evolution, especially in the vicinity of transition points between colloidal species or subspecies such as when granular flows get close to 'jamming' into a solid foam (Gardel et al., 2009). The circular patterns of causation in colloids also allow forms of final causation or function to arise, even if only fleetingly – such as the way that submarine avalanches organise themselves into a differentiated 'body', with particles in different regions of the whole playing different roles in maintaining the runaway, self-sustaining dynamic (Leeder, 2011: 184-97).

What about my fourth criterion, that culture requires the possibility of different traditions, of particular groupings of individuals that over time remain within a particular subset of possible behaviours – and do so in some sense actively? This is a bit more challenging to separate from Hünefeldt's (2022: 45-6) requirement that in order to be capable of culture, population members must be capable of forming, maintaining and sharing subjective interpretations. The populations of discrete particles in colloids are perhaps more endowed with the (underappreciated) powers of forgetting than they are with the powers of individual and collective memory that this would require (Szerszynski, 2019a). This limitation of nonorganic colloids also might seem to diminish the applicability of animal culture terms, such as 'learning' and 'transmission', to the way that colloidal particles affect each other. But here, Deleuze and Guattari's discussion of the machinic phylum may be helpful. Cultural 'traditions' may not be genetically mediated, but they are still lineages, in that

they involve the passing down of form from individual to individual across time. But Deleuze and Guattari suggest that such 'distinct, differentiated lineages' and other organised assemblages are mere abstractions from 'the flow of matter-movement' – and that more a fundamental resource for matter-as-such in its forward development is the machinic phylum of solutions that 'cuts across' all lineages and assemblages (Deleuze and Guattari, 1987: 406). It might be that studying both the differences and similarities between colloidal culture and culture in living things might prompt us to alter our understanding of both.

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Author information

Bronislaw Szerszynski is Professor Emeritus of Sociology at Lancaster University, UK. His research situates social life in the longer perspective of human and planetary history, drawing on the social and natural sciences, arts and humanities. He is co-author with Nigel Clark of Planetary Social Thought (2021), author of Nature, Technology and the Sacred (2005), and co-editor of Risk, Environment and Modernity (1996), Re-Ordering Nature (2003) and Technofutures (2015). As well as academic publications, his outputs include performances, creative writing and art-science exhibitions and events. He was co-organiser of Between Nature: Explorations in Ecology and Performance (Lancaster, 2000), Experimentality (Lancaster/Manchester/London, 2009-10), and Anthropocene Monument, with Bruno Latour and Olivier Michelon (Toulouse, 2014-2015).