The residue of uniqueness[1]

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> To agree that a machine can be intelligent is to open the door to one more Other.… We make this opening in terror and exhilaration – how much must we give up of ourselves; what will we gain?
>
> Pamela McCorduck, *Machines Who Think* (1979)

> What would it mean to give a logical consistency to the in-between? It would mean realigning with a logic of relation. For in-between, as such, is not a middling being but rather the being of the middle – the being of a relation.… it is *the contingent effect of that which it conditions*.
>
> Brian Massumi, *Parables for the Virtual* (2002)

Abstract.

To build an argument for the supervening importance of agenda, I locate the digital humanities within the context of a central human predicament: the anxiety of identity stemming from the problematic relation of human to non-human, both animal and machine. I identify modelling as the fundamental activity of the digital humanities and draw a parallel between it and our developing confrontation with the not-us. I then go on to argue that the demographics of infrastructure within the digital humanities, therefore in part its emphasis, is historically due to the socially inferior role assigned to those who in the early years found para-academic employment in service to the humanities. I do not specify an agenda, rather conclude

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[1] My thanks to Wendell Piez for his insightful comments and indeas.

that modelling, pursued within its humane context, offers a cornucopia of agenda if only the "mind-forged manacles" of servitude's mind-set can be broken.

1.   Agenda or infrastructure?

I answer Professor Thaller's question, "Does the digital humanities have an agenda or constitute an infrastructure?", by addressing each alternative in turn. First I connect the discipline's fundamental activity – exploring cultural artefacts methodologically by building and reflecting on models of them[2] – with an ongoing problem sufficiently basic to all the humanities that all have cause to engage with it. This problem is the widely, sometimes anxiously discussed possibility that in the light of scientific discoveries and inventions the distinction between human and not-human will soon be impossible to maintain.[3] I want to show that what digital humanists do bears on this possibility and so to argue that an agenda for the field rooted in a shared concern for the human has the best chance for providing a fundamental rationale, not just an instrumental one. I then turn to infrastructure, arguing that although it is crucial for the disciplines and has proved useful in giving us an institutional foothold, it is quite secondary: a service we perform, not what we're for.

I ask the reader's patience. For long stretches of the first part the digital humanities will go unmentioned. But this is necessary to prepare a place for it, or rather, to show the fitness of the place it already occupies, though perhaps unnoticed. Throughout, for convenience, I subsume under the term "digital humanities" all activities of computing within the humanities and interpretative social sciences from the conventional beginning with Roberto Busa in the mid 1940s (Wisbey 1965: 222-5), ignoring the historically significant changes of name. I consider "digital humanities" a singular collective noun denoting a cohesible if not coherent although loose and open bundle of practices – an amalgam, as historian Michael Mahoney said of computer science (2011: 165). What makes the digital humanities cohesible, of course, is the potential for an agenda we are setting about to discover and develop from what has been happening these last many years. And so to the task.

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[2] By this notoriously polysemous term "modelling" I include both analytical modelling (McCarty 2005: 20-72) and simulation, by which I mean construction of models in order to explore possible objects or behaviours unobserved or unobservable otherwise in the real world – "the one we… turn out to be in", as Francis Sparshott has said (1990). I also qualify both activities with Michael Polanyi's idea that engagement with a model or simulation enables our attending from it in an act of tacit knowing so that we may attend to the modeled entity or simulated phenomenon – until a breakdown of some kind occurs (Polanyi 1983/1966; McCarty 2005: 43-5).

[3] Here I depend, as references will suggest, on the excellent collection of essays, Sheehan and Sosna, eds. 1991, but also on a project of the National Humanities Center, On the Human (onthehuman.org/), in which I participated, and for which I owe a debt of gratitude to the President of the NHC, Geoffrey Harpham.

2. A fearful vision and response to it

My title, "The residue of uniqueness", I borrow from the subtitle of an essay by sociobiologist Melvin Konner (1991). It alludes to the hotly debated question of whether humankind is unique among life-forms and beyond the reach of mechanism. Although this question or elements of it can be traced as far back as one wishes to go, most discussions of it begin with Descartes, who argued that animals were machines made of flesh and our own bodies likewise but invoked the power of reason to distinguish our kind (Sheehan 1991; Hahn 1991). Since then, scientific research, technological invention and the sharp tools of historians and philosophers have steadily chipped away at categorical differences said to separate humans from both animals and machines, to the point at which it would seem that drawing a line between us and not-us is at best a temporary act. "It would seem", Konner concludes, "that we are sorted to a pulp, caught in a vise made, on the one side, of the increasing power of evolutionary biology… and, on the other, of the relentless duplication of human mental faculties by increasingly subtle and complex machines." He asks, "So what is left of us?" (1991: 120).

I quote Konner for the literally reductive imagery of a human space being squeezed to a residue as computational and biological explanations advance on it, not for his argument (whose sociobiological detail is beyond my competence) nor the answer he gives to his own question. His answer – that "only we combine the emotions and the life cycle drama of the animal world with a fully empowered reflective and communicative faculty" (120) – I put aside not just because his is one of many, rather more because they all assume the validity of the question. I grant that "what marks out all humans from other animals is a question that can be, and to some extent is being, determined by physical anthropology and evolutionary psychology" (Lloyd 2010: 211). I also grant the possibility, anticipated by Alan Turing more than 60 years ago, that one day it may prove rather difficult to tell the difference between what we have made with computing and what we think we are. Indeed, it seems likely that for a very long time, perhaps since a group of hominids became *sapiens* if not earlier, we have been becoming what we make and making what we become. But more on that later.

In computer science, with its emphasis on seeing what can be done, the talk is often of how, with increasing success, a "problem space" is heuristically explored (Newell 1980), hence by implication incrementally reducing what's left over, which tends to be regarded as uninteresting, insignificant or temporary. To those scientists who in C. P. Snow's words feel "the future in their bones" (1998/1959: 10) there would seem to be no reason not to be confident that one day soon a scientific "theory of mind" will trump the metaphorical habit of mind characteristic of the humanities. Such a theory, Alan Newell declared more than 20 years ago, "will entrain an indefinite sequence of shocks… through all our dealings with ourselves.

And the humanities might just be caught in the maelstrom" (1991: 195). Not everyone invokes the apocalyptic language of an End Time, but the message running through the history of such talk up to now is with Newell in suggesting that in time human uniqueness will prove untenable.

In an essay in the same collection as Newell's, Sherry Turkle predicted that computing then in development would put to rest the "romantic reactions" ordinary people tend to have to AI (1991). That this has not happened, that the shocks Newell spoke of are still thought to be foreshadowed if not in delivery would seem to be robustly confirmed by the February 2009 meeting of artificial intelligence researchers at Asilomar, California, to discuss "potential long-term societal influences of AI research and development". Echoing Newell but in somewhat more cautious language, these scientists were particularly concerned about "disruptive social changes" that could follow from "computational systems [achieving] 'human-level' abilities along a variety of dimensions, or [surpassing] human intelligence in a variety of ways" (Horvitz and Selman 2009). News about this meeting may have been exaggerated,[4] but the fact that leading AI researchers were concerned enough to call the meeting tells the tale: they were, and I suppose still are, worried. My point is not that Turkle was wrong or premature, or that something is coming we had better prepare for, rather it's the worrying I take interest in. This worrying is worth far more to us than to be treated either as romantic reaction or as premonition.

3.   An aside on the digital humanities

But what does all this have to do with the digital humanities? Like much of the humanities as a whole, the field has not been anywhere near the front line of the action I depict. Since the beginning it has kept far back, absorbed with technical concerns, with its place in the academic world and with the enormity of its task (for all the humanities and human sciences are affected). Those in the field who have noticed this enormity have, I suppose, been understandably bemused. Hence little if any ecological awareness has emerged within the digital humanities despite the fact that abundant information about relevant work in the sciences and beyond has been in circulation from before its beginnings: as raw news and excited commentary in the mass media, in novels, films and throughout the creative arts and in the reflections of public intellectuals and cultural critics.[5] Given the isolation of the digital humanities and the newness of both computing and its inherently experimental methodology to the humanities, we can hardly be surprised to find complaints of stagnation and theoretical poverty: from the philosopher and linguist Margaret Masterman's complaint of "no new theoretic vision" in 1962; Louis Milic's in 1966, of a startling lack of imagination and failure to think afresh; Susan

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[4] Markoff 2009, which "touched off a mini-firestorm" of public reaction (Wellman 2009).
[5] See e.g. Hayles 1999, a very useful though over-determined account.

Wittig's in 1978, of a stultifying, positivistic idea of text taken for granted; Rosanne Potter's, summarizing a range of views in 1991, of the need for theories; Jerome McGann's in 2004, of failure to touch the central concern of the interpretative disciplines, i.e. interpretation; David Hoover's in 2007, of the forces that have suppressed interest in text-analysis; to Stephen Ramsay's hopeful response to the problem in 2011, *Reading Machines: Toward an Algorithmic Criticism*.[6]

In his Introduction to the published proceedings of the 1962 Burg Wartenstein conference, *The Use of Computers in Anthropology*, Dell Hymes wrote that "the development of the electronic computer… [presents] a challenge that must be met, yet whose full nature is not yet generally grasped" (1965: 15). Much has happened in these last 50 years, but the fact that Hymes' words could be spoken today and still ring true is a wake-up call for the digital humanities: to wake up to the possibilities of its situation among the disciplines and to wake up to the fact that by Turing's design computing demands a perpetual waking up, that is, a modelling of as well as with the indefinitely plural, reconfigurable scheme for acting and thinking confusingly denoted by the singular term "the computer".

As to the first waking up, I think the inescapable conclusion is that lacking an agenda-awareness of its own the digital humanities has been almost entirely an instrument in the support of work that happens elsewhere by other means. That the great changes in humanities scholarship have come upon us unawares, a result not of deliberate innovation as chiefly of simple access to quantities of information,[7] is no fault, but the fact that these changes have not been studied by the digital humanities is indicative of its immaturity and lack of outward reach into the disciplines that could help. Ramsay may well be on the right track, but why after more than 60 years is the digital humanities still in approach? Why *are* we having this debate?

This is where I begin, with the question of where to find a connection to the humanities that is not merely between servant and served. And for that reason I turn to the analogy for which I have been preparing: as the problem of the human, so the problem of human artefacts. Let us say, as so many are saying now, that the humanity of *homo sapiens* is a matter of what's left over after biological and computational models have done their best. If we think this way, then it seems inescapable to treat the humanity of human artefacts likewise, as a residue, and to construct the digital humanities as a humane pursuit orientated to illumining not eliminating it. If what we do with computers is to model these artefacts, to see how

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[6] For the complaints also see Fortier 1993; for a survey up to the early 21C, Rommel 2004, and for a diagnosis of the central problem of interpretative disciplines, McGann 2004a; since then, Juola 2008; McCarty 2010; McCarty 2012a. The problem identified by these and several other publications has not been comprehensively studied since Potter.

[7] Considering the question of social impact, Joseph Weizenbaum makes the point that the important changes brought about "by any pervasive new technology" are not those we tend to notice but "the much more subtle and ultimately much more important side effects" (1972: 609).

far our ideas of them go and what this going teaches us about them and about a computing adequate to the challenges they present, then we can go the other direction as well, back to the bigger question, the question all humane disciplines share, and think of it in the same way, as modelling the human and modelling human processes of thought, leading to results whose shock has real therapeutic value because it is provocation to re-model. In both cases attention turns to the residue, and as McGann said of that which escapes markup, what we find is "the hem of a quantum garment" (2004a: 201; cf e.g. Matt 14:36), the touching of which brings about a real revolution.

The complaints which run through the professional literature establish that something has been amiss but do not take us far enough into the nature of the problem. They do not connect it with the historical contexts in which the digital humanities have developed. For that we need the subtler clues to unease which surfaced in the professional literature especially during the early period, up to the introduction of the Web. These are found, for example, in expressions of fear (that "the" computer may put scholars out of a job or is otherwise a threat to scholarship) and reassurance (that it won't and isn't); in insistent proclamations of a great revolution spreading through the humanities under the banner of (positivistic) science; in reactions against that anticipated and much postponed revolution; and in the consistency with which computing is assigned to drudgery, and so to servitude (more about which later), with curious parallels to industrial production, employment and the curiously underspecified notion of leisure. I do not have scope here to examine these clues in detail, but suffice it to say that in their historical context they sum to an overall anxiety which demands explanation. This anxiety is certainly matched by strong warnings from leading cultural critics and public intellectuals during the early period,[8] but these also give evidence that a problem existed but do not tell us enough about what that problem was. The Cold War (1945-1991), the "electronic battlefield" of Vietnam and other sinister alliances of computing with what Dwight Eisenhower called the "military-industrial complex" certainly played a role (Whitfield 1996; Edwards 1996; Eisenhower 1961). But the pall of these alliances did not discourage everyone uniformly – not at all, for example, the more adventurous artists brilliantly at play nor the early enthusiasts in the digital humanities.

Is there is an explanation that goes beyond and is ultimately more positive and useful to the digital humanities than any of these or, for example, than the rage for Theory often fingered as the cause of stalled progress in literary computing (cf Hoover 2007)? What can we do with the facts we have in order to find out?

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[8] See e.g. Ellul 1964/1954; Mumford 1970 (with his series of four articles, "The Megamachine", in *The New Yorker* from 24 to 31 October 1970; Leavis 1972/1970; Cousins 1989. In all these the dichotomy of human vs. machine is quite explicit.

4. The co-evolution of humans and machines

Let me illustrate by turning back to the wider history of the techno-sciences to consider a particular temporal sequence important to the digital humanities: from Turing's landmark paper of 1936 on the *Entscheidungsproblem* to his paper of 1950 on artificial intelligence. In the 1936 paper, he like many scientists anchors his reasoning in a metaphor – curiously, since he is writing not for the wider public but for fellow mathematicians. Thus, he writes, "We may compare a man in the process of computing a real number to a machine which is only capable of a finite number of conditions…." (231). He then leaves the metaphor behind. But the abstract machine he invents to assist his proof, conceived in the image of a mathematical bureaucrat (Agar 2003: 69-74), later inspires the neurophysiologist Warren McCulloch and mathematical logician Walter Pitts to design their model of the human brain as a Turing Machine (1943). Two years later mathematician John von Neumann adopts the McCulloch-Pitts brain in his architectural sketch of the Electronic Discrete Variable Automatic Computer (EDVAC, 1945), as we know both from McCulloch (1988/1961: 9) and from the neurophysiological vocabulary that peppers von Neumann's description of hardware. Five years after that, in the 1950 paper, Turing famously asserts that once we can no longer tell the difference of intelligence between human and digital computers, we will have to grant that there is none. At this point technical and existential concerns connect, as with hindsight we can see anticipated by Jonathan Swift's satirical genius in *Gulliver's Travels*.[9]

Such is the chronology from Turing 1936 to Turing 1950. But what we see historically is more than mere chronology. It is a recursive process of co-evolutionary development:[10] from Turing's bureaucrat to a rigorous machine; from his machine to a machine-like brain; from the brain to a design for hardware; and from that hardware to the human-machine dilemma in the form we now know. The Turing Test (as it came to be called) is an expression of it. It continues to this day in machine-to-human/human-to-machine mirroring instantiated, for example, in computing become the dominant model of mind and in human neurophysiology modelled in the SyNAPSE Project, which (according to IBM's press release) has produced a chip that duplicates human neuronal architecture. The chip isn't

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[9] See Kenner 2005/1968 and Harris 1987, esp the former, for brilliant commentary on the importance of Swift's satire for the questions taken up here.

[10] I use the term "co-evolutionary" advisedly, with cautious metaphorical intent. Mazlish 1993 uses "co-evolution" in the subtitle but doesn't devote substantial discussion to the term; see pp. 229-33. See esp. Rosenkopf and Tushman 1994; Baum and Singh 1994; and Yates 1993, who defines the term "to denote contemporaneous and interacting developments of a technology and its use…" (5 fn 9). This is more than Meyer-Drawe's "mirror of machines" would suggest (2007) and different from the cybernetic process denoted by "feedback" (Rosenblueth, Wiener and Bigelow 1943: 19) and "feed-forward" (Richards 1951: 54), whose purpose is homeostasis, though this kind of thinking does proceed from theorizing interrelated things as systems.

programmed, its developers say, rather it observes and learns.[11] Again, never mind the facts (though their solidity is important and IBM no fool); mind the rhetoric: we think like the machine we have made in the image of ourselves; the machine thinks like us as we have come to think about ourselves in the image of the machine. A house of mirrors.

The co-evolutionary process of interest here is widely attested. Consider the following three examples from technological history before the digital humanities.

The first is the 19th-century analogical relationship between the human nervous and circulatory systems on the one hand and electrical communication and railroad networks on the other. As Laura Otis and others have shown, each shaped the development of ideas about the other.[12] Thus in 1854, about a century before "giant brain" became synonymous with the digital computer,[13] a telegraph company's head offices could be called "the great brain… the nervous system of Britain".[14]

Sometimes (as Otis documents) the morphological mapping of self onto world and vice versa was consciously metaphorical, but often not: one suspects that the phrase "sentient wire", used e.g. by Edward Bright of the British and Irish Telegraph Society in 1867 (v), simply declared what the telegraph was commonly thought to be. (Metaphors are like that: first consciously figurative, then dormant in descriptions.) Ernst Kapp, who coined the term "philosophy of technology" about the same time, argued in effect that such mapping is what we tend always to do, whether consciously or not: "in the tool man continually produces himself",[15] he wrote. I will return to this in a moment.

My second example is cybernetics, which arose out of wartime efforts to design control systems that would match human physiological response move for move.[16] Arturo Rosenbleuth, co-author of a foundational paper in cybernetics (Rosenbleuth, Wiener and Bigelow 1943), drew from the French physiologist Claude Bernard's fundamental idea of the *milieu intérieur* of biological organisms (Gross 1998: 384), thus emphasizing the self-contained nature of the cybernetic model. But in constructing it the cyberneticists reproduced the human in a particular and partial

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[11] IBM's press release is at www-03.ibm.com/press/us/en/pressrelease/35251.wss (24/3/12); note also current brain-chip interfacing devices, for which see Vassanelli et al 2012.

[12] See Otis 2002 and 2001; Morus 2000; Hochfelder 2001: 308-13; Gleick 2011: 125-67. See also Borck 2012; Sappol 2006 and von Debschitz and von Debschitz 2009 for Fritz Kahn's "dream anatomy".

[13] A hugely popular phrase promoted by Berkeley 1949, opposed in vain by many computer scientists and manufacturers of machines: see Armer 1963; McCorduck 1979: 173, who notes the opposing phrase "giant morons"; cf. Andree 1958: 2, "A computer is not a giant brain…. It is a remarkably fast and phenomenally accurate moron."

[14] Andrew Wynter, English physician, q. Morus 2000: 459. For the apparently common phrase, "sentient wire" see Bright 1867: v.

[15] dass der Mensch in dem Werkzeug stets nur sich selbst producirt (Kapp 1877: 45; cf. Mitcham 1994: 20-4).

[16] For entry-points into cybernetics, see Dupuy 2000/1994; Heims 1993; Hayles 1999, chapters 3-6; and cf. Mindell 2002.

way, so when they reflected it back as an image of the human, humanity was identified with a machine-in-a-new-sense, in Evelyn Fox Keller's words, a machine "endowed with its own purpose… absolutely autonomous, capable of constructing itself, maintaining itself, reproducing itself" (1991: 85). Our ideas of human autonomy would thus seem suspect.

Finally, consider Warren Weaver's account of his and Claude Shannon's mathematical theory of information, which begins in a schematic of "How… men communicate, one with another" (Weaver 1949: 11), becomes a mathematical design, is translated into circuitry and finally returns as an authoritative explanation for human communication.[17] The Shannon-Weaver model certainly has its roots in earlier technologies such as telegraphy, but its adhesiveness as a way of thinking about media (as conduits rather than environments) strongly suggests the co-evolutionary recursiveness for which I am arguing.

5. The techno-scientific context

If as Kapp said, "in the tool man continually produces himself", then what he produces is more precisely a model of himself, a simplified and partial thing that instantiates some aspects of human nature as he understands it and can be accommodated within the particular technology. This, the history suggests, then tends to be taken as a true image to which the beholder begins to conform. The trauma I want to examine is from the seeming inevitability of a degenerative loop which the co-evolutionary process suggests.

A more promising way of considering this loop is to think of it in terms of what we might call the psychological reception of science, that is, of the tacit as well as explicit dimensions of the images of the human communicated as scientific fact. Weaver's popularization in *Scientific American* (1949) is a good example: in essence human communication, and so the human performed in communication, being nothing more than passing of pre-formed messages through a certain amount of interference and distortion to a recipient. Information, as it came to be known.

The Shannon-Weaver "transmission model" (Chandler 1994) is thus an instance of what neuropsychologist Richard L. Gregory has called the "exorcisms of mind" from science, though here mind is not completely exorcised, only shoved off-stage (1981: 96ff). Other instances are, for example, the Cartesian "machinery of the body"[18] and the one central to my concerns, the computational model of mind rapidly convergent on the brain, with the promise not only of mingling physiology and philosophy but, in its most radical form, of erasing the distinction altogether, and so leaving no residue of mind. In physicist Steven Weinberg's unminced words,

[17] See Chandler 1994 on the "transmission model" of communication; cf. McCarty 2012b.
[18] The title of Carlson and Johnson 1938, a very popular textbook in physiology, 5th edn 1961 (the book I used in school).

the end result of progressive exorcism is a view of nature (including *homo sapiens*) "as impersonal and free of human values as the rules of arithmetic" (1974: 43). This is shocking to be sure, but it becomes culturally intelligible, as we will see, when we look more closely at the language he and others use to declare such freedom. We cannot simply wave this language away as accommodation to the scientifically undereducated. "For men believe that their reason controls words", Francis Bacon wrote in the *Novum Organum* (1620); "but it is also true that words… turn their force back on the understanding…"[19] He was particularly concerned with the understanding of scientists.

Weinberg's is one of many reductive attacks of the sciences on what biologist Jacques Monod has called "the anthropocentric illusion" (1972/1970: 47). These attacks have a long history. In the early 20th Century their lineage was famously identified by Sigmund Freud in a shortlist of great outrages against deleterious self-love: Copernican cosmology, Darwinian evolution and his own psychoanalysis (Freud 1920a; 1920b). But Freud's list of therapeutic shocks is radically incomplete, not only because such shocks have always been happening, but also because the list is indefinitely extensible by the very nature of the scientific enterprise. It is also, in its therapeutic intent, at one with the scientific tradition going back at least to the 17th Century. Both Bacon and Galileo, for example, spoke of scientific method as a defence against what Bacon called "the sciences as one would"[20] – i.e. fanciful or capricious knowledge tainted by human weakness and corruption of mind, among which faults self-love is basic. In historian Alastair Crombie's words, science for them was a corrective, restorative force: "the moral enterprise of freedom for the enquiring mind … a therapeutic experience offering perhaps the greatest moral contribution of science to mankind."[21]

We now know that the idea of secular science as a rejection of religion "has almost no place in the early modern world" (Reeves 2009: 61). Thanks to the work of several scholars[22] we know that early-modern science succeeded because of "its association with religion, rather than any attempt to disassociate itself from religion" (Gaukroger 2006: v). Thus in their preoccupation with human cognitive weaknesses, faith in the corrective discipline of experiment and moral function of science, Galileo and Bacon were of their time: their science was formed by religious purposes for ends we must recognize as religious, though in a sense that now takes

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[19] Bacon 2000/1620. Credunt enim homines, rationem suam verbis imperare. Sed fit etiam ut verba vim suam super intellectum retorqueant et reflectant…. (I.59)

[20] id quod generat ad quod vult scientias, in *Novum Organum*, I.xlix.

[21] Crombie 1994: 8; for Bacon also see 1208-9 and 1572-86.

[22] In addition to Crombie 1994 and Reeves 2009 see Gaukroger 2006, Harrison 2007, Corneau 2011 and, as background, Delumeau 1990/1983. Harrison, for example, argues that "the protocols that Bacon sought to inaugurate in the realm of the sciences may be regarded as a parallel sacramental system aimed at the restoration of corrupted Adamic abilities…. For this reason Bacon could see his role in sacerdotal terms, establishing the scientific rituals that would minister to and restore fallen human intellectual capabilities…" (2003: 171 and ff).

work to recover. But thanks to Freud we know that such preoccupation, however secularized, is ours as well. The anxiety persists. With it, made problematic precisely because of the moral tradition within which it is articulated, is a conviction that places faith in a regimen and methodology for obtaining reliable knowledge. As we say, or used to say, these standards may seem God-given, but their origins are more complex, interesting and contingent than can be accounted for by reference to an absolute. But I am not taking a cheap shot at science, rather wanting to establish a continuity in the concern for weaknesses we still have and strengths we can still acquire in spite of them.

My point, however, is more that the argument from human weakness applies recursively to the arguing of it: thus the extreme dogmatic distrust of all human constructions, and so the passion to strip away desirous imagination from scientific results, or to relegate it to the as yet unconquered periphery of the real. Scientist and historian Evelyn Fox Keller illustrates by quoting Monod's image of man become, as he says, "like a gypsy… on the boundary of an alien world; a world that is deaf to his music, and as indifferent to his hopes as it is to his suffering or his crimes" (Monod 1972/1970: 160). There is energy in these words, a kind of melancholic glee, which makes the alienation all the more shocking. Quoting Weinberg as above Keller points out that "this rhetoric goes beyond impersonality: nature becomes uncaring and 'hostile,' traits that are impersonal in a quite personal sense". She quotes Weinberg's astonishingly arrogant view that the world we know is "a more-or-less farcical outcome of a chain of accidents reaching back to the first three minutes" of the universe (Keller 1991: 87f). Although no one would say that hostility and farce are scientific terms, their use exemplifies the way in which recommended cultural norms are, as Keller says, read covertly, through unexamined language, into natural law. Indeed, the very phrase "natural law" tells the tale, of nature covertly personified as an absolute judge,[23] thus made as Keller says, "impersonal in a quite personal sense". "In this way," she concludes with Bacon, "through our inescapable reliance on language, even the most ardent efforts to rid natural law of cultural norms become subverted, and the machinery of life takes on not so much a life of its own as a life of our own" (1991: 100).

6   The usefulness of the modern inquisition

One response to the dichotomy of human *versus* not-human is to say that the real problem is created by that *versus*, that the way forward lies somewhere between the polarized opposites. "There is a kind of awful magnetism to this opposition", Lorraine Daston remarks: "it draws and bends other, quite distinct debates as if they

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[23] "Paralleling political changes", Raymond Williams has noted, "nature was altered from an absolute to a constitutional monarch, with a new kind of emphasis on natural laws. Nature, in C18 and C19, was often in effect personified as a constitutional lawyer" (1983/1976: 223).

were iron filings in a strong field of attractions and repulsions" (2010: 226). Though I can see the problem, I want to argue that sharp opposition, driving extremes to extremes, is useful. I will try to say what I mean by this in a moment.

A quite different response to the human/not-human dichotomy has been worked out by Bruce Mazlish (1993) with reference to earlier work by Jerome Bruner (1956). Roughly, by their argument, the confrontations I have just reviewed become discoveries point-by-point that humanity is continuous with the world: not an alien outsider, as Weinberg would have it, but family – hence the comic structure, with total reunion in view.

The story I am telling is in contrast not a comedy but a *Bildungsroman* in which polarization, opposition and conflict are essential to a great educational programme. Thus I return in spirit to Bacon's, of reformation to knowledge of a better self. In his case this begins with belief in Adam's cognitive abilities lost in the Fall of Man, as Harrison and others have argued. In our case it begins in anxiety awakened by scientific research, which demands an existential refiguring of the human. To see Copernicus in this light now requires a strong act of the imagination, though it can be done, for example on a very dark night, when the Milky Way is visible. Darwin is easier, for example by reading Lemuel Gulliver's account of his confrontation with the young female Yahoo in heat, and all that followed. The Freudian menace is closer yet, whatever our tastes: careful, honest observation of oneself is sufficient to reveal it. For computing nothing betters Marvin Minsky's impish declaration that "The brain happens to be a meat machine".[24] Irrespective of his beliefs or anyone else's, this is a provocation to confront what we see, *or fear we see*, ever more clearly in the mirror of artificial intelligence.

In his brilliant book *The Language Machine* (1987) linguist Roy Harris quotes Joseph Weizenbaum's question, "What is it about the computer that has brought the view of man as a machine to a new level of plausibility?", then counters with the question he says Weizenbaum should have asked: "What is it about the view of man as a machine that has brought the computer to a new level of plausibility?" (Harris 1987: 95). The latter question is the more striking for a number of reasons – one of them surely that it invokes the old deterministic fear that we have been squeezed to a hopeless residue. And this is why both are not just cogent but crucial. What matters for us, at the intersection of computing and the humanities, is their simultaneous presence. If we are to remain honest we cannot deny technological progress to ever smarter machines, just as we cannot deny the explanatory power of mechanisms in biology; and – this is the crucial and most subtle demand – we cannot take cold refuge in an imagined end to the uncertainty in which the two become one, since to posit that is to embrace a fallacy at once nihilistic and hubristic, hence deeply

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[24] A very widely quoted epithet: see esp McCorduck 1979: 70 (the title of Chapter 4); Turkle 1991: 242; Jerome Lettvin in McCulloch 1988/1965: viii.

seductive. It is to assume that the human imagination will reach an ultimate limit and so become the last finite machine it invents.

Whether we still live within the same Judeo-Christian mythological envelope as Bacon, putting the shocks of techno-science to the service of a once and future identity,[25] is a question well beyond the scope of this essay. Help from several disciplines, anthropology included, is needed. For now, however, I put the question aside, assuming that we have no other reasonable choice than to come to terms with what research in the sciences is showing us, shockingly. But, I argue, we have a choice other than to capitulate or hide. We can pay attention and reform. We can re-model.

In summary, then and again, my argument: that what we in the digital humanities primarily do – build and reflect methodologically on computational models of cultural artefacts – is but a specific and technical form of confronting that essential residue of humanity left over after rational explanation has done its best. The digital humanities, that is, not only should be borrowing extensively from the other disciplines of the humanities but can also reciprocate by locating the computational model of mind within the humanities as a powerful alternative way of thinking. One of its elementary lessons is how to "think like a computer" at will, as a powerful imaginative tool. That is where, I think, our agenda could take root.

7. Agenda or infrastructure?

What, then, about infrastructure? This is the hard part for me, because I must move from talking about my research to talking about the lives of others and their place in the world. For infrastructure is the people who comprise it, whose roles are defined far more than they are enabled by it. Or if it enables them, then it does so that they may act effectively in certain ways for a certain purposes which they have not much liberty to determine. Infrastructure is, the *OED* tells us, "the subordinate parts of an undertaking; [its] substructure [or] foundation". It is that which exists below stairs so that those above can better do what they wish to do. I have no argument against infrastructure; rather my argument is for its secondary status. Of course the digital humanities has to do with infrastructure; it has proved itself eminently capable of providing it, not just in the Text Encoding Initiative brilliantly but in numerous other projects as well. That's good, a fine and noble public service, but it's far from enough in the context of scholarship.

The problem with advancing infrastructure as our focus is that in doing so we surrender the discipline to servitude. We identify the digital humanities at best as an institutional function vested in an academic unit, not an intellectual function

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[25] I paraphrase Viveiros de Castro's characterization of societies that "attempt to remain, in a nontrivial sense, identical with themselves and coextensive with the cosmos… by means of devices that put difference in the service of identity" (1992: 4).

belonging to a discipline. "New disciplines", Mahoney has argued, "emerge by acquiring that autonomy" which allows them to set their own agenda (2011/1997: 130). If an emergent field doesn't do that, if others tell its practitioners what to do, or if they do what they do because they think others want them to, or will love them for it, then the development of the field as a discipline is stifled. There is then simply no point to any discussion beyond technique, workmanship and professional responsibility – all fine virtues, but not intellectual ones.

In the book from which I quoted earlier, *The Language Machine*, Roy Harris notes that,

> The equation 'man = machine' had long been preceded by the equation 'machine = slave'. In Europe that earlier equation sprang from the social conditions already established in the civilizations of Greece and Rome. The social history of Western technology is largely the history of replacing slaves by machines, machines being on the whole more efficient, more docile and less expensive…. [T]here was never any objection to an equation between the human and the mechanical in the Western tradition, as long as it was understood that the human side of the equation applied only to members of one (socially inferior) class of human beings, and that the comparison related to the execution of tasks under the direction of a master. (1987: 96)

Evidence for equating computer with slave or servant is abundant in Anglophone publications from the incunabular years of computing, especially by implication in the typical assignment to drudgery, such as generating concordances. In those early years a few practitioners and observers pointed out that the intellectual potential of computing was under threat from the "dangerously strong" temptation to bury it in servitude (Vickers 1971). By 1962, in the year of the meeting of anthropologists at Burg Wartenstein, it was clear at least to some that the promoters' "boundless age of the computer" (Burck 1964), was in fact intellectually straitjacketed by the prevalent tendency to regard it, in Masterman's words, "as a purely menial tool…[for] performing… a series of irksome repetitive tasks… [performances of which] provoke no new theoretic vision" (1962: 38). And so the litany of complaints I mentioned earlier. While it is true that indifference is rapidly vanishing and that hardly anyone today can be found whose scholarship is unaffected and (I think we can say) unimproved by the use of digital resources, we need look no further than the current debate to see that those fifty-year-old criticisms still bite and give us some measure of how serious the problem of disciplinary servitude remains. Again let us ask, why are we having *this* debate and not another?

Those of us with direct experience of academic computing in the early years will know the relegation-by-association that assigned a kind of institutional servitude to scholars on the academic periphery who found work using their humanistic training and technical skills to bring together the machinery of drudgery and the research of

established humanists. By mediating interaction between conventional scholarship and digital methods, such people (I was one for a dozen years) were rewarded with invaluable insights into the interrelationships between computing and the humanities but lacked the freedom to set their own agenda. In 1992 the Yale historian of religion, Jaroslav Pelikan, noticed the injustice to such scholars and others in like positions of servitude, arguing that the future of the university was at stake (1992: 62). In 1996 when I took up my job in London, there were few if any full-time appointments in the field. Since then, especially in the last few years, the digital humanities has become respectable if not trendy, but at a time when academic jobs of any kind are scarce. Hence Bethany Nowviskie's admirable "alt-ac" movement.[26]

As a result of the history I've just rapidly sketched a pronounced imbalance in favour of infrastructuralists in the digital humanities may be observed. We should hardly be surprised that many of the scholars among them, not paid to think and act like scholars, have lost sight of that which infrastructure is for. An extreme though not isolated example is provided by a prominent member of a leading infrastructural digital initiative, who during a recent gathering of its governing committee was heard to say to a young lecturer, "We have no need… for career academics here". The question to my mind isn't who has a "real" job or which side of the wall it is on. Given how badly higher education has fared in recent decades, one must allow that a life of the mind outside the academy might be preferable, indeed recognise that such lives are being productively and happily lived. The question, I want to say, is rather one of autonomy. But this is no simple matter.

Comparing the civilizations of ancient Egypt and Greece, Richard Gregory notes that viable societies require a subtle balance between individuality, from which original, innovative thinking comes, and orthodox obedience to the group, which "inspires group loyalty and allows very large-scale cooperative works (such as pyramid building) to be undertaken" (1981: 21). The humanities owe their orientation in this regard (and in many others) to Ancient Greece, for example to the surviving ideas if not the historical realities of Socrates' life and death in Athens. Big Science, the Big Humanities following it and the infrastructure that both require are in contrast Egyptian projects, pyramids, if you will. Looking out from my study onto an imagined scene of sweaty workers pulling heavy stones up steep inclines to build a sepulchre for the dead makes me glad to be where I am, but again the matter isn't quite that simple.

On the one hand, we so-called lone scholars are autonomous in the Russian poet Marina Tsvetaeva's sense: we write in solitude for the benefit of others, in correspondence and communion with many both living and dead.[27] Historian and philosopher of medicine Ludwik Fleck taught us that we all belong to and work within "thought-collectives" (1979/1935). And, we are increasingly becoming aware,

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[26] See http://mediacommons.futureofthebook.org/alt-ac/ (12/3/12).
[27] "Art is an undertaking in common, performed by solitary people" (q. Gifford 1986: 51).

no discipline, however independently it may set its agenda, is an island without urgent need of boats and a healthy economy of trade.

On the other hand, how can a mind develop properly without the chance to go its own way, however stumblingly? In 1976 Roberto Busa, conventionally the first to do what we do, concluded a retrospective on his own great project, the Index Thomisticus, by saying that ,"if I consider the vast amount of human work demanded by processing texts of this size in this way, I think that such initiatives are better based on a strongly systemized team, supported by an institution able to keep alive its efficiency for decades" (1976: 117). Yes, I think, following his Egyptian argument as far as it goes, but it was *his* work that *his* team was faithfully carrying out. What about *their* research? Indeed, who were *they*?

If we must have an Egyptian social structure to support our Greeks, then I would hope that the norm for service in it would be temporary and educational, perhaps something like apprenticeship as a junior researcher in a scientific laboratory, such as one finds in biology. Good, even essential training but not a life for the long-term in the academic sense. Such crucially important cultural changes are underway for which all hands and minds are needed that we must not allow the digital humanities to become only, merely infrastructural. It has much more important work to do. Agenda item number one, I've suggested, is to carry forth the humane project of becoming.

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