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FUNDAMENTAL: The Cultural Negotiation of Radically Remote Science.

Abstract

Historically, the cognitive and imaginative dislocation of lay publics from the extreme abstraction of fundamental science has been understood as an issue to be addressed via public outreach initiatives; within this paradigm, the science itself is understood as essentially 'complete' and the task of communicators (sometimes with the added cultural advocacy of art) is to make the science more publicly accessible. Recent shifts in critical theory within the realm of New Materialism (Haraway, Barad), as well as questions regarding how empirical data can be reconciled with lived experience (Dowker), break down this rigid dichotomy of nature and culture; within this new paradigm, all fields are relational and contingent - but how do we negotiate this landscape in the context of cross-disciplinary research? This question is approached by looking at the specificity of practice-based strategies within two research projects (one recently completed and the other currently in R&D) that bring critical art practice into the sphere of radically remote science, exploring how we might approach knowledge-making practices in cross-disciplinary spheres as "*social-material enactments that contribute to, and are part of, the phenomena we describe*" (Barad 2007, 26).

In the summer of 2018, I was transitioning between two research projects: 'Material Sight' (Crisp 2016-18) [1] had used critical art practice to examine the use of visualisation in fundamental science and explored how non-documentary photography and moving image might be used to embody a sense of material encounter at three world-leading research facilities for particle physics, astrophysics, and cosmology. The project had resulted in several outcomes, including two exhibitions and a book [2] but, most importantly, it had brought together a constellation of artists, scientists, philosophers, curators, and publics. Keen to channel this momentum, I had begun to work on a new project, 'FUNDAMENTAL', which picked up on key findings from 'Material Sight': the possibility of critical art practice developing a 'sensorium' for fundamental science, the experience of 'phenomenological dissonance' that such an endeavour might necessitate and a desire to research how we culturally negotiate 'radically remote' science.

'Material Sight' was funded by a Leverhulme Research Fellowship that allowed me to spend a two-year period working with three world-leading facilities for fundamental science, that included: The Laboratori Nazionali del Gran Sasso - a set of subterranean laboratories for particle physics and astrophysics, sited underneath the Gran Sasso Mountain Range in Central Italy; Boulby Underground Laboratory, located in the UK's deepest working mine that stretches out many kilometres under the bed of the North Sea; and the combined facilities at Durham University that include the Centre for Advanced Instrumentation and the Precision Optics Laboratory as well as the Institute of Computational Cosmology that produce, amongst other research, data visualisations of the origin and evolution of the universe, constructed using their super computer, COSMA.

As we know, it is extremely difficult to imaginatively or cognitively connect with the spatial and temporal scales of fundamental science that range from the subatomic to the multiverse; when we attempt to approach such ideas of paralysing abstraction through the perceptual range of our sensing bodies, a form of perceptual vertigo can be provoked. The experimental fields of physics and cosmology employ vast technical apparatus, often sited in physically extreme, subterranean environments, yet their object of study can only be witnessed through traces, or experienced vicariously via remote sensing or data constructions. The practice-based research undertaken for 'Material Sight' has allowed me to come to understand that the dissonance between the experience of material presence on the one hand and a sense of radical remoteness on the other, could be described as 'phenomenological dissonance' (Crisp 2020); but at its outset, the project was premised on questions about how fundamental physics might be brought back into what the philosopher Edmund Husserl (1859-1938) called the 'Life World' or as the contemporary astronomer Roger Malina put it

more prosaically: 'How do we make physics intimate?' (Malina in Crisp and Triscott 2018) Working in partnership with the organisation Arts Catalyst, [3] 'Material Sight' approached these questions through developing experimental workshops and performance weekends, as well as through network building, symposia and publishing; but at its core, the research was driven by the paradoxical desire to create a 'sensorium' for fundamental physics through asking if photography, moving image and sound could *embody* the spaces of experimental science and present them back to scientists and non-scientists alike, not as illustrations of the technical sublime (which we often see with image-making in relation to technology) but as sites of phenomenological encounter. (Crisp 2020)

By the autumn of 2018, the new project, 'FUNDAMENTAL', was beginning to find a shape with areas of research activity mapped against partners and organisations - some existing/confirmed, others new/still to confirm - but at this juncture, when the project was in a state of open, necessarily unstable, dynamic potential, I was obliged to call a halt to all activity when I was diagnosed with cancer. After over a year of treatment and recovery, I was (thankfully) back in the studio, slowly starting to corral the ideas and working relationships that had inevitably shifted during/because of this hiatus, when everything came to a halt for a second time: It was now spring 2020 and the whole world was brought to a standstill by COVID 19. I mention these events – one, life-altering on an individual level, the other a global pandemic that has seeped into every conceivable aspect of our collective lives – because they both matter for the research at hand. As Karen Barad reminds us, "practices of knowing and being are not isolable; they are mutually implicated". (2007, 185) Through this framing I can acknowledge that, although both events have had, and continue to have, severely disruptive effects, it is the affective impacts of a messy, heterogeneous, and emergent social world (Braidotti, 2011, 137) that are of ultimate significance for the research itself. Of course, one could argue that this is no more than the recognition of situated knowledge whereby the experience of serious illness combined with the shifting sands of current global events has re-calibrated the relationship I have with the methodologies and subject of my research subject; but, as an artist and academic who has been working in cross-disciplinary spheres for many years, my thinking is in flux like at no other point in my career. In this context, I find myself asking where we, as artists, should situate our work so that the conditions and structure of our 'endeavour' might map over the critical, conceptual, and socio-political dimensions of the questions we are asking and wondering whether it is here that we need Barad's 'ethico-onto-epistem-ology' as an 'intertwining of ethics, knowing and being...' (2007, 185)

The excellent symposium that has shaped this journal publication proposed: “What the world needs now is artists engaging with science”. There is much to unpick in this provocation – not least, the historical issue of nomenclature that has produced the false binary of ‘Art’ on the one hand and ‘Science’ on the other. Added to this is the disciplinary a-symmetry, observed by Barry and Born (2010), whereby the ‘Science’ in Art and Science has always been perceived as essentially ‘complete’ and, by extension, that art’s engagement with science is primarily interpretive (or illustrative) with the ultimate, instrumentalised goal of improving public understanding. Sleight and Craske (2017) have gone on to explore the historical roots of these binaries in the UK, plotting the first funded wave of Art and Science (A&S), via schemes such as the Wellcome Trust’s Sciart (sic) programme (1996-2006), concluding that within this era, ‘The lightweight epistemological justifications that were given, concerning the complementarity of art and science, were not strong enough to surmount their institutionalized asymmetry.’ (2017, 317) Whilst there have undoubtedly been advancements in the subsequent decade and a half [2], it must nevertheless be acknowledged that the legacy of these foundational a-symmetries has been hard-wired into the policies and politics of almost all inter, cross and trans-disciplinary work between art and science and therefore define its funding structures. Consequently, we are too often faced with transactional relationships where artists’ access to science is predicated on the delivery of public outreach and impact agendas.[3]

So, while the world does indeed need artists engaging with science (and vice-versa), we also need everyone – scientists, artists, *and* publics - engaging with the multiple cultures of science and technology in the context of our current socio-political realities. But how do we inculcate this engagement and make it proactive? To return to my question about artists’ endeavour, I would suggest that we need to pay more attention to *how* artists are asking questions. This point is of importance because it attends to the catalytic dynamic of artists’ *practice* and the role it plays in creating new knowledge in highly specific ways through *doing*. Creating advocacy for the specificity of practice – especially in experimental and performative contexts – is the one of founding principles of ‘The Cultural Negotiation of Science’ (CNoS) [3], a research group led by myself and fellow artist Christine Borland. Founded in 2013 when we produced the exhibition and symposium, ‘Extraordinary Renditions’, at BALTIC Centre for Contemporary Art, [4] CNoS includes artists, research staff and postgraduate researchers who critically engage with expert cultures across a broad spectrum of fundamental, bio-medical and climate science as well as with the fields of genetics, geology, botany and museology. An important aspect of CNoS’s critical

engagement is advocacy for shifts *within* the cultures of science - to support, for example, different approaches to subjectivity, diversity, and gender; for the recognition of 'doing science' as a human activity and cultural endeavour; and to acknowledge the entanglement of science with the socio-political sphere. Indeed, in this respect, it is beholden on us all to acknowledge, what the historian of science, John Tresch, describes as 'the disorientingly plural, technologically modified, politically and environmentally precarious worlds we now inhabit'. (Tresch 2014, 167) [5] Against this terrifyingly unanchored backdrop, I have found some grounding in Maria Puig de la Bellacasa's linking of knowledge politics with feminist politics when she asserts that 'knowledge-making processes are inseparably world making and materially consequential' (2009; 299); this seems to me to be the crux of interdisciplinary knowledge-making – *not* the transactional exchange of services we too often encounter.

I also concur with Puig de la Bellacasa when she takes Marx's famous phrase 'philosophers have only interpreted the world, the point is to change it', and updates it to her own version: 'theory has only observed the world; the point is to touch it'. (2009, 299) The idea of 'touch' sits at the centre of my practice. My compulsion has been to work with fundamental scientists – particle physicists, astrophysicists, and cosmologists – a choice that could be seen less as Donna Haraway's idea of 'staying with the trouble' (2016) and more along the lines of seeking out the trouble as I have been increasingly drawn to the extreme abstraction of these fields of knowledge-making and their radical intangibility. The 'tools' through which I pursue this extreme remoteness, however, are the materially prosaic means of the contemporary artist; in my case, photography, moving image, sound, sculpture and installation. To be clear though, this does not mean that the research is premised on visual aesthetics - my use of photography is not primarily as a visual medium, but rather I am asking if the photograph or film object can become a site of phenomenological encounter. Significantly, it was the questioning of the limits and capabilities of photography that drove the project 'Material Sight'; in other words, it was the idea of radical intangibility that had emerged out of a long history within my own practice working with the photographic and film object, but now explored in the context of fundamental science, that was the driver of the project.

Developing an understanding of (and engagement with) the specific positioning of the research with the project's science partners was a large part of the challenge, interest, and impact of 'Material Sight'. The research fellowship took place over a two-year period, but the working relationships were fostered, and methodologies trialled, over several years prior to

the project commencing. This lead-in time enabled me to counter some of the preconceived views held by my science partners about the methods and motivations of an artist working within the laboratory environments and wider sites of fundamental science - views that I understood as revolving around three, somewhat contradictory, assumptions: First was that working with photography and moving image would inevitably produce documentary images; second, that the primary purpose of the project was to communicate science to public audiences; and third that my approach as an artist would be centred on visual aesthetics.

I refer to my work as non-documentary because, even though the photographs and films are, in literal terms, a document of a specific site, they are not driven by documentary intent. By this I mean that there is no narrative drive, no conveyance of meaning beyond the image's own, internal presence – in this respect it is *how* something is looked at by the camera, as much as *what* is looked at. These are of course complex ideas to convey when working in the field. Negotiating access to a site (particularly where access is difficult, dangerous, or limited to specific personnel) and then arriving with film, photography, and sound equipment, develops an expectation from the host organisation that a document will be made, via the narration of histories or the communication of information. In theoretical terms (thinking about histories of photography and the conflicted position of my practice within it) I have come to think about this expectation as a form of 'documentary burden', but when working the field, particularly in cross-disciplinary contexts, I have come to recognise that communicating the intentionality of the research in the early stages of a project is key. In this way, I have been able to establish that it is an engagement with the combined physical, philosophical, and conceptual concerns of fundamental science that is the focus of the research and will therefore influence how I may be using my own technical equipment (still/moving image and sound) and, crucially, how this material becomes manifest for a public audience through exhibition or publication. At the same time, I am also able to address any expectations that the research will straightforwardly fulfil public outreach agendas.

Interestingly, the view that an artist's involvement in cross disciplinary research is, by default, centred on visual aesthetics, is still remarkably common. In the same way that the asymmetries instrumentalising art and influencing funding structures in cross-disciplinary research persist, the perceived differentials of 'purpose' assigned to Art and Science throughout much of the twentieth century also remain hard to shift. The British aesthetician, Harold Osborne exemplified this position when in 1981 he wrote in the journal *Leonardo*,

'scientists are motivated by the human urge to seek new knowledge for its own sake, fine artists by the impulse to provide and enjoy visual material for the expansion of aesthetic experience'. (1981, 290) [6] Despite the fact that this view would have been considered anachronistic by most artists, educationalists, and critical theorists when it was written forty years ago, Osborne's statement reflects the paradigm that many scientists and funding/commissioning bodies still tend to adhere to today. If asked, many fundamental scientists will speak about ideas of 'beauty', 'order' or 'patterns in nature' forming the key interface of their own discipline with the field of art. This is unsurprising since, in common with the population at large, most scientists have not been exposed to the idea of art practice as an expanded, critical, socio-politically engaged discipline – especially one where ideas of visual primacy (Jay) or visual objectivity (Daston and Galison) are acknowledged as contested concepts.

There are, of course, many scientists who are fully conversant with critical art practices and, as such, already comfortable with the speculation and (productive) uncertainty that working with artists can bring. [7] These scientists are often catalytic in cross-disciplinary research because they can produce confidence in a wider group of peers to move out beyond the comfort zone of one's discipline. I have found that encouraging shifts away from discipline-specific norms can be a vital aspect of new knowledge production and, to this end, I have used a creative strategy of constructively 'wrong-footing' fellow researchers. Akin to the idea of 'purposeful dislocation' (Ferguson and Gupta) in anthropology, wrong-footing can be brought about by small shifts in behaviour or action within the cultures of specific disciplines. An example of wrong-footing in action would be the request given to the physicists contributing to the publication 'The Live Creature and Ethereal Things: Physics in Culture' to write in the first person. With this request, editors Nicola Triscott (then Arts Catalyst Director) and myself understood that we were encouraging a transgressive act from researchers bound by codes of objective knowledge and collective intelligence.

The research methodologies of 'FUNDAMENAL' will build on the creative, practice-based strategies developed in 'Material Sight' whilst also looking at how other, historical models might inform contemporary thinking. A useful attitudinal approach, for example, could come from Deleuze and Guattari's (1988, 369-370) advocacy of a 'minor science' that runs alongside mainstream, major or 'royal' scientific endeavours (1988, 367): 'Whereas the latter developed formal disciplines in the natural and social sciences to underpin authoritative statements about the world by monarchy, State or societal establishment, minor science is

practically oriented: providing local knowledge to achieve specific tasks while acknowledging a world that is dynamic and heterogeneous rather than stable and consistent.’ (Fox and Alldred 2019, 10) What differentiates the two scientific approaches is their sense of attitude towards their objects of study; whereas major or royal science would be driven by empirical approaches toward producing data evidence, a ‘minor science’ perspective might come from immersion in the flow of events as they unfold: ‘Rather than observing and documenting a river and its contents from a fixed point on the bank, Deleuze and Guattari (1988, 372) suggested, minor science takes to a boat and becomes part of the flow it wants to fully understand’. (ibid 2019, 10)

Another area that ‘FUNDAMENTAL’ will look to develop is new approaches to the idea of the artists’ residency, asking what it is to work across and in-between cultures of practice and what might be done to ‘crack-open’ a form of interstitial space, building on historical models such as the Artists Placement Group (APG). Founded in the UK in the 1960s, the APG described themselves as having developed the first ‘industrial artist-fellowship’ where the artist could be an ‘engineer of conceptual material’. (Rycroft 2019, 295) With an emphasis on process rather than product, APG organised for artists to be embedded in government and non-government organisations such as Esso, ICI, British Rail, the Department of Health and British Steel. Whilst the idea for the APG as an organisation can probably be attributed to Barbara Stevini, (ibid, 293) it was her partner, John Latham, that provided the framing of the artist as an ‘Incidental Person’. The ‘IP’, as they were referred to, could affect thinking within the organisation, operating far outside the usual remit of an artist’s placement, consulting on issues such as ‘environmental protection, urban design and urban renewal, environmental engineering, communications technologies, production systems and human resources.’ (ibid, 296). To a large extent, the APG’s radicality resided in the fact that it was *led* by art practice; in this respect, the fact that the group persuaded large-scale industrial and administrative organisations to engage with a remit premised on the idiosyncratic ‘cosmic speculations’ of John Latham, can be seen as an extraordinary achievement.

The APG does not provide a conventional model for cross-disciplinary practice but this, I would argue, is its value in the context of the a-symmetries and false binaries that have been described. In this context it is an historical precedent that, together with the critical lens of New Materialism, can be used to constructively de-stabilise the art-science binary as well as exploring questions of how empirical data can be reconciled with lived experience. Through this approach, ‘FUNDAMENTAL’ seeks to challenge existing, instrumentalised models of

collaborative practice between the cultures of arts and science and instead approach knowledge-making practices as, “*social-material enactments that contribute to, and are part of, the phenomena we describe.*” (Barad 2007, 26); in this respect, artist, scientist, and publics are placed inside of, and indivisible from, the knowledge-making process itself in what is a fundamental re-positioning with, potentially, profound implications.

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Notes

[1] www.materialsight.wordpress.com

[2] Crisp and Triscott. 2018

[3] Arts Catalyst <https://www.artscatalyst.org/>

[4] Sleigh and Craske go on to outline changes made in the ‘second decade’ of A&S (2006-16) where, as well as cultural-political factors coming into play, there has been the adoption of the idea of ‘creativity’ as, ‘a sort of epistemology-lite that is used ubiquitously to describe the working method of both science and art.’ (2017, 317)

[5] The Negotiation of Science <https://www.cnos.ac.uk/>

[6] Extraordinary Renditions:

<http://fionacrisp.com/Website%20update/EXTRAORDINARYRENDITIONS.html>

[7] I am grateful to Adrien de Sutter for introducing me to the writing of John Tresch.

[8] In this statement Osborne differentiates what he calls 'basic' or 'pure' science from applied science and fine art rather than applied art.

[9] Interestingly, I have found that it often transpires scientists in this category have some relation – partner, sibling, child, or parent – with an artist or creative.

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