

The Transparent Body? Diagnostic Radiology and Society

A collaborative reflection on the workshop and its themes, written as an '[exquisite corpse](#)'.¹

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Biomedical Visualisations are fascinating, complex, contested objects in contemporary culture. Diagnostic radiology, from ultrasound to CT, PET and MRI, raises many questions for researchers interested in its social and political impact. These questions demand urgent attention at a time of technological development, increased use of imaging technology in healthcare and the widespread representation of medical images and imaging in popular culture. The workshop was organised around the theme of the 'transparent body'. This is the notion that imaging technology offers the possibility of accessing the inner body without mediation (Joyce 2005); the cultural belief that we can peek inside, as if through a window, and see everything that is there, just as it 'really is'. The myth of transparency encourages faith that looking will inevitably lead to 'the truth' about our health, accurate diagnosis, and ultimately successful treatment. Our discussions raised a diverse range of questions and issues around radiology, its clinical use, and its cultural narratives.

One clear overarching issue, however, was the question of both the *degree* and the *nature* of the correspondence that exists (or might exist) between the body scanned and the image depicted. Can we really use this technology to take a look at the inside of a given body, one to which the images produced will remain both faithful and realistic? Alternatively, could we say that the scan is no more than a (self-conceived) heuristic device – with claims to efficacy in medical practice, sure, but otherwise quite disinterested in arguments about truth? Or is it the case that the scan is indeed faithful and realistic – but only because of an inherent capacity to (co-)produce the very object to which it will later show such fidelity.

Our session with a Richard Wellings, Consultant Radiologist, was an excellent resource for starting to think through these kinds of questions: for example, the radiologist was generous enough to take us through some of the possibilities currently available (in this NHS trust, at least) for scanning

¹ Authors received the document by email in a random sequence. Authors were asked to read the piece (not just the last sentence as is sometimes the case with the 'exquisite corpse') and to add their reflections at the end. Many thanks to Jen Sterling (Loughborough University) for suggesting this writing task.

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particular parts of the body with CT and MRI, and clearly demonstrated the capacity for adaptation and manipulation¹¹ of the image that the new technology has bestowed upon skilled practitioners. Thus, we were able to see the difference in clarity (or, perhaps more significantly, *kinds* of clarity) depending on whether an image of a human brain was depicted in greyscale only, or if it used a more varied colour-palette.

Now, we might be inclined to conclude from the evidence of such techniques that there *is* no simple correspondence between a real, transparent body and a biomedical image – or, at least, that where such correspondence exists, its nature is bound up with a series of highly-contingent connections, put together by humans and machines alike. But such a conclusion would be problematic: if biomedical visualisation can sometimes be too convinced of its own capacity to reveal truth beneath layers of bodily unreason, socio-critique is not, itself, an entirely unrelated discipline (viz. Latour, 2004). Thus, if we wish to identify a sense of naivety in any biomedical-imaging technician's¹² claim to unmask the body and display the truth of the beating heart below, then we need to be sure that we are not, in turn, simply proposing to unmask the machine and reveal the fleshy reality of human practice beneath. Thus, we need to tackle these questions without ourselves relying on an ethic of revelation – that is, without presuming to use *our* technology to penetrate *another* transparent body (of knowledge, this time).

In effect, as posed by the paragraph above, what the study of biomedical visualisations makes possible to think is that there is no longer a comfortable place for social sciences from where to perform their 'traditional' role as –similar to medical techniques- 'diagnosing' discourses. That is, considering how biomedical visualisations 'construct' their objects of visualisation as seemingly transparent, immediately graspable and penetrable objects may very well lead us to question the length to which social sciences equally partake in this economy of representation. Or is it not the case that customary ways of thinking about what it is to produce critique in social science all too frequently equate it and viabilize it through metaphors of 'revelation' and unveiling? In this sense, it may be worth thinking if an emergent disciplinarian interest in biomedical visualisations does not have significant interfaces with the emergent attempt to acknowledge the performative character of social sciences' gaze. Since a 'critical' exploration of 'biomedical visualisations' patently show the enacted, constructed character of the object that they handle, would it be possible to say that such visualisations act as mirrors that allow social scientists to 'reflect' on their own practices? If, as Karen Barad (1998, 2003) has suggested, natural sciences create their objects of experimentation through the very apparatuses that they deploy to make such knowledge possible, then it is clear how social sciences also have creative powers in making certain objects –as biomedical visualisations– come to exist as legitimate objects of inquiry.

I believe a partial answer to these dilemmas can be found in the work that some Science and Technology Studies (STS) scholars have been developing in the last two decades. For example, Bernike Pasveer's (1989) work "Knowledge of shadows: the Introduction of X-ray Images in Medicine", discusses how X-ray developed and how it became a part of a diagnostic tool to examine disease. He reveals how the process of shaping the content and use of X-ray images, of making them

¹¹ NB this is 'manipulation' for good therapeutic and diagnostic reasons.

¹² This is an imagined figure; the radiologist that we met evinced no such.

represent reality, took place within specific institutions. Donna Haraway (1989) points out that our understanding of nature was constructed and reconstructed historically and culturally from science. She uses primate visions as an example to probe the relationship between fact and fiction as the relationship between nature and social construction and as a process of story telling. The way how we visualise and read the image of the materialised body as the object of knowledge projected to the monitor seems a kind of story telling which is full of social construction. However, Haraway stresses that 'technological determination is only one ideological space opened up by the reconceptions of machine and organism as coded tests through which we engage in the play of writing and reading the world' (1991:153). In other words, it is more a matter of how we situate ourselves and enact to the materialised body image.

In effect, if as showed above 'natural' and 'social' sciences similarly have performative capabilities that allow them to 'construct' –rather than just 'find'- their objects, then we are witnessing how 'society' and 'nature' have much more in common than we were prepared to acknowledge in the first place. And this co-constitution of society and nature illustrates how humans no longer hold the prerogatives that social sciences were traditionally prepared to grant them. As it is, both the natural and social worlds are co-constituted, and this co-constitution takes place through the participation of both human and non human entities. This was obvious to me when we visited the Radiology Department and were kindly instructed by Richard Wellings on the basic operations of technologies such as MRI, CT and PET. Because if it is true that we could conduct classical social critique to 'unveil' the uncertain or opaque character of the body that is being visualised through these technologies (an uncertainty that is the correlate of the need to 'interpret' such depictions through the 'human' skills of the consultant), what is also obvious is that such (human) interpretations are already moulded by the interpretative capabilities of the (nonhuman?) technologies. Hence I think that it is all too useful for us to start acknowledging the active, interpretative role that visualising technologies have, without fearing that such recognition might make us lose the capacity to understand the 'reifying' qualities of technologies. In conjunction with an STS approach, I think that the visit to the Radiology Department was highly instructive in showing how humans and machines cooperate on equal grounds in the construction of medical visualisations, signalling how visualising techniques are active actors in the enactment of disease.

The role of the radiology suite within the practices of disease enactment reminds us of its place in the wider context of the hospital and medicine, and the influence that these practices may have in the form that it takes. The radiological suite is one in a number of steps for patients on the path to diagnosis, and arguable one aspect of the wider calculations and assessments required to generate a diagnosis which can be acted upon. Explored by Anne Marie Mol in *The Body Multiple* (2007), disease construction can be considered as a result of a multiplicity of hospital *practices*. As Mol observes in her discussion of the diagnosis of the arterial disease, atherosclerosis, the referral for an investigation using scanning technologies is only raised by feelings of pain reported first-hand by patients. (Mol 2007: 46-47). The apparatus of these impressive and costly technologies of diagnosis and treatment are still mobilised by the very normal requirements of quotidian comfort and mobility, woven into wider narratives of the activities of family life or work (Mol 2007: p.70-71).

Our discussion with the consultant radiologist also showed that the output of the radiological apparatus as a unit is mobilised and shaped by the practical concerns and needs of the physicians

who order scans.¹³ This reference to the end users of the information provided by the radiological suite reminds us of the suite's function within the wider technical and social apparatus of medicine and, in the case of screening (for example using C.T. Scanning for breast cancer screening), epidemiology. It could be suggested that the way in which information from scans is evaluated and acted upon within wider contexts is somewhat obscured by the way in which the suite represents itself as primarily with the activities of scanning and reading,¹⁴ making images and looking at them. Here, the weight of the technologies are so great that the machines are visited by the patients; in most cases, we might avoid moving sick people who are usually be considered as incapacitated (it is usually normal to visit them). Once they are made, scans are most often read by radiologists working at single person workstation, away from patient and machinery,¹⁵ the results are then electronically shared with their client physicians. The way in which scans come to be part of larger pictures of individual case histories is therefore obscured.

So, what becomes of these 'visiting patients' in the obscuring of the individual case history as described above? Is radiology a helpful legitimisation of their symptoms and distress? Or does the primacy of imaging technology make their story obsolete? There is no doubt that radiology has added huge benefits to health, for example, the use of CT scanning avoids exploratory surgery for approximately 300,000 children in the USA annually (Donnelly and Frush 2001) and many present day medical disciplines would be non-existent without its development (Gunderman 2005). However, despite being an important adjunct to a full clinical picture and ultimate diagnosis, a CT or MRI scan is, as Born (2003) explains, not an object but an image of one aspect of that object and the radiology report is simply a personal interpretation of that image or, as Helman (2004: 15) describes, "only a rectangular slice of time, a split second in the trajectory of a life". Read alone, it can be notoriously unreliable or unhelpful, with mammograms missing up to 15% of breast cancers (King 2006) and herniated spinal discs being revealed in a quarter of 'normal' individuals (Born 2003).

However, both clinicians and patients may fail to recognise the 'blind spots' of this technology (Gunderman 2005: 339). Stacey (1997:152), a social scientist and self-confessed sceptic of visual reliability, describes her own experience of receiving a falsely positive CT report. Despite being "engaged in writing about the cultures of medicine and challenging the truth claims of its aspirations to objectivity and positivism", she suddenly and unexpectedly had complete trust in the interpretation and 'truth' told by the imaging in the moment that it applied to her. This is exemplified by a respondent in Gross' study of brain cancer diagnosis, who explains of their report, "This is a summary of my disease, so I know whether I am better or not" (Gross 2009: 1821). An MRI

¹³ Wellings discussed with us how his prior experience as a surgeon allowed him to predict the types of visualisations that would be useful to surgical clients, who would use the information he provided as maps to follow in their surgical interventions.

¹⁴ During our visit to the radiology suite we visited three types of room, a meeting room (for teaching and discussion of cases), a reading room (for examining scans and making diagnosis) and the scanning rooms which housed technicians and equipment.

¹⁵ This privileging of the scan as containing all necessary data for an assessment is consistent with a kind of rhetoric of objectivity dealt with by Daston and Galison's in their history of Objectivity (2007). Here they introduce the notion of objectivity as a form of 'blind sight' where observations should be made in isolation from prior assumption, interpretation or hunches (Daston and Galison 2007: 17), all of which unnecessary knowledge meeting the patient might provide, interfering with a 'pure' reading of the machine made scan.

that reveals a treatable musculo-skeletal problem may seem like manna from Heaven to someone who has lived with chronic pain and increasing disability but what of the person who has pain but no radiological 'evidence'? Furthermore, how much additional confusion is bestowed on the patient who has cancer but for whom the source cannot be visualised in this high-tech age, despite having an average of nineteen investigations per patient (Symons 2009)?

The anthropologist DiGiacomo (1987) in her account of her Hodgkin's Disease diagnosis, describes the physical and emotional detachment of radiology technicians in comparison to other healthcare professions. This is illustrated by Gunderman (2005: 234) who explains how vision only becomes acute when we step back from what is being viewed and advises that the more visual medicine becomes the greater the distance between clinician and patient. He warns that a CT scan, for example, can only reveal the density of the tissue being imaged and is unable to 'see' a person's diet, response to stress, alcohol intake and many other determinants of health and wellbeing. He suggests that in radiology's enthusiasm to reveal what is hidden, the patient may become simply "the background against which the disease is projected".



An article published on February 18 in the *New England Journal of Medicine* (Monti et al. 2010) described 5 patients in an apparently minimally conscious state who were able 'to willfully modulate their brain activity'. One patient in particular exhibited a seeming ability to communicate complex phrases, as determined by functional MRI in conjunction with a technique called 'facilitated communication'. This exciting development was reported in the popular press as 'Think tennis for yes and home for no: how man trapped in his body 'spoke'' – and was accompanied by pictures, not of the patient, but of fMRI images of his brain (*The Guardian*, Thursday 4 February 2010). The finding generated a huge buzz for days; the Belgian patient's name and history entered the public domain; the news media reported that the 'trapped' man might soon be dictating a book.

Mere days later, on 12th February, one of the article's authors, who also treated the patient in question, addressed the British Neuropsychiatric Association and announced that the speech therapist who 'facilitated' the communication was 'wrong'. The patient was not actually communicating at all. There was some, but not much, reporting of this retraction.

My interest in and understanding of this (supremely tragic) case history and its trajectory into the public eye were thoroughly coloured by having participated in the 'transparent body' workshop. The myth of transparency, the reification of the technical (re)production of images, Joyce's observation that technology acquires agency, van Dijck's (2005) that transparency is dense, complex, and layered; an allusion to the consultant radiologist as high priest of the transparent body: my workshop notes go some distance toward comprehending how such a narrative could unfold.

How different is this case from that of 'Clever Hans', the horse that 'did' arithmetic? An editorial, entitled 'Cogito ergo sum by MRI', appears in the same issue of NEJM, and invokes the disciplines of philosophy and theology in addressing the issues raised (Ropper 2010). The author warns that the fMRI changes perceived in the brains of these minimally conscious patients might well be 'a shadow on the wall', and that "[t]he mind is an emergent property of the brain and cannot be 'seen' in images" (Ropper 2010: 649). He, at least, queries the emperor's wardrobe choices.

But how could so few have realised, for so long, that trickery, illusion, a 'shadow on the wall', were all likelier explanations than what was reported as true in a highly-esteemed, peer-reviewed journal (impact factor = 51.296 in 2009, for goodness sake)? In describing the creation of an MRI image, Richard Wellings, 'our' radiologist at the workshop, employed the word 'fiddle' or 'fiddling' more than half a dozen times: a term often linked with duplicity and artifice; and yet, these are images that acquire an almost sacred aura of authority. No overt intent to deceive can be imputed.

The high priority attributed to 'seeing' as a route to or as (in English, anyway) a gloss for 'knowing' – especially in contrast to the Japanese approach, which Kelly pointed out— perhaps offers a clue, and deserves further investigation. A comparative ethnography of MRI in particular and medical imaging in general between Japan and an English-speaking western country might offer useful insight.

The scanning equipment in the radiology department uses a number of different physical properties to create the data for the images, all of which is converted to computer code. Computers with their software are used to convert this code into images. The clinical – social – technical construction of the images occurs in two stages, the production of the computer code and the interpretation of the computer code. The computer code is easily transported and stored so can be re-interpreted by different people and at different times. This was also possible with x-rays on film but was much more difficult due to their bulk. The impact of this on clinical practice and health and on social understanding of medical imaging seems as yet to be unclear. However, the ability to combine and manipulate the computer code to produce four dimensional images was breathtaking – for me as someone with a clinical training. To 'see' the valves of the heart moving in a living patient was wonderful, having been trained in anatomy on cadavers, mechanical models, diagrams and text - despite knowing about all the uncertainties about the image as a representation of the real heart at that time. These images provide a different experience for current students that might provide them with greater insight about the workings of the body than in the past. I don't know whether there is a danger of students omitting to take into account the way the image has been produced.

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