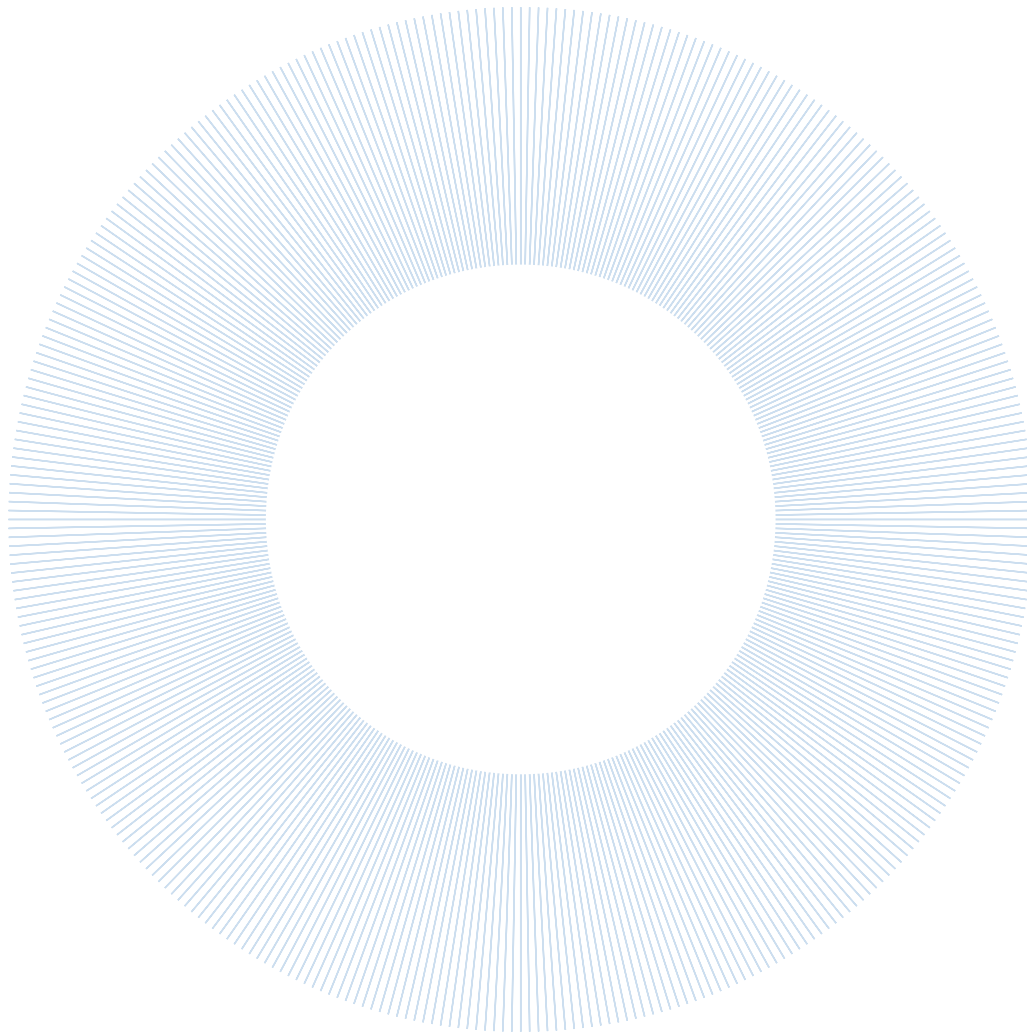# Ontological Politics: Realism and Agency in Science, Technology and Art

## Andrew Pickering

## About Insights

*Insights* captures the ideas and work-in-progress of the Fellows of the Institute of Advanced Study at Durham University. Up to twenty distinguished and 'fast-track' Fellows reside at the IAS in any academic year. They are world-class scholars who come to Durham to participate in a variety of events around a core inter-disciplinary theme, which changes from year to year. Each theme inspires a new series of *Insights*, and these are listed in the inside back cover of each issue. These short papers take the form of thought experiments, summaries of research findings, theoretical statements, original reviews, and occasionally more fully worked treatises. Every fellow who visits the IAS is asked to write for this series. The Directors of the IAS – Michael O'Neill, Colin Bain, Barbara Graziosi and Tony Wilkinson – also invite submissions from others involved in the themes, events and activities of the IAS. *Insights* is edited for the IAS by Michael O'Neill.

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# ONTOLOGICAL POLITICS: REALISM AND AGENCY IN SCIENCE, TECHNOLOGY AND ART

*In a brief and preliminary way, this essay seeks to open up some of the concerns of my current research. I want to continue the shift from an epistemological to an ontological perspective on science, technology and our being in the world. The essay opens with some ground-clearing: a discussion of standard epistemological perspectives on scientific realism. This motivates a shift to questions of agency, material as well as human, and an extension of my earlier analysis of the 'dance of agency' to include the concepts of 'free-standing machines,' 'making the world dual' and 'islands of stability.' The essay concludes with a discussion of art as 'ontological theatre' – as staging and helping us to grasp different ontological visions. The connection to the IAS theme of 'futures' is important but largely implicit here. The process of making dual can be understood as an attempt to fix and freeze the future. I argue that this stance is underpinned by a mistaken ontology and inevitably evokes unintended consequences, which can take the form of disasters and catastrophes. I am therefore interested in exemplifying and exploring an alternative stance that recognises unpredictability and emergence and is open to what the world has to offer us.*

This essay moves from classical philosophical arguments about realism to my current concerns with ontological politics and art as ontological theatre, with a discussion of agency as the pivot.

To clear some ground, we can begin with the problematic of realism. The traditional question here is an epistemological one, a question about knowledge: do scientific descriptions of nature correspond to how nature really is, at least sometimes? For many people, the obvious answer is: yes. All that time, money and effort that goes into producing scientific knowledge – it would be crazy to imagine that the scientists get it wrong. The universe really is built from quarks or strings or whatever. The DNA molecule really is the unit of biological inheritance. On the other hand, however, there are nagging questions of how we could know that scientists get it right. We have no independent way to check that the universe really is the way the so-called standard model of elementary particles describes it. It might be the best story physicists have come up with, but that does not prove it 'cuts nature at its joints.' I learned how to do science studies at the Science Studies Unit in Edinburgh, home of the famous strong programme in the sociology of scientific knowledge, SSK, which argued empirically and philosophically that knowledge is not given by the world but is somehow relative to social attributes of its producers and users – an argument that points in the opposite direction from correspondence realism.

There are, then, these two traditions which surface everywhere in the social sciences and humanities, which we can call 'realist' and 'constructivist,' and which are diametrically opposed to one another on the question of realism. My sympathy is with the constructivists – my first book was called *Constructing Quarks*. But at the same time that book came out, 1984, I had a fellowship at MIT which changed my life in many ways. One was that Thomas Kuhn was there and he often questioned me, along the lines of 'you constructivists are very good on the social

dimensions of science, but how does the world get into the story?'  It was a good question, to which I eventually found what I think is a good answer, though in the end it requires a shift from epistemology to ontology.

The difficulty here is a very general one that has haunted the humanities and social sciences since the so-called 'linguistic turn' of the mid twentieth century, usually associated with the later Wittgenstein and his book, *Philosophical Investigations* (1953).  The central idea behind the linguistic turn was that we have no access to reality in itself; our access is instead mediated by language; and therefore the proper job of scholarship is to investigate language rather than to speculate about some unreachable language-independent reality.  This is the thought that underpinned the development of SSK and relativist/constructivist science studies in general. To even imagine that one could talk about reality was seen as an embarrassing mistake, a sign of philosophical naivety, so, of course we cannot have a story of how reality enters into our knowledge of it.

Fredric Jameson wrote a book called *The Prison-House of Language* (1972), a phrase that sums up nicely the perspective of the humanities and social sciences after the linguistic turn. And my attempts to answer Kuhn's question convinced me that we had to somehow break out of the prison and undo the linguistic turn.  So now I can start trying to say something constructive, beginning with the analysis of scientific practice set out in my book, *The Mangle of Practice* (1995).

The key move in that book was a shift from what I called the representational idiom for thinking about science to a performative idiom.  The representational idiom suggests that we should think about science as a body of representations of nature, of empirical statements, theory, language.  This is the idiom, the style of thought and writing, that hangs together with the linguistic turn and that produces the standard epistemological problematic of realism and all the puzzlement about how nature can get into our representations.  My suggestion instead was to start by forgetting about the representational aspects of science and to begin with questions of practice, performance and agency.  This is what I meant by the performative idiom, and within that idiom the question of how nature enters into culture turns out to be straightforward to answer.

Scientists do things, they act in the world; the world, in the shape of laboratory instruments and machines, does things too, and these performances are constitutively intertwined.  I called this back-and-forth process a dialectic of resistance and accommodation, or mangling, for short – now I tend to speak of a 'dance of agency,' which is a more symmetrical phrase.  Either way, the process is the one I exemplified in a study of Donald Glaser's work on the development of the bubble chamber as a novel experimental instrument in particle physics.  As a classical human agent, Glaser would construct some set-up, and then he would become passive and see what it would do, how it would perform.  Then he would react to that, usually redesigning the apparatus in the light of whatever emerged, and then watch again to explore its performance.  And so on and so on.  That is the basic form of the dance of agency as I understand it – a performative, transformative and productive back and forth between human and non-human agency.  Now I can make some comments on that.

(1) Recognition of the dance of agency solves, or possibly dissolves, the problematic of realism. It becomes entirely obvious that the material world plays a constitutive role in science. The entire trajectory of Glaser's research was structured by the emergent performances of his laboratory apparatus, and that is how the real world entered into Glaser's work – it is as simple as that. And there is really nothing left for us to worry about here.  Without those sorts of performances

science would not exist – it would just float in the sort of vacuum that the linguistic turn conjures up for us – but through these interconnections science is intimately and irrevocably engaged with its object.

(2) We just have to remember that this constitutive role for reality is located at the level of performance, worldly happenings, not, in the first instance, at the level of knowledge.  If you remain in the representational idiom, mangling and the dance of agency are invisible.  Non-verbal performance, human and non-human, is a whole new topic for research that the linguistic turn obscured from us.

(3) Having grasped that, of course, we do not have to remain at the level of performance.  It is easy to get knowledge back into the story – we just need to see it as geared into performance.  As I showed in the bubble chamber study, Glaser's explicit knowledge was mangled in just the same process as his instrument and its performance (and also the network of social relations in which he was embedded).  So the real world gets into knowledge, too, via the dance of agency.  Without that back and forth with the material world, it is inconceivable that Glaser could have learned anything conceptually.  So recognition of the dance of agency is my answer to Kuhn's question of how the world gets into our knowledge of it.  It does so, as I keep saying, at the level of performance, which has nothing special to do with questions of correspondence at all – which is fine, I think: we can just forget about questions of whether our knowledge corresponds to reality.  In the representational idiom the question of whether scientific knowledge is a reliable map of the hidden structure of the world seems terribly important, just because the only alternative seems to be that it floats entirely free of the world, as a 'mere construction' cooked up by scientists in a 'purely social' process.  In the performative idiom things look different.  We can appreciate the constitutive connection of knowledge to reality without bothering ourselves about realistic mappings.  That is what I mean by saying that the classical problematic of realism dissolves in the performative idiom.  We do not need to worry about the threat of 'mere construction' anymore.

(4) When I was writing about the mangle, I was very much inspired by actor-network theory, ANT as it has since come to be called.  But still, my interest in questions of agency and performance probably marks the point at which my work diverges from ANT.  As far as I know Bruno Latour never speaks of agency or performance.  Others like John Law and Anne-Marie Mol are willing to use these words, but only in a very weak sense.  They are quite keen to tell us about how agency is 'enacted' or 'performed,' but agency itself rarely plays a constitutive part in their ANT stories. ANT, to my way of thinking, is still in the shadow of the linguistic turn and its prohibition against that taking agency and performance seriously.  In contrast, I think that thinking about agency is straightforwardly a new opening into a range of fascinating and important topics and problematics.

So, that is as far as I had got in my early writings about the mangle.  But recently I have felt that more needs to be said, and that is the topic for the rest of this essay.

I overlooked something important in my early writings on the mangle, which is that scientific dances of agency have a specific and peculiar structure.  They are dances that aim to extinguish themselves, to bring themselves to an end.  Their aim, their telos, is to disentangle and separate the human and the non-human, and once this is achieved they stop (Pickering, 2009a).  Glaser did not engage in a dance of agency with his set-ups for the pleasure of doing so.  He wanted to create what I would call a free-standing or autonomous machine, something that would function without continual attention from him – something that no longer engaged him in dances of agency, something instead that he and others could use as a reliable tool to do things with,

to carry on research in particle physics.  The telos of scientific and engineering practice is, in general, I think, to make the world dual (in a Cartesian sense) – to make a clean split between human and non-human agency in a way that subjugates the material world to us, that puts material agency at our disposal: on the one hand, Donald Glaser as a classic human actor, on the other, his servant, the bubble chamber as a well behaved self-acting machine.  That we sometimes succeed in this sort of project is, I think, an amazing ontological fact; the world is such a place that we can sometimes make bits of it dual like this – it did not, as far as I can make out, have to be that way.

This process of making dual is what I want to meditate on now.  The first point is that it sounds like what Latour calls purification, though I suspect he uses the world in more of an epistemic than an ontological sense, to refer to our understanding of human/non-human hybrids. Second, from another angle, it sheds light on constructivism again.  Oddly enough, what I want to call autonomous machines can rather easily be glossed as social constructs. We designed and made them, they serve our situated social purposes, so they must be sociologically explicable, is how the argument goes.  Against that, I think we should recognise that specific autonomous machines are not the products of our will; they emerge from dances of agency that transform us as well as the material world.  We find ways of aligning material agency to our human purposes, but we also line ourselves up with the emergent agency of nature – 'production creates an object for the subject but also a subject for the object,' as Marx put it – so the social has no special explanatory centrality here.  The social is mangled as much as machines, disciplines, knowledge and everything else.  And this process of reciprocal reconfiguration is, again, where reality enters into the human sphere, quite brutally, at the level of performance.  We certainly do not need to worry in the traditional fashion about whether we have any grip on reality, or whether it has a grip on us – it is strikingly obvious in this domain of free-standing machines and our evolutionary accommodation to them.

And third, I want to continue this line of thought by examining the key concept of an autonomous machine more closely.  What should we have in mind when we think of such a thing?  In *The Mangle* I wrote as if the process of making dual is a one-off thing that once accomplished is accomplished for all time – as if Glaser had achieved perfect mastery of the bubble chamber. But this was not the case. Bubble chambers are complex mechanisms that need to be serviced, repaired and maintained.   At an everyday level, the same goes for my car, which actually shows me a message on the dashboard that says 'service within the next thousand miles.'  If I do not take it to a garage for someone to work on it, it starts counting down the miles in a threatening fashion.  What should we make of this?  Presumably that dances of agency never quite go away.  An autonomous machine is never quite autonomous; it is one that, as it happens, can be enveloped in mini-dances of agency – repetitive and routinised back-and-forths of the human and non-human.  This is another important ontological discovery – the world just happens to be that way.  Perhaps the way to gloss this is to say that the process of making the world dual consists of finding small islands of stability in the intersection of the human and non-human agency, islands where machines become quasi-autonomous, but we never know exactly where these islands are.  Exploiting them is then an experimental business of performative finding out and continual small corrections, a sort of tuning as I call it – like tuning a radio by the strength of the signal.[1]

I am reminded here of a fascinating paper by Kathleen Jordan and Mike Lynch (1992) on the so-called 'plasmid prep.'  When they wrote the paper, the plasmid prep was already an entirely standard procedure in molecular biology, described by an explicit list of instructions on how it should be performed.  But what Jordan and Lynch found was that the instructions were not enough, that everyone who learned to do the plasmid prep mastered it through creative material

practice – an open-ended dance of agency – and that different individuals would end up with their own specific ways of doing it, none of which exactly matched the formal description. In the representational idiom there is no way to understand what was going on here. In the performative idiom, in contrast, it is obvious that learning the plasmid prep entails finding a way to tune into an island of performative stability, and there is no reason to expect that everyone would arrive at exactly the same point in this – as indeed they did not.

And we can go further with this line of thought. Our grip on material agency, our occupation of these islands of stability, is not as secure as we often think. Glaser's bubble chambers worked well; so did Luis Alvarez' giant chambers full of highly explosive liquid hydrogen. But a hydrogen bubble chamber built at Harvard exploded when it was first used in 1965, ripping off the roof of the building and causing at least $1m in damage. One person died and another seven were injured (Harvard Crimson, 1965a, b). The $9bn LHC, the Large Hadron Collider at CERN, exploded on 19 September 2008, shortly after it had been turned on amidst a global publicity offensive, and had to be shut down again for a year or so. The engines have exploded in no less than three cars that I have owned, two of them brand new ones (American Ford Windstars, to be precise).

Where does that leave us? It seems to me now that humanity lives on these little islands of stability and technoscientific mastery where we have succeeded in making the world dual (this idea first came to me when I was writing about the nineteenth century of organic chemistry and the synthetic dye industry), and also that these islands are more or less perilous – sometimes we fall off them and lose control, with potentially disastrous results. And the question then becomes: does it have to be that way? At some level, the answer must be yes. Individual and social life depends on some degree of worldly stability and order. Even animals remake their environment to suit their needs. Birds build nests. Only madmen and mystics could live in perpetual open-ended dances of agency. But, on the other hand, I think that our quest to master the world by making it dual is getting more desperate and more dangerous, more ridiculous, all the time.

In his wonderful book *The Railway Journey* (1986), Wolfgang Schivelbusch argues that the development of the railroads in the nineteenth century brought into being the potential for unprecedented accidents, disastrous crashes of a magnitude that had never been seen in the world before. Shock entered the civilian world for the first time, as a new way for bodies and minds to be. Schivelbusch expressed this in terms of what he called (in English translation) the unprecedented 'falling height' of railway technology – meaning something like the amount of energy locked up in a speeding train. And this points to the idea that in a technoscientific society our problem is not at all in gaining access to the real (as the traditional epistemological problematic would have it) but in containing it, stopping its spilling out and washing us away. And, of course, the falling height of our worldly endeavours has only increased since rail and the nineteenth century. Think of the Fukushima nuclear reactors and nuclear waste ponds in 2011, and the long and dangerous struggles to contain their energy and stop the fuel melting down catastrophically. Those reactors might be the perfect mnemonic for the idea I am trying to articulate: that we live on perilous islands of stability and the costs when we inevitably fall off get bigger all the time.

So what? Here we move into the realm of ontological politics. What does this analysis imply for how we conduct ourselves in the world? The obvious moral is: be careful! It is an ontological point, not a sociological one, that we live on chancy islands of stability, so we should pay a lot of attention to which islands we choose to inhabit and how we live there. Those mini-dances of agency that keep material agency contained are important even if they sometimes fail. The

moral is also: slow down! We should contain our desperation in trying to extend existing islands or find new ones. Drilling for oil a mile below the surface of the sea would be a case in point – think of the massive Deepwater Horizon oil spill in the Gulf of Mexico in 2010.

'Slow down' is the point of Latour's (2004) parliament of things and his politics of nature – and I entirely agree with that. But unlike Latour I would like to go further (Pickering, 2009a). My analysis suggests that we could act in the world in a systematically different fashion, which is a possibility that Latour seems entirely uninterested in. We cannot completely abandon the dualisation of the world, but it would be good to recognise that there exist alternatives to this mode of being, different ways of relating to the world, natural and social, which are interesting and worth entertaining in their own right, and which can also serve to denaturalise desperate dualisation as the one best way to go on. Much of my own recent work has been devoted to exploring such alternatives, ways of being in the world that do not share the telos of making the world dual, ways that instead dwell on, thematise, enjoy and take advantage of dances of agency instead of trying to bring them to a close. My recent book, *The Cybernetic Brain*: Sketches of Another Future (2010), reviews a whole range of such projects in the history of cybernetics, running from psychiatry, brain science, biological computing and river engineering to management, politics, education, non-standard spiritualities and the arts. I think that it is important that one can find other ways to go on – non-modern ones, let me call them – in many fields and areas, not just one. But rather than elaborate on that, let me shift gears and end by discussing briefly how the arts can address the issues I am trying to explore here, since this is one of my current research projects.

I am interested in art because it escapes the linguistic turn. It is not a verbal thing. It can thus, potentially at least, directly foreground agency without any detour through words. Having said that, I can note that the canonical Western artistic tradition does not actually thematise agency at all, which is itself a significant historical fact: the great artworks of the West are firmly situated within the representational idiom. Paintings and sculptures just stand there passively, and we just stand there in front of them, contemplating them in a detached fashion. But in the margins of our culture one can indeed find artworks that do foreground agency and performance. These interest me a lot, and I think of them as ontological theatre, as somehow staging and dramatising configurations and interrelations of human and non-human agency. Oddly enough, and interestingly, it turns out to be hard to find art that stages our usual processes of making the world dual, and I will come back to that in a moment. On the other hand, from World War II to the present one can find all sorts of non-modern art that invite us to think about agency and ways of being in the world without a telos of dualisation and mastery. Here are three quick examples.[2]

First, a machine called Musicolour built by the cybernetician Gordon Pask in 1952. Musicolour was an electromechanical device for exploring synaesthesia. It turned a musical performance into a light show. And two points about it are worth noting. One, the machine was cognitively opaque. Even if you knew and could understand the circuit diagram (which most musicians could not) there was no way to predict which musical inputs would trigger which lighting effects. So the musician had to enter into an immediately performative relationship with the machine, trying things out and seeing what would happen. Two, the machine adapted to the performance in real time. Its parameters would change and eventually it would cease to respond to repetitive tropes – it would get bored, as Pask put it, thus prompting the musician to adapt to the machine by trying something new, and so on and so on, back and forth, endlessly.

Musicolour was, then, a beautiful example of non-modern ontological theatre, staging a performative dance of agency that had no telos of dualist mastery of the human by the non-

human.  Any Musicolour performance was a unique event, a dynamic joint product of the human and the machine.  From one angle, a Musicolour performance helps us to get the general idea that a non-modern alternative to a modern stance in the world might exist, and from the other angle it staged that stance as a strange kind of art.

My second example, is simpler: we can think of so-called generative and ambient music, which I tend to associate with Brian Eno, *Music for Airports* being a canonical example.  Again, the impulse towards dualist domination of matter is absent here. Generative music is a form of composition which entails surrendering some of the composer's agency to sound-generating algorithms – picking the algorithms and then setting them free to hear what they will do – sailing the tides of algorithms, as Eno once put it.  This stands, of course, in an artistic tradition going back at least to the works of John Cage.  And again generative music can stand as non-modern ontological theatre, thematising human and non-human performances that do not aim at a stance of separation and mastery of the non-human by the human.  Eno explicitly talked about this sort of compositional system as a laboratory in which people could experiment and familiarise themselves with a non-modern relation to the world.

Thirdly, I could mention biofeedback and brainwave music.  In a piece called *Music for Solo Performer* first performed by Alvin Lucier in 1965, electrical brain-waves inside the performer's head were read out by an EEG set-up and used to control a range of music generating devices. The biofeedback aspect is that the sound-generating equipment was only triggered by the alpha-wave dominated brain-states that characterise transcendental meditative states.  The performer could not will these alpha waves into existence, but the musical output indicated their achievement and helped the performer maintain that position.  As ontological theatre, this work thus again thematised a reciprocal performative coupling of human and non-human that depended upon not achieving any sort of dualistic separation – the performer needed the machine to maintain his or her own performative (not cognitive state). And what interests me especially about this example is that it stages the fact that human performance and agency is not in any way given.  To perform *Music for Solo Performer* one had to enter into an altered state of consciousness – as people called it back in the 1960s.  So, the work stages for us the idea that our very selves can be at stake in non-modern dances of agency.  One can see this set-up as sort of Foucauldian technology of the self in which, again, one surrenders control in the dance of agency.

As I said, it is easy enough to find artworks that stage symmetric dances of agency, and that thus help us to imagine that there are other ways to be in the world than dances that aim at mastery.  But what about the other way?  What would the other sort of artwork look like, that stages our usual way of being, namely finding and inhabiting these chancy islands of dualist stability?  I only started to ask myself this a couple of weeks ago, and basically it seems to me that there are few if any examples of artworks that do this.  Artists, it appears, do not really want to know about our hegemonic ways of relating to the world.  I have tried asking artists and art historians and they do their best to come up with examples, but none of them is really what I have in mind.  So to finish, and maybe to clarify what I have said so far, I have to make something up.[3]

Here is my line of thought.  It is said that the most discussed piece of twentieth-century art is the urinal that Marcel Duchamp turned into art in 1917 by putting it on a stand in an exhibition. I would like to do something similar but which, as far as I know, no artist has ever done – namely exhibit as an art object some autonomous machine in action, doing its thing.  It would have to be something very noisy, powerful and scary. I used to have summer jobs in factories when I was a student, and one of those machines that make a deafening crash and make the whole factory shake as they bend and punch holes in metal would be good.  Or, for some reason I

think of motorbikes.  Mount a big bike on a pedestal with its engine going full blast. Get rid of the silencer.  Maybe have the back wheel spinning in a trough of gravel that it could blast at the wall.  An art object like that might help to bring our usual dualist way of relating to material agency into focus.  But what about the possibility of slipping off our islands of stability?  This should also be a key feature of the non-modern artwork I have in mind.  How would you do it with a Duchamp-like ready-made?  I cannot think quite how to arrange this.  You would want a machine that was sometimes on the edge of going out of control.  A pile of spent nuclear fuel rods heating up and about to explode and spray radioactivity all over the place would work.  You could give spectators buckets of seawater to throw over the artwork to try to keep it under control.  Sometimes they would fail.

There might be problems with health and safety regulations here, I admit, but an exhibit like that would be a wonderful piece of ontological theatre, I think, staging in microcosm our modern mode of being in the world.  It would remind people quite forcefully, I think, of the way we generally live.  And, of course, it would terrify them. Then next door you could have a room that reacted in unpredictable ways to EEG readouts from people entering and leaving, which housed some interactive robots playing generative music.  Take your pick, would be the implicit invitation – which sort of world do you want to live in?  That is my vision of a kind of non-verbal ontological politics played out as art.

## Acknowledgements

[1] On 'tuning,' see Pickering (1995); on 'islands of stability,' see Pickering (2009b).

[2] Taken from Pickering (2010). For a wide-ranging history of technology and performative art, see Salter (2010).

[3] The work of the art collaboration called HeHe comes closest to what I have in mind; see hehe.org.free.fr (last accessed 29 August 2011).  HeHe's projects include a series of dynamic working models: *Plane Jam*, a model airliner with smoke coming out of an engine; *China Syndrome*, a power station with a mushroom cloud emerging from its cooling tower, and *Is There a Horizon in the Deepwater?* – an oilrig on fire. These works stage very nicely the chanciness of our usual technoscientific relation to nature but, of course, they are only models, and as far as I know one cannot interact with them – the relationship of the viewer is the usual one of detached contemplation

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