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The Ontological Turn: Taking Different Worlds Seriously

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ABSTRACT
I discuss different scientific and nonmodern worlds as they appear in a performative (rather than representational) idiom, situating my analysis in relation to the recent ontological turns in STS and anthropology. I propose an ontology of decentred becoming that can help us take seriously the multiplicity of 'found' ontologies. A key concept is that of 'islands of stability,' which enables a comparative transition between the worlds of science and shamanism. This offers an opportunity to reflect back critically and politically on modernity, while highlighting the problems of anthropological translation that surface in a performative apprehension of nonmodern worlds. In conclusion, I touch on scientific and nonscientific worlds (complexity theory, cybernetics, taoism, zen) that do not centre themselves on islands of stability.

KEYWORDS
ontology, performance, science, technology, shamanism, islands of stability

The Ontological Turn: Taking Different Worlds Seriously

> Reality will tolerate alternative descriptions without protest. We may say what we will of it and it will not disagree.
>
> Barry Barnes, *Rethinking Objectivity*, 31.

> [W]e cannot think first and act afterwards. From the moment of birth we are immersed in action, and can only fitfully guide it by taking thought. We have, therefore, in various spheres of experience to adopt those ideas which seem to work within those spheres.
>
> Alfred North Whitehead, *Science and the Modern World*, 187.

Different Worlds in the Performative Idiom

Different worlds—the fact that other social groups understand and act in the world differently from 'us'—have been with us for as long as there has been contact between cultures. They have been a topic of anthropology as long as the field has existed. And yet there is something unsettling about them. Surely in the end there is just one world we all inhabit. It seems impossible to make sense of different worlds, even to take the idea of them seriously. During the 20th century, the response was to not take them seriously. The problematic was defanged academically by adopting a social constructivist or relativist perspective. Following Durkheim's (1995) example, the different accounts of the world offered by this group or that were explained, and effectively explained away, as translations of social attributes of the groups in question. People might talk as if there were different worlds, but in fact the differences reside in us—they are unthreatening differences in social organisation and relations, not in the nonhuman world we all inhabit. Nothing very disturbing there after all. But in the 21st century, the social-constructivist consensus has broken down, and both anthropology and science and technology studies (STS) have taken an ontological turn (eg Woolgar and Lezaun (eds) 2013/15, Kelly 2014). Now the aim is to confront different worlds as an unsettling fact rather than something to be explained away. My aim here is to sketch out my own attempt to take different worlds seriously and my own route through some of the issues raised. I begin in STS, because it is the field I know best and because it is where the problem of different worlds can seem most acute. I then tentatively extend the discussion to the anthropological territory of nonscientific worlds.

The theme of different worlds crashed into history and philosophy of science in 1962 with the publication of Thomas Kuhn's *The Structure of Scientific Revolutions*. Kuhn's claim was that scientists working in different paradigms act as if they live in different worlds. His argument was that

we should take this very seriously, though he conceded he was not sure what to make of it.[1] Instead, the dominant reaction was to shoot the messenger. The idea that scientists have historically inhabited different and 'incommensurable' worlds threatened standard narratives of a certain sort of rationality as the hallmark of science, provoking a rash of philosophical rejections of Kuhn's arguments—he must be just wrong (Hollis and Lukes 1982, Lakatos and Musgrave 1970). Sociologists were less dogmatic. Within the frame of the strong programme in the sociology of scientific knowledge, the different worlds thesis could be tolerated, on the understanding, as above, that these worlds were social constructs, projections of the social onto nature (Barnes and MacKenzie 1979). As in anthropology, the 21st century has seen an impulse in STS to take different worlds more seriously than that, usually marked by phrases like 'multiple ontologies' (eg Law and Lien 2013, Mol 2002), though the field of examples is less striking and seems less pressing than those offered by Kuhn. In the introductory essay of a special 'ontology' issue of *Social Studies of Science*, for instance, Steve Woolgar and Javier Lezaun (2013) focus on 'the wrong bin bag' as a deflationary example of ontological multiplicity.[2]

I have long argued that one can indeed find instances of different worlds—multiple ontologies—in the history of science (eg Pickering 1984a), and I want now to examine why this idea is unsettling and to develop a way of thinking about it. I am interested in taking different worlds seriously rather than conjuring them away. The important analytic move, for me, is from what I call the representational idiom for thinking about science to a performative idiom (Pickering 1995a, 7).

The representational idiom is our usual way of thinking about science, namely as a set of representations of nature, and this is the way of thinking that makes the idea of different worlds hard to swallow. Representations are sharp-edged things that evoke a sharp-edged nature to go with them. Either our representations are true to nature or not; either nature more or less matches our descriptions of it or it does not. Is the world built out of quarks, or have the physicists got it wrong? Different representations cannot all be right; so the idea that different worlds are genuinely to be found in the history of science must be at best an illusion. This line of thought is at the heart of the philosophical rejection of Kuhn's different worlds. Or, of course, at the other extreme, perhaps nature is not really

[1] In his later writings Kuhn approached the problematic of different worlds through an analysis of language (eg Kuhn 1991). He thus remained within the frame of what I call the representational idiom below.

[2] This deflationary impulse is typical in STS. Sismondo (2015, 441) argues that 'The difference between this ontological turn and constructivist work in Science and Technology Studies appears to be a matter of emphases found useful for different purposes.' Aspers (2015, 449) likewise argues that 'there is no fundamental difference between the ontological turn and what we know as constructivism.' To be clear, my argument here is that taking ontology seriously marks a big and important difference from constructivism.

sharp-edged. Maybe it is foggy and amorphous, so the sharpness of our representations comes not from nature but from culture—in which case we arrive back at social constructionism and cultural relativism.[3]

My work in the history of science convinced me that we can never get satisfactorily to grips with scientific research practice in the representational idiom. Instead we need, in a performative idiom, to think about practice, performance and agency—doing things—and I want to sketch out briefly how the analysis goes before returning to the question of different worlds. Scientists, I argue, are lively agents in a lively world (Pickering 1995). We act in the world, the world acts on us, to and fro, in a dynamic process I call the dance of agency, in which all the partners are unpredictably and emergently transformed. This is how scientists genuinely find out about the world. There is nothing mysterious about this. It is just how things go in science and, indeed, everywhere else.

One of my earliest examples (Pickering 1993, 1995 ch 2) concerned Donald Glaser's invention of a new instrument for experimental particle physics, the bubble chamber. Over a period of a couple of years in the early 1950s, Glaser, as an active human agent, would put together some configuration of apparatus. Then he became passive while the agency of the material object took over, standing back with a movie camera in his hand to see what his latest set-up would do. Switching back, Glaser would react to whatever the machine's performance turned out to be—which was usually not what he wanted (on a scale from inaction to explosion)—and the dance of agency would continue. Its upshot was a new instrument that did new things in a new way—revealing the trajectories of elementary particles as strings of bubbles—and winning Glaser a Nobel prize. At the same time Glaser was himself transformed: shifting from small science to big science, becoming the leader of a sizeable group, becoming famous, changing his ideas about how bubbles form and what bubble chambers should look like, and moving from one subfield, cosmic-ray physics, to another, accelerator-based experiments. A new object and its powers, the bubble chamber, and a new human with new individual and social attributes, Glaser, came into being together and in relation to one another.

This example, like many others, is very straightforward, and I want to generalise from it. The world—humans, nonhumans and whatever—just is an indefinite multiplicity of performative entities endlessly

[3] Thus Shapin's (1979, 139) constructivist analysis of 19th-century controversies around phrenology begins with an image of seeing pictures in the clouds from *Hamlet*, and Collins' (1992, 16) likewise speaks of seeing pictures in the fire in developing his relativist analysis of scientific knowledge.

becoming in decentred and emergent dances of agency.[4] This is the ontological picture I want to dwell on. I want first to connect it back to the problematic of different worlds in science, before situating it with regards to the ontological turn more generally. I then need to add a new concept—islands of stability—which can serve as a pivot from STS to anthropology.

What of different worlds? The point to note is a very simple one: connotations of necessary uniqueness vanish when we move from the representational to the performative idiom (Pickering 1995a, ch 6). If knowledge demands to be true or false, our performative tracks through history do not. Who knows where dances of agency can take us? We have no clear intuitions about this; we just have to look and find out. And it turns out, for example, that in particle physics in the 1970s one can document two quite different social, material and conceptual trajectories of development, which physicists referred to as the old and the new physics. Each had its own distinctive range of machines, instruments and practices, which evoked quite different natural phenomena, which spoke to disjoint realms of theory. The old and new physics are thus nice examples of Kuhn's different paradigms as different worlds, different ontologies (Pickering 1984a, ch 14).[5]

If we remained in the representational idiom, we would have to say that the old- and new-physics theories described quite different worlds, quite different ways that nature might be, and thus that one or the other (or both) must be wrong. In the performative idiom, in contrast, it seems much less problematic to see the two paradigms as two different 'machinic grips' on nature, the existence of which demonstrates, as an empirical discovery, that there is more than one way to 'tune' ourselves performatively into a lively nature (Fleck 1979, Pickering 1995a). All the puzzlements that attach to the different worlds thesis in the representational idiom are defused, and in the performative idiom it becomes possible to take different worlds in the history of science seriously. Generalising, the conclusion—the discovery—is that the world just is the sort of place that we can latch onto

[4] I should emphasise that I do not exclude scientific knowledge from this story. Pickering (1995a) analyses ways in which knowledge is bound up and transformed in performative dances of agency, and also analyses purely conceptual developments as dances of agency in themselves. Pickering (1995a) draws upon detailed case studies in physics and mathematics. In subsequent work I extended the analysis to more accessible topics, including major technoscientific transformations in the 19th century and WWII (Pickering 2005a, 1995b), invasive species (2005b), the Mississippi river and painting (2008) and bonsai (2013).

[5] The old physics was the dominant mode of doing physics that had evolved since WWII. The new physics became the 'standard model' now taken for granted. To be more specific about technicalities (Pickering 1984a), the switch between the old and new physics entailed (a) a switch between different sorts of machines, from fixed-target particle accelerators to colliding beams, (b) new geometries of experimental particle detectors, singling out rare hard-scattering events from common soft-scattering interactions and (c) computer filtering of data, rejecting almost all the phenomena of interest in the old physics. These changes at the level of experiment isolated rare phenomena exclusively of theoretical interest in the new physics of quarks, leptons, quantum field theory and the unification of forces.

performatively in many different ways that each hang together with a distinctive story about it (Pickering 2015). That is the key point, which I will return to and elaborate throughout this essay.

The Ontological Turn

At this point, I should try briefly to situate my analysis with respect to the wider ontological turn in STS and anthropology. Obviously my perspective is in much the same space as many other non-dualist accounts, and this is not the place to go into details, but I hope the following remarks are useful as triangulation.

My ontology is a symmetric one of a multiplicity of reciprocally coupled emergent agents, human and nonhuman.[6] Clearly, my shift to the performative idiom and my references to the liveliness of the nonhuman world fit well with approaches that come under headings like the new vitalism or new materialism (eg Bennett 2010, DeLanda 2002). What is added to them here is an analysis of how lively human beings are coupled into this lively world—the dance of agency. This moves my analysis into the space of Karen Barad's (2007) relationalism. One difference here might be that my analysis foregrounds the temporal evolution of relational entities. As far as temporality is concerned, there is an affinity between my ontological analysis and Daniel Miller's thinking on dialectical relations between people and things and the co-constitution of both (eg Miller 2010, ch 2). In my earlier work I referred to the dance of agency as a dialectic of resistance and accommodation (Pickering 1993, 1995). Missing from that phrase and perhaps Miller's analysis is a sense of productive latching onto emergent nonhuman agency (rather than simply friction). Miller's topics and examples (material culture studies) are different from my own (beginning in science studies), and my analyses began from more fine-grained studies than his.

On the other hand, my approach departs markedly from methodological approaches to anthropology that propose to treat things simultaneously as concepts (eg Henare, Holbraad and Wastell 2007 ch 1, Holbraad 2011). My ontology does not arise from contemplation of bubble-chambers (or whatever) as somehow both things and concepts. It comes from recognising them as performative agents, positioned and emergent in engagements with other agents (human scientists). A similar remark applies to all aspects of the ontological turn that centre on hybrid terms like 'material-semiotic' and

[6] The symmetry here is at the level of agency-as-performance: we do consequential things in the world; so do bubble chambers, cats, rocks and stones. This differs from the humanist identification of 'agency' with will and intention. My argument is that the latter are themselves 'mangled' in dances of agency. They are not independent causes or privileged centres of explanation (Pickering 1995a).

'nature-culture' (eg Haraway 2004).[7] For better or worse, my approach takes off from performances and performative interactions which may, but also may not, include a significant linguistic, semiotic, conceptual component. My analysis gets into focus something more immediate than words.

We could come at this from another angle. The ontological turn of the 21st century, at least in STS, grew out of a prior turn to practice from the 1980s onwards (Pickering 1992). I once argued (Pickering 1995, 4), it makes a difference if the word 'practice' has a plural. Studying practices, plural, means looking in detail at particular relatively well defined ways of doing this or that, in science, maths, industry or whatever. My example was the 'plasmid prep' in molecular biology, explored by Kathleen Jordan and Mike Lynch (1992). By 'practice,' in contrast, I meant a generic structure of doing research, which I claimed to have analysed. The same point can be made about ontology. Studying ontologies, plural, begins with detailed studies of 'found' ontologies, the ontology of this group or that. In anthropology, Viveiros de Castro (2004) takes Amazonian ontologies seriously to reflect back critically on our own ontology, western dualism. Phillippe Descola (2014) offers a four-fold typology of ontologies: animism, totemism, analogism and naturalism, which he sees as four different organising principles for both society and nature. Bruno Latour's (1993) typology is even shorter: modern and nonmodern. The moderns make a clean dualist split between people and things; the nonmoderns do not. In science and technology studies, and harking back to the practice-turn, one finds an insistence that ontologies are not simply schemes of classification and representation; they are enacted or performed in practice (Mol 2002, Law and Lien 2013).[8]

Much of the ontological turn thus occupies itself with ontologies in the plural: the different worlds that turn up in ethnographic studies.[9] This indeed marks a determination to take different worlds seriously. But a certain puzzlement still remains (to my mind, at least): what sort of world, in the singular, could possibly sustain all these different ontologies, in the plural?[10] And I am thus interested in ontology without a plural, and with questions of what the world is like—what sorts of entities make it up; how do they relate to one another?—in general and independently of what our informants say

[7] Likewise, the central object of my analysis is not the 'entanglement of matter and meaning' (Barad 2007). As noted above, I am happy to include concepts, meanings, etc in my analysis of practice, but these occupy no special place in the performative dances of agency I focus on.

[8] My early studies of controversies in recent physics can be read as detailed studies of the enaction of multiple ontologies, though the phrase was not current then: charmed quarks (Pickering 1981a), free quarks (1981b), magnetic monopoles (1981c), weak neutral currents (1984b), the old and new physics (1984a).

[9] In history and philosophy of science, see also Hacking (2002), Klein and Lefèvre (2007).

[10] Salmond (2014) reviews many of the philosophical arguments around multiple ontologies, but the arguments and discussion are framed within the traditional representational idiom that begins with knowledge, meaning, language and translation.

about it. My question is: what sort of world could sustain a multiplicity of ontologies in the plural? Even to ask the question might strike many people as ridiculous. It certainly smacks of philosophical hubris, though in fact I think it leads in the opposite direction, to put us in our place. Anterior to Latour's thoughts on modern and nonmodern ontologies, for example, is actor-network theory (Latour 1987, 2005), and ANT is an ontology in the singular, without a plural. The world just is built from networks of human and nonhuman actors (agents, actants). That is the general ontological conclusion Latour and his ANT colleagues have drawn from their studies. That is the way things everywhere always have been, are, and will be, according to ANT. Nonmodern ontologies (in the plural) typically recognise an ANT-style entanglement of the human and the nonhuman (while dressing it up in all sorts of ways). We moderns are equally entangled, but processes of 'purification' veil this fact from us (Latour 1993). So the ANT ontology (in the singular) puts us in our place—cuts us moderns down to size and situates us on a level with the nonmoderns and the nonhumans. We are a bit peculiar simply in being unable to recognise the ontological condition we in fact share with everyone and everything else.

My work owes much to ANT, and my thinking here on ontology in the singular (I will drop this qualification from now on) is in much the same space as ANT. It is hard to mark any sharp departures from ANT, not least because of the wide range of territory it has covered and the wide variety of assertions and analyses that have appeared under the ANT banner. I have discussed some points of divergence elsewhere (Pickering 2009). Much of Latour's best known work approaches questions of representation from novel angles, while the ontological picture I am developing here is more determinedly focussed on questions of agency, performance and temporality. Politically, Latour is an admirer of modernity and wants to improve its modes of political representation; I am less enthusiastic and this correlates with my interest in different worlds (Pickering 2010; see also Fortun 2014 for a political critique of Latour).[11]

In what follows, I return to the performative perspective on different worlds and take it further.

Islands of Stability

Something needs to be added now to my ontology of dances of agency. Science and engineering seek to organise these dances in a peculiar and distinctive way. Scientists like Glaser plunge into dances of

[11] Latour's discussions of nonhuman performance typically circle around his important but relatively undeveloped concept of laboratory 'trials'. His early work focusses on the length of actor-networks: we moderns have long ones, the nonmoderns short (Latour 1987). His more recent writing dissects different 'modes of existence' within modernity itself—science, law, religion, etc—but there is little ontologically puzzling or unsettling about these (Latour 2013)

human and nonhuman agency but always with the object of escaping from them. The telos—the defining objective—of science and engineering is to bring them to an end. Glaser wanted to construct a free-standing machine, one that would work independently of him, that he would no longer need to tinker with. That is what he won the Nobel prize for. In that sense, he succeeded in making the world more dual than he found it. Now it included a new and reliable machine, the bubble chamber, that would predictably obey the will of its human masters—the paradigmatic asymmetric dualist relation imagined by Descartes. That we are, in modernity, surrounded by free-standing machines like that, and that our social worlds are built around them, goes a long way towards explaining the hold that a taken-for-granted dualism has over us. Our made world echoes an asymmetric dualism back to us.[12]

But how can we square the existence of reliable, free-standing machines with my ontology of decentred becoming? I want to say that the success of science and engineering (and all sorts of other practices) shows us that there are what I call islands of stability in the flux of becoming; configurations, sociomaterial set-ups, where some sort of reliable regularity in our relations with nature is to be found. This, for me, is an ontological discovery. I cannot see that nature had to be that way, but the history of science and technology shows us that it is.

These islands of stability are central to human existence, the ground of our productive engagements with the world, and they deserve much more attention than I can give them here (Pickering 2014, 2015). Typically we take the existence of reliable machines and instruments—bubble chambers, cars, computers—for granted. If we reflect on them at all, we return to the representational idiom and assume that someone somewhere knows how they work and that that knowledge underpins their construction and functioning. But this is a mistake. Arriving at an island of stability is not a once-and-for-all achievement guaranteed by knowledge. These islands remain fragile and uncertain performative accomplishments requiring continual repair and maintenance (Swanton 2013), mini-dances of agency. We are always struggling to stay on them, and sometimes we fall off. Think of the Deepwater Horizon oil-spill in the Gulf of Mexico, or the catastrophic meltdown of the nuclear reactors at Fukushima, or (as I write) the massive explosion of stored chemicals in Tianjin. These disasters in turn provoke new dances if agency, now seeking to put the genie back in the bottle and to re-assert dualist mastery. And our mastery is sometimes, perhaps always, accompanied by a performative excess. Power stations do what we intend them to do (generate energy) but also what we

[12] This idea of 'making dual' clearly relates to Latour's concept of 'purification.' However, Latour's discussions of purification are largely epistemological, focussing on the modern impulse to represent the world in a dualistic fashion. I am interested here in a performative split between humans and free-standing machines that obey their will. As usual, one can find traces of this line of thought in Latour's work, too. See, for example, his outline history of the diesel engine in Latour (1987).

do not intend them to do (generate carbon dioxide and global warming). The flux of becoming never goes away, though we readily forget it.

Returning to my theme, thinking in terms of performative islands of stability is again an antidote to our intuitions of uniqueness. I have no idea how many islands there are, but the divergent histories of the old and the new physics (and many stories like that) make it clear that there are plenty. We can readily imagine an endless number of different worlds founded on different constellations of islands. Here in the west we live on one set of islands; in the Amazon rain-forest the Yanomami live on another. The switch to the performative idiom, and the ontology of decentred becoming, accompanied by the concept of islands of stability, helps us to appreciate this in a nonsceptical fashion, to take it seriously. That the world is such as to support a multiplicity of constellations is indeed something we should wonder at, but in the performative idiom we can grasp how it might be. Different worlds no longer appear as a contradiction in terms as they do in the representational idiom.

Shamanism and Science

The Yanomami . . . I now want to leave my homeground of western science and technology and to venture onto the wider terrain of anthropology in a very tentative discussion of islands of stability in other cultures.

My ontology is one of endless performative flux and becoming in a space of multiplicity, punctuated by islands of stability. The impulse to find these islands must be quite general. At some level, we all need to find and maintain human/nonhuman configurations that are relatively predictable and dualistic, where we can more or less rely on causes and effects. Even birds and ants build nests. But we could entertain the thought that the telos of finding stability can vary to some extent. Very crudely, my idea is that the modern west is relatively distinctive in its insistence that its islands of stability are also zones of human mastery where the world performs as a predictable machine. This asymmetric dualism is a hallmark of modernity. In other times and places the insistence on getting rid of any trace of emergence and unpredictability in nature is less obsessive, and islands of stability can have a different character. Especially, I want to note that stability does not have to entail squeezing all the agency out of the world (or, better, somehow side-lining and then forgetting it) as we do. One thing that ethnographic studies show us is that islands of stability can, in fact, encompass lively nonhuman worlds that can always surprise us, for better or for worse—the nonhuman as a zone of fear, hope and magic—the non-machine-like worlds that are edited out of modernity.

For example, as I understand it, in everyday life Amazonians are as dualist as the rest of us, in the sense of readily and routinely distinguishing between humans and nonhumans, plants and animals, etc. But this is not a principled Cartesian dualism that marks a difference in kind and an asymmetry of control. Humans and animals are really the same, just clad in different flesh. The animals, like the humans, remain genuine agents in Amerindian cosmologies—unpredictable and dangerous—and the wrong kind of interaction with them can lead to cross-overs from the human to the animal realm, becoming animal. So while these people have indeed achieved a stable modus vivendi with their environment, it is not one of dualist mastery. Nonhuman agency remains ever present, to be feared and continually warded off (Viveiros de Castro 2014).

I can take this line of thought to an extreme by reference to Davi Kopenawa's first-person account of Yanomami shamanism (Kopenawa and Albert, 2013). What marks Kopenawa out as a shaman is precisely his access to a different world, a world populated by spirits known as *xapiri*. Kopenawa can see the spirits, communicate and engage with them, they come to live with him, and they instruct and aid him in his life. And the *xapiri* are performative agents, in curing and exacting revenge, hunting and gathering fruit, keeping gardens and dealing with the weather. The shaman calls on them, but the *xapiri* do the work that humans alone cannot do.

What can we make of this? In my terms, there is an island of stability here. Kopenawa can reliably and repeatedly access a world populated by *xapiri*. He knows how to do it and what to expect—just like particle physicists accessing their world of quarks and leptons. We can also speak of a certain duality here. On this island, it is crucial to Kopenawa that the *xapiri* are independent nonhuman entities, not human beings or aspects of himself. But it is also crucial that the *xapiri* are genuine agents—profound and often dangerous and terrifying ones, easily alienated—not controllable and predictable machines like bubble chambers. Here, then, we have another dualist island of stability, but another kind of island from those of the modern west—an island, a world, from which the agency of the nonhuman world has not been entirely squeezed out and tamed. Within the shamanic assemblage, the liveliness of nature is instead foregrounded, celebrated, feared and taken advantage of.

This contrast between what we could call the symmetric dualism of Yanomami shamanism and the asymmetric dualism of western science (and western common-sense) is worth thinking about. On the one hand, we should note that in the representational idiom the spirit-world of the shaman is entirely refractory to western thought. Modern science has no resources for imagining that *xapiri* spirits exist. They can at most be some sort of projections onto nature by the Yanomami. On the other hand, and as above, there is no difficulty in taking the contrast seriously in the performative idiom. Just like the

divergent paths taken in particle physics in the 1970s but in more extreme form, the Yanomami track through the emergent performativity of nature has led them to other islands of stability than ours. From a performative perspective, this is a striking fact, but not ungraspable or self-contradictory.

What this story shows, then, is that the shift to the performative idiom offers us some conceptual elbow-room for grasping and taking seriously the possibility of multiple ontologies, not only within science and the modern west, but across the territory of anthropology. It helps us to comprehend the fact that a single nature might sustain many worlds and to appreciate the possibility of different stances, different ways of being in the flow, that dualise nature in different ways, respectively backgrounding or foregrounding nonhuman agency. There is nothing mysterious about this, though it is hard not to wonder that we live in such a place.

We might also think about 'progress' here. The standard representationalist position is that modern science is progressive simply in dispelling mistaken beliefs in *xapiri* or whatever. We could reformulate this in the performative idiom by arguing that moving from symmetry to asymmetry is what progress is about. We moderns are better than the rest precisely in getting the upper hand and achieving our own sort of asymmetric duality and machine-like control of nature. Against that, one might argue that modernity needs more fear. We should not overdraw the contrast between them and us. As I noted above, our islands of stability are themselves chancy performative achievements. We might be better off understanding bubble chambers and nuclear power stations as temperamental spirits like the *xapiri*—powerful entities with which we can engage productively but which are always liable to let us down badly. That would help us get the unpredictable liveliness of nature into focus, and to recognise the fragility of our Cartesian islands of stability and the catastrophes and disasters mentioned above that are the darkside of the illusion of mastery. Then we might act differently. That might be the practical politics of ontology in the performative idiom.[13]

Altered States

The discussion of shamanism puts me in a position to emphasise an aspect of the notion of islands of stability that might not yet be sufficiently clear. The temptation is to think of them like real islands that one finds in rivers or seas, entities that are just there, independenly of us. Central to my analysis of the dance of agency however is that we ourselves are transformed in tuning ourselves into the emergent agency of the world, and that these islands are thus decentred joint products of the human

[13] This is where my ontological analysis feeds into a different politics from Latour's. On doing things differently, see Pickering (2010). See Kopenawa and Albert (2013) for the contrast between Yanomami and western relations to the environment.

and the nonhuman. That they sustain a duality of people and things does not efface the coupled transformations that lead up to and away from them. I tried briefly to express the fact that we are ourselves at stake and liable to transformation in finding these islands by emphasising the social transformations that Glaser underwent, often reluctantly, en route to the bubble chamber. I think those changes are important to recognise, but they can easily seem unremarkable and not worthy of reflection, akin to find a new job, say.

Kopenawa's account of Yanomami shamanism offers us a more striking example to think about. He makes it clear that becoming a shaman entails much more than finding a new job, a new social role. It calls for an intense inner transformation, finding a new self or subject-position. As Kopenama describes in detail, accessing the world of the *xapiri* entails an arduous and multidimensional technology of the self, in Foucault's (1988) terms—a regime of abstinence from company, sex and some or all foods, complex rituals, a hallucinogenic resin, *yakoana*, and near-death experiences.[14] Clearly, then, the strange experiences of the shaman depend upon and stabilise an altered state of being, very different from the everyday state of Amazonians or Englishmen. The *xapiri* and the specific altered state of the shaman are two sides of the same coin, collectively constituting this specific sort of symmetric dualist island of stability.

Various comments are appropriate here. I contrasted physicists and shamans, but now I can qualify the contrast. The *xapiri* are hard to contact, but not many of us can commune with quarks and leptons either. It requires years of training, education and experience to be in a position to do so.[15] It would be fruitful to take seriously an idea of physicists (and scientists in general) as western shamans: they are the people who can visit certain sorts of exotic islands of stability for us and report back to us on other worlds. But two differences between science and shamanism remain worth contemplating, both of which concern the anthropological problematic of translation, bringing home other cultures. It is worth emphasising that neither of these would need discussion in the representational idiom with its focus on words, representations, meanings and symbolism, but both are pressing if we want to take different worlds seriously as genuine performative engagements of the human and nonhuman.[16]

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[14] Foucault's examples of technologies of the self are techniques of self-control. The shamanic techniques described by Kopenawa are better seen of technologies of abandonment, followed by a restabilisation of the self in the world of the *xapiri*. Technologies of the self are little discussed in the STS literature. On meditation, see Carvalho (2014a, b); on abandonment in drug users and musicians and music lovers, see Gomart and Hennion (1999).

[15] Glaser's dance of agency with the bubble chamber, sketched out earlier, sat on top of and extended that sort of training in an emergent fashion.

[16] Eliade (1964) is a classic representationalist account of shamanism.

On one side, there is a sense in which anyone can see the products of scientific research. Not so long ago, bubble-chamber images of particle tracks were on sale as postcards at CERN. As Latour (1987) has argued, scientific research aims to produce immutable mobiles—representations and images that can travel freely. The same cannot be said of shamanism. There are no photos of *xapiri* to be handed around and examined as part of anthropological scholarship. There are only 'subjective' accounts from shamans like Kopenawa, unverifiable by the non-shamanic anthropologist. And subjective accounts are what science seeks to exclude from their discourse. So there is a major problem for the anthropologist in bringing home shamanic islands of stability. To take them seriously requires somehow crediting that which should not be credited. The anthropological dilemma is to be trapped between explaining these islands away (as in social constructivism) or leaving the realms of 'objective' science.

From the other angle, the problem is worse. The west is well organised to discredit stories of other worlds. They are defective apprehensions, the products of deranged minds—the mad and drug-users. The visions do not correspond to anything that exists, and the seer should be helped to stop seeing them, with antipsychotic drugs and drug-rehabitation programmes. So bringing home shamanic islands of stability requires taking seriously nonmodern versions of the self that are devalued and stigmatised in modernity, not least in academia. No doubt, shamanic stories do resonate with many people in the contemporary west, but they are visionaries, mystics, New Agers, recreational drug-users and drug addicts, the mad and people verging on one of the many mental illnesses to which modernity is prone—hardly the company one wants in a 'sober' enquiry into ontology and what the world is like.[17] Or, to put it the other way round, taking shamanism seriously as genuine performative engagement with world (rather than a representational system) would require a reconfiguration of foundational western hierarchies of approval and disapproval.

There are, then, major problems entailed in taking other ontologies seriously and bringing them back home. Conversely, anthropology might be instrumental in dislodging the taken-for-grantedness of the modern self and the social structures it reinforces.

Beyond the Islands

One final thought on different worlds. So far, the focus has been on the different sorts of islands of stability that characterise different cultures. But we can note that there are cultures that do not centre

[17] The western canon here would include Huxley (1956), Lilly (1972), Laing (1967), Castaneda (1968).

themselves on islands like these at all. In the west, the mainstream sciences taught in school certainly focus on stable machines, stable instruments and stable knowledge, and stability and reliability are of course the hallmark of modern technology and engineering. But the sciences of complexity, for example, foreground emergent, unpredictable processes and help us think about the world more generally as an unpredictably and open=endedly emerging assemblage (Gleick 1987, Waldrop 1992, Kauffman 2002, Wolfram 2002). And I have argued at length that one branch, at least, of cybernetics can be understood as a science of the unknowable, centred on devices that can adapt to the unexpected, rather than dominating a world already known (Pickering 2010). These sciences and associated branches of engineering, then, share to some degree the ontology (in the singular) of decentred becoming that this essay is predicated on (while narrowing it in various ways and then adding to it mathematically).

Many philosophies point in a similar direction. Like cybernetics, taoism and zen emphasise graceful adaptation to an emergent world and real-time responses to the moment (Lao Tzu 1963, Baynes 1967, Watts 1957, 1975). They also emphasise performance over representation, in a way that is echoed by the switch from the representational to the performative idiom. Everyday knowledge and reflection get in the way of the spontaneity valued in taoism and zen. Going beyond cybernetics and echoing Kopenawa, they also focus on altered states as integral to their plateau, one might say, of non-stability: meditation as a key technology of the self and, ultimately, enlightenment as the loss without any replacement of the everyday self.

This as far as I can go with this line of thought. I hope to have shown that the switch from a representational to a performative idiom and the concept of islands of stability opens up space for an ontology of decentred becoming, in the singular, that can help us to take multiple ontologies seriously, in ways that, in the end, reflect back both critically and constructively—politically—on our dominant ways of thinking, being and acting in modernity.

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