

Lecture: Getting from here to there (Or why the transition to Digital Humanities might be painful and slow)

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Based on his keynote lecture at the international conference on Digital Humanities at Aalborg University in April 2014, John Naughton reflects on being an engineer in a Humanities research institute that is currently seeking to adapt to the digital potentials and challenges. The Humanities represent an analytical, critical, or speculative approach whereas the so-called hard sciences focus on problem solving. Naughton discusses why he agrees with the authors of the Digital Humanities Manifesto 2.0 and why the digitisation of the Humanities not only effects universities and scholars but also industrial and cultural life in general.

To be honest, I feel like an intruder in this company. Full disclosure: I'm not a Humanities scholar. But I'm pleased to be here because two of the other speakers today were instrumental in getting me thinking about the subject of the symposium. When Helle Porsdam was a Fellow on the Arcadia Project (<http://arcadiaproject.lib.cam.ac.uk/index.php>) that I ran at Cambridge University Library between 2008 and 2012, she started me thinking about Digital Humanities in the context of the famous 'two cultures' debates that raged in Cambridge in the early 1960s – and have resonated ever since wherever people gather to discuss such things. And then, on 18 April 2012, Jeffrey Schnapp gave a really memorable talk in Cambridge that left me thinking about why the transition from traditional to digital humanities might not be straightforward – which is what I want to talk about today.

But first a health warning: I'm an engineer, and as everybody knows, engineers are simple-minded people who are basically problem solvers. But now, I'm in the fascinating position of being the only engineer in a large and vibrant Humanities research institute. Which means that I'm the only person in the institute who's allowed to ask stupid questions. Questions like: What problem are you trying to solve? And when I ask this kind of question, my colleagues look at me as though I've said something unmentionable. *Problem! Solve!* How naive and uncultured can you be?

Undaunted, I approach the question of Digital Humanities (DH) in this simple-minded spirit. The Humanities, according to Wikipedia (Humanities, 2014), are "Academic disciplines that study human culture, using methods that are primarily analytical, critical or speculative, and having a significant historical element, as distinguished from the mainly empirical approaches of the natural sciences."

So ... the Humanities are the disciplines that study human culture using analytical, critical, and speculative tools. Given that human culture is increasingly expressed and encoded in digital media, this means that Humanities scholars are going to be increasingly engaging with digital media, tools, and the mindsets that go with them. QED.

You won't be surprised to learn, therefore, that I buy the argument espoused by Jeffrey Schnapp and Todd Presner in their *Digital Humanities 2.0* manifesto (Schnapp, Lunenfeld, Presner, et.al., 2009). Or that I agree with the view expressed in the *Digital Humanities* book authored by Burdick, Drucker, Lunenfeld, Presner, and Schnapp (2012) that "the humanities must survive because they embody distinctive models of producing knowledge and distinctive modes of knowledge itself."

Actually, to me, the term Digital Humanities seems, well, a bit absurd. Almost as absurd as it would be to speak of the 'Print Humanities'. In 20 years' time, nobody will use the term 'Digital Humanities'. They'll just talk – as they do now – of the Humanities. So, I'm with Nate Kreuter (2011) when he asks,

"What if we just called it the humanities? Drop the digital part. My logic is this: I think that it becomes more and more of an obligation for humanists to account for and incorporate appropriate digital technologies in their work, whether those uses of technology are for the discovery of new knowledge and relationships, or for the transmission and display of finished work, or some combination of the two. In an era when the humanities disciplines are clearly under assault, both financially and intellectually, I would go so far as to say that not accounting for and capitalizing upon such technologies in one's work is a disservice to one's discipline."

That makes sense to me. And yet, whenever present-day Humanities folks gather in significant numbers, there are signs of profound unease. There appears to be a chasm between traditional scholars and what some of them refer to, disparagingly, as "the Digital" – as if it were an alien, parallel universe.

In that context, I've been struck by a piece in *The Chronicle of Higher Education* (Panapacker, 2013) summarising the tenor of a round-table discussion of Digital Humanities,

which took place at the annual meeting of the Modern Languages Association in Boston last January. Here is a (paraphrased) list of the charges levelled against Digital Humanities by what I assume are traditional Humanities scholars:

- DH is insufficiently diverse.
- DH falsely presents itself as a fast-track to academic jobs (when most of the positions are funded on soft money).
- It suffers from “techno-utopianism” and “claims to be the solution for every problem.”
- DH is “a blind and vapid embrace of the digital” that insists upon coding and gamification to the exclusion of more humanistic practices.
- DH detaches itself from the rest of the humanities (regarding itself as not just “the next big thing” but “the only thing”).
- DH allows everyone else in the humanities to sink as long as the DH’ers stay afloat.
- DH is complicit with the neoliberal transformation of higher education; it “capitulates to bureaucratic and technocratic logic,” and its strongest support comes from administrators who see DH’ers as successful fundraisers and allies in the “creative destruction” of humanities education.
- And – most damningly – there’s the canard that DH’ers are affiliated with a spectre that is haunting the humanities – the spectre of MOOCs.

This is a pretty poisonous charge sheet, and it suggests to me a level of fear and loathing that, in happier times, might have interested Hunter S. Thompson. And yet if the definition of the Humanities as disciplines that study human culture is to continue to hold, these self-same scholars, or their descendants, will have to cross the Rubicon into that parallel, digital universe. This sounds like technological determinism, I know, but to me it looks awfully like common sense.

And at this point, I become really interested. Because what preoccupies me as a historian of the Internet and a student of these things is how society is making and handling this transition into a new, digital, information ecosystem. The questions that it raises apply not just to scholarly disciplines but also to industrial and cultural life in general: Namely, how do transitions of this type and magnitude happen? What institutional and psychological changes are involved? Under what conditions do some institutions, industries, and communities fail to make the transition? What are the consequences of failure to adapt to the new circumstances? And where should we look for ways of thinking about these questions?

Affordances of ‘the Digital’

In thinking about the nature and scope of the transition to Digital Humanities, and understanding why the evangelists for DH 2.0 think as they do, we need to have a good feel for the nature of the digital technology that is the cause of all this angst. My impression – as an engineer – is that the nature and capabilities of digital technology are not uniformly

understood or appreciated by some of those who fear or loathe it. So I'd like to spend a few moments talking about those capabilities and characteristics. My guess is that everything I'm going to say under this heading is already familiar to this audience, but just in case it isn't, can I crave your indulgence for a moment?

In thinking about this, the idea of affordances is helpful. An 'affordance', according to a useful working definition, "is a quality of an object, or an environment, which allows an individual to perform an action. For example, a knob affords twisting, and perhaps pushing, while a cord affords pulling" (Affordance, 2014).

What are the affordances of digital technology that are most relevant to our concerns here? The first, and most important, is that the technology blurs the boundaries between things that were once entirely distinct. It does this by reducing them to the lowest common denominator – the bitstream. Nowadays, almost every cultural artefact you can think of is encoded as a sequence of ones and zeroes.

This convergence is already commonplace for text, images, movies, and music. But in a strange way, it is also happening to three-dimensional objects: The combination of scanning and 3D printing is making it possible to encode sculptures as bitstreams that can be reproduced with astonishing fidelity, bringing new resonance to Walter Benjamin's speculations about the work of art in an age of mechanical reproduction (Benjamin, 2008).

The implications of convergence are simultaneously obvious and profound. Once upon a time, for example, we were clear about what a 'book' or a 'document' was: a codex and a slab of linear text respectively. But in a digital world, those simple certainties begin to look naive.

Consider, for example, one of the great canonical texts of modernism: T.S. Eliot's *The Waste Land*. When I was an undergraduate, my friends who were studying literature used to go on and on about the importance of this great poem. So, being an impressionable and naive young man, I obtained a copy of the text and embarked upon it. But I found it impenetrable, freighted as it was with references and nuances that were entirely foreign to me. So I concluded that I should stick to engineering, where at least there were such things as the 'correct' answer to puzzles.

But then, many decades later, a friend of mine named Max Whitby founded a company called TouchPress and rendered the poem as an iPad app (<http://thewasteland.touchpress.com/?tpnav=1>). Suddenly *The Waste Land* became a number of different but inextricably connected things: a filmed performance of the poem by the distinguished actress Fiona Shaw; a set of five audio readings of the poem – including two by Eliot himself – and an entrancing reading by the great actor Alec Guinness; the plain text of the poem with dynamic, hyperlinked annotations; and facsimiles of Eliot's typescript, complete with his handwritten corrections. And suddenly, via the affordances of digital technology, the poem that had baffled me as a young student came to life, and I finally gained some insight into its meaning and its significance. And now, Max and his colleagues are doing the same for another canonical modernist text, James Joyce's *Ulysses*. And with much the same effect.

A second affordance of digital technology is its ability to democratise access to cultural goods that were once accessible only to a privileged few. For many centuries, we knew what a university was. It was an institution that did three things: Firstly, it created knowledge; secondly, it stored, curated, and conserved that knowledge; and finally, it transmitted it to new generations of students and scholars. In order to carry out those functions, however, one important condition had to be met: Students and scholars had to come to the university.

But as Eli Noam pointed out many years ago in a prescient essay entitled 'Electronics and the Dim Future of the University', which was published in the journal *Science* in 1995, the affordances of digital technology loosened those constraints in profound ways. Noam asked the question: What's the function of the university when students and scholars no longer have to come to the university? Or as Howard Rheingold – an early evangelist of cyberspace – put it: Where is the Library of Congress when it's on your laptop?

Digital technology enables us to do old things in new ways. And this indeed was the basis for much of the scholarship that people nowadays refer to as 'Digital Humanities 1.0' or 'computational humanities' (e.g. <http://ehumanities.nl/computational-humanities>). Thus, our ability to digitise large collections of existing texts enabled scholars easily to identify patterns and correlations that were implicit in those corpora but that would have been difficult or impossible to find by hand. "Like all media revolutions, the first wave of the digital revolution looked backward as it moved forward," wrote Jeffrey Schnapp, by which he meant that the first wave was "quantitative, mobilizing the search and retrieval powers of the database, automating corpus linguistics, stacking hypercards into critical arrays" and so on.

But digital technology also enables us to do new things, things that were inconceivable in an analogue age. It enables scholars separated by huge distances to engage in collaborative work on an unprecedented scale, for example. To create an online encyclopaedia on a scale that was unimaginable in an analogue era. To crowdsource the indexing and tagging of cultural resources (e.g. <http://www.bbc.co.uk/arts/yourpaintings>). To have ongoing, interactive conversations with one's peers about the scholarly works and publications that matter to them and to me. (Think, for example, of what went on in the literature-sharing service Mendeley, which has just been swallowed by the publishing giant Elsevier (Dobbs, 2013). Or of how, when I read an eBook on my Kindle, I can see the passages in a text that other readers, all over the world, have highlighted.)

One inescapable implication of these affordances is that the traditional model of scholarly work in the Humanities – predicated on the model of the lone scholar labouring quietly in a specialist vineyard before eventually producing a monograph every five years – begins to look, well, a bit dated.

I could go on to talk about other affordances of digital technology – of the way it challenges old notions of copyright and fair use, for example; or of the way it appears to be shrinking the size of the basic unit of cultural communication; or of the way it challenges old notions of indexing and cataloguing (Weinberger, 2008); or of the colossal abundance of cultural production that it enables. But you will have got the point. The reason I raise

them here is because I suspect that one of the reasons why traditional Humanities scholars are suspicious of, or puzzled by, Schnapp's and Presner's *Manifesto* is that they don't appreciate the affordances of digital technology in the way that the *Manifesto's* authors do.

Where we're headed

To me, the really interesting thing about the *Digital Humanities Manifesto 2.0* is how *unremarkable* it seems. On reflection, the reason for this is obvious: It takes for granted the affordances of digital technology with which those of us on the other side of the Two Cultures divide have lived for many years.

For example, the *Manifesto* accepts that "print is no longer the exclusive or the normative medium in which knowledge is produced and/or disseminated." To those of us who look first on arXiv (<http://arxiv.org>) for articles, this seems pretty straightforward. Likewise its acceptance that "print finds itself absorbed into new multimedia configurations." (See my earlier remarks about *The Waste Land* iPad app.) Likewise the *Manifesto's* assumption that "digital tools, techniques and media have altered the production and dissemination of knowledge," though its assertion that this is currently true in the Arts, Humanities, and Social Sciences seems unduly optimistic, at least for the time being.

I'm less sure about the *Manifesto's* claim that "universities are no longer the sole producers, stewards and disseminators of knowledge or culture." Were they ever the *sole* producers, I wonder? But I agree with the thought that, if they are to have a significant role in the new ecosystem, it will be in: shaping "natively digital models of scholarly discourse for the newly emergent public spheres of the present era"; modelling "excellence and innovation in those domains"; and facilitating "the formation of networks of knowledge production, exchange, and dissemination that are, at once, global and local."

The *Manifesto* is spot-on in its argument that scholarship in the Digital Humanities will involve *co-creation* – which is really code for people working together, collaboratively, in teams, as researchers in the sciences and technology have done for generations. "Because of the complexity of Big Humanities projects," it says, "teamwork, specialized roles within teams, and 'production' standards that imply specialization become defining features of the digital turn in the human sciences. Large scale, distributed models of scholarship represent one of the transformative features of the Digital Humanities."

That's true, but it also highlights the distance that traditional Humanities disciplines will have to travel to make the transition.

Cultural revolution?

If my assessment is right (that there exists a significant gap between (i) the culture of the Humanities as it is traditionally practised and understood and (ii) how these disciplines will

have to change if they are to thrive and stay relevant in a digital universe), then the question of *how* the transition might happen becomes really interesting.

We know, more or less, where the Humanities are at the moment. I say “more or less” because I’m sure the picture is not uniform across disciplines. But I’m fairly certain that, in each one, the threats and opportunities of digital technology loom increasingly large. And in the *Digital Humanities 2.0 Manifesto* and the *Digital_Humanities* volume we have a persuasive vision of where they need to get to. The question is: How might the transition happen?

To my mind, this looks like a specific instance of a more generic puzzle, namely how do cultures change under technological pressure? As you can imagine, many scholars have pondered this over the years. For the purposes of this talk, I have singled out four perspectives in the hope that they might shed some light on the transition problem.

Disruptive technologies

The first is an industrial perspective, which stems from the work of a Harvard scholar, Clayton Christensen (1997), who has focused for many years on a significant phenomenon in industries faced with technological disruption. His original book, *The Innovator’s Dilemma*, asks the question: Why do successful companies fail to adapt to disruptive technology?

Christensen’s pioneering case study was of the industry that made disk drives, mainly because a colleague told him that disk manufacturers were “the fruit flies of the computer industry,” i.e. companies with apparently short lives. His research showed that the companies that made fourteen-inch drives for mainframe computers had been driven out of business by companies that made eight-inch drives for mini-computers, which in turn were destroyed by companies that made 5.25-inch drives for PCs. The puzzling thing, Christensen found, was that in each case, the new technology that supplanted the established one wasn’t better than the old stuff; it was *worse*. And yet in each case, the inferior products thrived.

And this was the case, Christensen discovered, across the entire industrial spectrum. In industry after industry, the upstart technologies that had brought established companies to their knees weren’t better or more advanced – they were actually worse. “The new products,” as one report put it, “were low-end, dumb, shoddy, and in almost every way inferior. But the new products were usually cheaper and easier to use, and so people or companies who were not rich or sophisticated enough for the old ones started buying the new ones, and there were so many more of the regular people than there were of the rich, sophisticated people that the companies making the new products prospered” (MacFarquhar, 2012). Christensen called these low-end products ‘disruptive technologies’, because rather than sustaining technological progress toward better performance, they disrupted it. His conclusion was that the only way an established company could avoid being disrupted was “to set up a small spinoff company that would function as a start-up, make the new

low-end product, and be independent enough to ignore what counted as sensible for the mother ship.”

Christensen’s work has been very influential in shaping the way people think about technologically driven disruption to the established order. The poster child for his analysis is what happened to Kodak, the company that, in its heyday, dominated the global photography business (Cambridge Judge Business School, 2013). Its prosperity was based on analogue – film – photography, a business that was astonishingly lucrative, with gross profit margins on some products exceeding 50 per cent.

But here’s the strange thing: Deep in the company’s R&D labs in Rochester, NJ, a group of Kodak scientists invented the first digital sensor. In effect, they invented digital photography.

But the early manifestations of this technology were, of course, very crude compared with the sophistication of film. And because it was digital technology, which is always likely to be commoditised, the profit margins on this technically inferior product were likely to be slim. So Kodak turned its back on this disruptive technology and eventually paid the price. Last year, it filed for bankruptcy – from which it has recently emerged in a much-diminished form essentially as the owner of a portfolio of patents.

Does Christensen’s perspective hold any lessons for us?

At first glance, no. The survival or health of academic disciplines is not determined – at least in the short term – by mere market factors. On the other hand, one can identify in some traditional reactions to DH scholarship the incredulous sneer that characterises the establishment enterprise that is destined to be disrupted but doesn’t yet know it. One hears it, for example, in the way Stephen Marche (2012) disdains the Digital Humanities as “yet another next big thing. It’s a phrase with a wide array of meanings. It can mean nothing more than being vaguely in touch with technological reality – being an English professor who is aware of the existence of Twitter, for example – or understanding that there are better ways of disseminating academic studies than bound academic journals languishing on unvisited shelves.”

Two Cultures?

Another lens though which one can view the tension between the traditional Humanities and their emergent Digital manifestations is provided by the age-old spat between CP Snow (2012) and FR Leavis – the so-called ‘Two Cultures’ debate of the early 1960s. Helle Porsdam (2011) first drew my attention to this when she was a Fellow on the Arcadia Project at the University Library in Cambridge, and she has written insightfully about it, so I won’t dwell extensively on it here except to say that I’ve always felt that Leavis’ side of the argument has not been widely appreciated. He only had himself to blame for this because his vituperativeness towards Snow created so much noise that the underlying signal was more or less totally obscured. But what I take from his Richmond lecture and subsequent

writing is that he disputed the ‘two cultures’ thesis not because he was ‘anti-science’ but because he believed that there is really only *one* culture and interpreted Snow’s championing of the superiority of the sciences as a patronising land-grab for the higher moral ground of that culture. “I am not suggesting,” Leavis (1972) wrote later,

“that we ought to halt the progress of science and technology, I am insisting that the more potently they accelerate their advance the more urgent does it become to inaugurate another, a different, sustained effort of collaborative human creativity which is concerned with perpetuating, strengthening and asserting, in response to change, a full human creativity—the continuous, collaborative creativity that ensures significance, ends and values, and manifests itself as consciousness and profoundly human purpose. ... A very strong, persistent and resourceful creative effort, then is desperately needed – a collaborative creativity to complement that which has produced the sciences.”

What’s striking for me about this passage is that I hear echoes of it in the agonised scepticism of some Humanities scholars about the worth – moral and intellectual – of the Digital Humanities. Remember the strictures from members of the MLA that I paraphrased earlier – particularly the accusation that Digital Humanities is complicit in the neoliberal transformation of higher education, that it capitulates to bureaucratic and technocratic logic, and that its evangelists are playing the role of Lenin’s ‘useful idiots’ in the “creative destruction” of humanities education. One would have to be a pretty boneheaded technological determinist not to recognise that there may be something to these concerns.

Grief observed

In 1969, the Swiss-American psychiatrist Elizabeth Kubler-Ross published a groundbreaking study of grief entitled *On Death and Dying*, which was based on her observations of people facing death or some other extreme fate. In the book, she advanced the hypothesis that individuals faced with such challenges go through five recognizable stages, which she categorised as Denial, Depression, Anger, Bargaining, and Acceptance. For most of my working life, I have been both an academic and a newspaper columnist and have therefore been in a good position to observe how my colleagues in print journalism have been responding to the near-death experiences offered by the Internet.

As I’ve done so, it has struck me that these reactions could accurately be mapped onto the five-stage model. At any rate, I certainly observed *denial*, *depression*, and *anger* and in recent years have also observed *bargaining* and a kind of resigned *acceptance*. Which leads me to speculate that the reactions of Humanities disciplines to the prospect of Digital Humanities might also be mapped onto the model (Naughton, 2009).

Kuhn's disciplinary matrices

A final perspective is suggested by the work of Thomas Kuhn, the historian and philosopher of science. We've just passed the fiftieth anniversary of publication of the book that really made his name, *The Structure of Scientific Revolutions* (Kuhn, 1962). In it, Kuhn set out an arresting picture of how *scientific* disciplines develop, but what I want to do is to borrow some of his ideas and apply them to academic disciplines more generally.

Most of you know Kuhn's work, I guess, but in case you don't, let me summarise it crudely. According to him, the scientific process is not a linear or uniform one, but rather the alternation of two phases – one called 'normal science', the other periods of upheaval or 'revolutions'. As its name implies, normal science is business as usual. A community of scientists, characterised by a collective commitment to a set of "shared theoretical beliefs, values, instruments and techniques, and even metaphysics" (which Kuhn variously called a "paradigm" and a "disciplinary matrix") engage in research that essentially involves exploring (and hopefully resolving) 'anomalies'. That is, discrepancies between the paradigm and the aspect of the real world to which it supposedly applies.

Despite the name, no scientific paradigm is perfect. There are always things it doesn't explain. Normal science proceeds by exploring and seeking to resolve these discrepancies, making the basic assumption that the paradigm is fundamentally sound.

And in many cases, this is justified: The anomaly is resolved by adjusting the paradigm or incrementally extending it. But over time, the number of unresolved anomalies builds up, until eventually some practitioners begin to question the paradigm and eventually to propose an alternative. At this point, the discipline enters a period of intellectual crisis, which ends with the overthrow of the old paradigm and its replacement by a newer one – the 'paradigm shift' of popular usage. After the shift, normal science resumes – until the next time.

This, brutally simplified, is Thomas Kuhn's picture of the scientific enterprise. It was controversial from the outset because it clashed with more idealistic, normative ideas about how science should proceed (for example, Popper, 2002). But it has also proved immensely influential because it chimes with many practitioners' experience of how science is actually done. And of course, the history of science is littered with examples of revolutions: Think of the transition from Newtonian mechanics to quantum mechanics, for example, or of the emergence of the theory of plate tectonics in geophysics.

Kuhn's book has had an extraordinary impact. It is, for example, the most cited 20th-century book in the Arts and Humanities index – above Joyce's *Ulysses*, Wittgenstein's *Philosophical Investigations*, and Chomsky's *Aspects of the Theory of Syntax*. The citation indices give us one measure of the extent to which his picture of scientific progress has penetrated our collective unconscious.

But in fact, the penetration goes deeper than we can measure. His account achieved a kind of metaphorical dominance that, I think, is only rivalled by CP Snow's trope about the 'Two Cultures'. And just as Snow's thesis exerted more leverage on the arts and humanities

than on the natural sciences and technology, so Kuhn's picture had a similar unintended consequence. For while scientists – who in tend to be unimpressed by the philosophy of science – generally paid little attention to Kuhn, in other parts of the academic forest, people began to sit up and take notice.

Kuhn's insight had a radical impact on one area in particular – the social sciences, which in the 1950s and 1960s were still struggling to attain academic respectability. So whereas scientists looked at Kuhn and found his account banal or unremarkable, social scientists and workers in other, non-scientific, fields saw in it an important message – not to mention a hope of salvation. The message was that if you wanted your discipline to be seen as academically rigorous, then it must have a theoretical and methodological core. It must, in other words, have a paradigm. And these non-scientific disciplines set about acquiring paradigms like ostriches going at brass doorknobs (as PG Wodehouse would put it), with consequences that were as predictable as they were sometimes malign.

To see why, we need to look more closely at the concept of a paradigm. Although it played a pivotal role in Kuhn's account, he was surprisingly – some would say maddeningly – vague about it (Masterman, 1970). But the essence of it is *a set of theoretical beliefs, methodological principles and values to which a mature discipline collectively subscribes*. A paradigm defines what an academic community believes to be true and valuable. It enables the community to decide what is important and what is peripheral. It sets the criteria by which professional work in the field is to be judged – the standards to be adhered to and hopefully achieved. It defines what should be taught to students, what textbooks and readings are approved. It enables appointment boards to decide who should be appointed to teaching and research posts, who should have professorial Chairs and tenure, who should be promoted and honoured.

A paradigm, in other words, is absolutely central to the functioning of a mature discipline. And this is not just a matter of organisational exigency, by the way. In any field of intellectual inquiry, we cannot operate without such a disciplinary matrix. Otherwise, the field would just be a cacophony of incommensurable beliefs. As Karl Popper used to say, all observation is drenched in theory.

So there's no escaping paradigms. The problem arises when they take on a life of their own. One sees this most strongly in the early stages of scientific revolutions: The paradigm is so deeply embedded in the way a discipline functions that challenging or abandoning it would open too many cans of professional worms. Too many senior people have too much invested in the old order – which is why, sometimes, we have had to wait for them to die off before a new paradigm could really take hold. So sometimes – even in science – paradigm shifts happen more slowly than they should. But in science, shifts happen eventually for the simple reason that, in the end, there's no way of fudging the issue. There was no way of concealing the fact that Newtonian dynamics simply couldn't cope with what went on at the sub-atomic level. In science, ultimately, reality intrudes. That's why, despite the best efforts

of the Stalinist state, for example, Lysenkoism eventually bit the dust: It was impossible to ignore the evidence provided by the natural world (Graham, 1998).

The problems start when we move away from the exact sciences and into fields where the concept of an external, objective reality is more problematic. In these, there may be no incontestable reality – no natural world – against which to judge the applicability or utility of a paradigm. What happens then?

Well, one thing that does not happen is that practitioners throw up their hands in horror and wail that it's all too nebulous and that it's impossible to think of having a paradigm in such circumstances and that the field is too immature and that basically everyone should go back to [fill in the blank] – naming a discipline that it allegedly more mature and respectable. No – disciplines do not turn their back on paradigms, for two understandable reasons. The first is intellectual: One cannot do rigorous inquiry without some agreed conceptual framework. The second reason is more disreputable and is rooted in what one might call the political economy of academic disciplines. Students have to be recruited, taught, and examined. University departments have to be created and staffed. Jobs have to be found for the boys – and girls. Scholarly journals have to be edited, peer-reviewed, published, and subscribed to. Professors have to be appointed, promoted, given tenure – and, occasionally, dismissed for unprofessional conduct. So even if there were no intellectual case for the evolution and maintenance of a paradigm, the practical, pragmatic arguments for having one are generally regarded as unanswerable. And disciplines don't give up easily on their paradigms.

One of the reasons Kuhn's account of scientific progress was so controversial stemmed from the fact that when a discipline gets into the crisis state where there are competing paradigms, there is no purely rational way of deciding on the relative merits of the two competitors. This is because, in general, rival paradigms are what Kuhn called *incommensurable*. By this, he meant that there exists no neutral calculus that would enable an impartial observer to choose between them. The two paradigms inhabit different conceptual universes. There's no 'neutral' way, for example, of deciding between Newtonian dynamics and quantum physics for the simple reason that some central concepts in one are unthinkable or utterly meaningless in the other.

Why was incommensurability so troubling to so many people? Simply this: It implied that the major advances in what are traditionally regarded as the highest expression of human rationality – namely the natural sciences – cannot be explained in purely rational terms. There has to be an element of faith – or something like it – involved. To some of Kuhn's infuriated critics, it was as if he were saying that scientific revolutions are the product of outbreaks of mob psychology.

What has all this to do with Digital Humanities? I see two possible connections.

The first relates directly to incommensurability. When one compares some of the most interesting contemporary work in the Digital Humanities with the kind of work that is esteemed within the disciplinary paradigms of traditional Humanities scholarship, then

one finds oneself looking at two parallel universes. There's serious incommensurability here, which means that transition from the old to the new is not going to be straightforward.

The other thought stems from unpacking the concept of a paradigm – as indeed Kuhn himself did in his later work – in favour of a richer portmanteau term, the *disciplinary matrix*. Paradigm is too bland a term for the complexity that is actually at work. What a disciplinary matrix implies is a “constellation of shared commitments” (Bird, 2011) and such constellations are not easily overthrown or abandoned because in any mature discipline, the network of commitments is very intricate. Remember what's involved in a disciplinary matrix: a definition of what an academic community believes to be true and valuable; something that enables the community to decide what is important and what is peripheral; a set of accepted methodologies, techniques, tools, and practices; a yardstick by which professional work in the field is judged and that specifies the standards to be adhered to and hopefully achieved; something that defines what should be taught to students, what textbooks and readings are approved.

Which brings us neatly to the Humanities, as currently conceived. The transformation of the Humanities envisaged in Digital Humanities as we now envisage them will require truly radical change in most if not all Humanities disciplines. And if I'm right about that, then the inescapable conclusion is that the transition to Digital Humanities will be pretty slow and largely determined by what in the newspaper business is called 'biological leakage', that is to say the rate at which the powerful overseers and custodians of treasured paradigms die or retire. It's a sad but true fact about human nature that most people – even intellectuals – would sooner die than change their minds. We'll get to the Digital Humanities one day, but I'm afraid that the journey may take longer than we once thought.

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