

What does Turing have to do with Busa?

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New media encounters are a proxy wrestle for the soul of the person and the civilization.... We want a way of imagining our encounter with new media that surprises us out of the “us” we thought we knew.

Alan Liu (2007)

1 Digitizing humanities

In its statement of motivation and aims, this third ACRH Workshop conjures the ancient image of the scholar pouring over the written record of the past, brings us to the present by noting the addition or substitution of a digital machine for the codex and then comes to rest on a crux I want to consider in some detail: the problematic relation between technological means and hermeneutic ends. It notes that technological and hermeneutic work on the written record remain disjoint. It recommends a “tighter collaboration between people working in various areas of the Humanities... and the research community involved in developing, using and making accessible annotated corpora”.

A laudable aim. But the central difficulty is not merely an inconvenience, inefficiency or stumbling block, nor is it merely to be overcome, say, by assembling individuals around a table or lab-bench, as desirable and appropriate as that may sometimes be. It is a fertile research *question*: what do these technological means have *fundamentally* to do with the humanities, and vice versa? In what sense, if any, are they other and more than resources to be exploited? If we can do no better than a utilitarian relationship between user and used, no matter how efficient, collaborative and harmonious it may be, there will be no digital humanities worth the candle, only digital services. Social scientists may study the impact of computing on the humanities; computer scientists may discover problems worthy of their efforts; scholars may get further than they could have otherwise. But none of these, or all of them together, constitute a discipline *of* as well as *in* the humanities.

Why does that matter? If, as the Workshop statement suggests, digital humanities is defined (which is to say, confined) by digitization as this is usually understood, then it hardly matters at all. But if by “digitization” we mean *everything* involved in rendering cultural expressions and artefacts digital, including that which is currently beyond capture and that which might never be captured, including all reflection on and analysis of the attempt to render digitally, then at issue is a cornucopia for research, worthy of a

presence among the other disciplines. Otherwise all we're being offered is infrastructure.

2 Busa and Turing

My role here is to help celebrate the centenary of Fr Roberto Busa's birth, and so my emphatic insistence on our reaching beyond the ordinary, reaching *ad astra per aspera*. I did not know Busa well and so cannot celebrate the man. To me, rather, he was and remains through his work an enlightening and kindred spirit, an intellectual father-figure, who was there, at that problematic cross-roads of the technological and the hermeneutic, from the beginning. There are other beginnings on offer. In crediting Fr Busa with the honour we digital humanists take as paradigmatic what he did, said and wrote; we take as paradigmatic (though not confining) the promise and challenge of his digital philology.

Hence the Busa Prize, given every three years by the Alliance of Digital Humanities Organizations, which now comprehends European, North American, Australasian and Japanese professional societies. The idea for the Busa Prize came from the great systematizer and theoretician of digital textual annotation, Michael Sperberg-McQueen. Michael's inspiration for it was the Turing Award, named (as you know) after Alan Turing for his invention of a fundamentally new kind of machine. This "prestigious technical award" has been given annually by the Association for Computing Machinery since 1966 for "major contributions of lasting importance to computing",¹ indeed, we cannot but say, of lasting importance *full stop*. In conversation Michael put the matter well: "if you want to know what computer science is all about," he said, "you go to the Turing Award lectures".

It's not for me to say how far we have come in realizing Michael's ideal for the Busa Prize lectures. But his implicit juxtaposition of Turing and Busa invites further thought. So I ask, what do the kinds of work which these two awards signify have to do with each other? I am asking from the perspective of the humanities, so I look at Turing's work and all that followed from it not as steps in the march of progress toward, say, Samsung's "Life Companion", but as scenes from a complex intellectual history in which our work is embedded. I want to know about the *shape* this history has other than merely the temporal, and what it can tell us about where and how digital humanities fits in, where and how it makes a lasting contribution.

3 The shape of technological history

Allow me to illustrate. Turing's abstract scheme, later known as the Turing Machine, was a byproduct of the 1936 negative mathematical proof that put David Hilbert's "decision problem" to rest [52; 5]. But Turing's scheme quickly diverged from its subservient role. By 1943 it had inspired the philosophical neurophysiologist Warren McCulloch and the mathematical

¹ See <http://amturing.acm.org/> (2/9/13).

logician Walter Pitts to design a model of the brain as a Turing Machine [37]. Two years later John von Neumann, who had read the McCulloch-Pitts paper [3: 40, 180-1; 36: 9], adopted their model in his “First Draft of a Report on the EDVAC” (1945), in which he sketched the architecture for digital hardware we still use today [56]. A modular notion of mind eventually followed. In 1948 von Neumann, who was deeply preoccupied with the physical realities of mind and machine, proposed that imitating natural intelligence might better be done “with a network that will fit into the actual volume of the human brain” [54: 34; 55]. Today precisely this is the goal of the DARPA SyNAPSE program,² which uses neuromorphic hardware that reflects current ideas of neurological plasticity [7].

What I want you to notice here is the historical back-and-forth, or around-and-around, of invention and human self-conception. I want to suggest that it is an instance of a “looping effect” between humans and their devices, each influencing the development of the other.³ It has been studied, for example, in the relation between 19th and 20th-century electro-mechanical technologies and ideas of human physiology [34: 31-2]. It was given far reaching attention in the early years of computing by Douglas Engelbart, J. C. R. Licklider and others, though only for their present and future. Unlike them I want to set the human-computer relationship into the *longue durée* of human history so that we can see it as an instance of that which makes us human, and so provoke a serious rethink of digital humanities. I want to argue that if we can see our ongoing confrontation with computing as integral to that history, then there can be no doubt that digital humanities is *of* the disciplines in which we have situated it.

But I get ahead of myself. First I need to argue for the common ground of computing Turing and Busa shared and have passed on to us. Then I will set Turing’s machine and its progeny into the larger history of the sciences from which they arose, specifically to connect them with the moral argument that became integral to the scientific programme in the Early Modern period. To borrow Gould’s and Eldredge’s evolutionary language [10], I want to use the moral dimension of this programme to argue that as a techno-scientific instrument, computing’s central effect is to punctuate our existential equilibrium and so to move us on to becoming differently human. In a sense this is nothing special: all the humanities do it. But that’s my point.

4. Turing’s man-machine

First, Turing. Consider his 1936 paper apart from the mathematical challenge Hilbert laid down. Consider it as a socio-cultural document as well as a mathematical proof. What do you see? What jumps out at me is the metaphor with which he begins, of the bureaucrat doing his sums. “We may compare a man in the process of computing a real number”, he wrote, “to a

² See www.artificialbrains.com/darpa-synapse-program (5/5/13).

³ I am borrowing Hacking’s term, which he coined for the psychodynamic interrelation of individuals and ideas of “human kinds” [11].

machine which is only capable of a finite number of conditions...” [52: 59, 49]. Thus he reduces his imagined “computer” (as that man would then have been called) to a “computer” (as we would now call the corresponding machine), collapsing a familiar human role into an abstract set of exact procedures. He creates an actor-device purged of everything extraneous to those procedures and thereby, through a long and complex argument, demonstrates that no such computer-become-computer can decide whether in principle a mathematical assertion is true. But thereby he also implicitly shows the inexhaustible role of imagination in mathematics, and so in the life of the mind as a whole [33: 167-70].

We are apt to regard Turing as a rather odd, one-of-a-kind genius, but to isolate him like that covers up important connections [5; 14]. In particular is Jon Agar’s demonstration of how Turing’s actor-device is perfectly of its time, matching the then widespread notion of human society, government and industry as a machine [2]. This notion is found, for example, in Taylorian management [49], Fordist manufacturing practices [18] and Keynesian economics [24]. It is tragi-comically played out in Charlie Chaplin’s *Modern Times*, which was released in 1936, just as Turing’s paper was going into print. Man becoming machine in a machine world was in the air, so to speak.

When, almost immediately, Turing’s abstract machine took on a life of its own, its implicit role in illuminating the imagination became much harder to see. For many Turing’s scheme supplied a model *for* mind, still visible in cognitive science, indeed, increasingly become a model for everything else. Busa, however, implicitly followed Turing’s use of the machine to illumine what it could not do. In 1976 Busa, who by then had processed 15 million words for the *Index Thomisticus*, asked, “Why can a computer do so little?” [6]. Inadequate machinery could not be blamed, he wrote; human ignorance was (and is) the problem. Busa argued again and again against the emphasis on saving of labour, to which so many turned to justify what they were doing. This emphasis had been noted and attacked from the first publications on computing in the humanities, e.g. in 1962 by Cambridge linguist and philosopher Margaret Masterman, who condemned the notion of the computer “as a purely menial tool” [30: 38], and in 1966 by the American literary critic Louis Milic, who pointed out that a focus on alleviation of drudgery narrowed research to problems involving drudgery rather than expanding its horizons. “We are still not thinking of the computer as anything but a myriad of clerks or assistants in one convenient console”, he wrote [39: 4]. “In language processing”, Busa wrote,

the use of computers is not aimed towards less human effort, or for doing things faster and with less labour, but for more human work, more mental effort; we must strive to know, more systematically, deeper, and better, what is in our mouth at every moment, the mysterious world of our words. [6: 3]

Systems scientist Sir Charles Geoffrey Vickers had written a few years earlier that the powerful temptation to save human effort would bury the potential of computing to help resolve “the major epistemological problem of our time”. He stated this in terms which take us back to Turing: “[w]hether and, if so,

how the playing of a role differs from the application of rules which could and should be made explicit and compatible” [53].

6. Incunabular digital humanities

But practitioners seem not to have heeded the advice. Attempts to explore the implications of computing for the humanities appear either to have been censured (Masterman’s playful experiments in poetry-writing by machine provoked the wrath of F. R. Leavis)⁴ or to have been ignored. In 1989 literary critic Rosanne Potter wrote that “literary computing still remains outside the recognized mainstream of literary criticism. It has not been rejected, but rather neglected” [45: xvi]. In 1991 she surveyed the previous 25 years’ work of *Computers and the Humanities*, identified a chorus of scholars who had written similarly about the problem in *CHum* and concluded with them that poverty of theory was to blame [46: 402-7]. The same year literary historian Mark Olsen recommended that close analytical work with computers be abandoned.⁵ The obvious question here is not why literary computing (and by inference digital humanities as a whole) had failed to make an impact – poverty of theory in an age of critical theory is a sufficient explanation – rather, why practitioners remained isolated from the theoretical debates in the humanities and seemingly unaware of the exciting developments of computing in the sciences, if only to note them as irrelevant. But let me put those two historical questions on hold for a moment.

The onset of the Web following its public release in 1991 (the year of Potter’s review and Olsen’s recommendation) seemed to seal off the first four decades of digital humanities – its incunabular period, as I call it – and mark the beginning of a new era. Some have argued that progress in the form of the Web marked a decisive turn away from a rather unimpressive past, rendering it irrelevant to present concerns. But once the dust settled ca. 2004-5 (when the first comprehensive survey [47] and theoretical treatment [33] were published), it became clear that the Web had not solved the fundamental problems, rather temporarily distracted attention from them. Thus, borrowing a term from the defensive rhetoric of government-funded services, digital humanists began talking about proving “evidence of value” – and so revealed the longevity of old anxieties [35: 118]. In 2012 a young scholar of American literature yet again asked if digital methods have had any significant effect on literary studies.⁶ In late September of this year, members of the online seminar *Humanist*, which I moderate, likewise took up the old question, asking whether any great digital works of scholarship can be identified, and if so

⁴ Leavis [18] does not name Masterman (who had studied with Wittgenstein 1933-34 and founded the Cambridge Language Research Unit in 1955), but the details he gives suggest her strongly: “a philosopher, a lady and cultivated; her place and conditions of residence gave her access to a friendly computer laboratory”; see also [24] and [23].

⁵ Olsen’s MLA conference paper [43] caused such a furor among practitioners that a double issue of *CHum*, edited by Paul Fortier, resulted; Olsen’s [44] was the lead piece in that issue.

⁶ See Ryan Cordell’s posting to *Humanist* 26.257, www.dhumanist.org/cgi-bin/archive/archive.cgi?list=/Humanist.vol26.txt (1/10/13).

how.⁷

In other words, although digital humanities has changed with the technology, it remains on the trajectory of those formative, incunabular years: struggling with the relation of theorizing to making; uncertain of its position between the techno-sciences and the humanities; and, most serious of all, without a normal discourse of its own, and so without the criticism for which Alan Liu [27] and Fred Gibbs [6] have called.

At first glance it would seem simple to explain why those incunabular practitioners remained isolated, why the majority of scholars fled to the theoretical high-ground.⁸

An explanation might run something like this: attracted by technological progress, empirically minded scholars raised in the critical environment of I. A. Richards, John Crowe Ransom *et al.* were drawn to computing as soon as it became available, however unrealistic the promises on offer. But the computer was a formidable object then – a massive, noisy, sequestered, technically complex and expensive mainframe, access to which was only for the dedicated technical staff that managed it. “*The computer*” – note the definite article – was widely known to be complicit in bureaucratization of daily life, the industrialization of research and the frightening developments of the Cold War, which began with computing and ended almost exactly with the public release of the Web in 1991. This period saw the exponential growth of Jon Agar’s “government machine” throughout Eisenhower’s “military-industrial complex”; rampant paranoia, especially in the United States; and the threat of nuclear annihilation felt across the world. It can hardly be surprising that affiliation with computing was rare among humanist scholars. Computers had been developed for numerical calculation and had only become widely available through a massive effort of salesmanship: they were not produced to meet a need, rather that need had to be found or, as often the case, created through advertising [29: 49f]. Computing thus came on the shoulders of hype, including claims of a better life for everyone, and by the very nature of Turing’s scheme, with an inexhaustible future of technological progress guaranteed in principle – though manifested in emotionally dark uses.

We can, then, infer a strongly discouraging anxiety about the machine. Unfortunately (perhaps tellingly) evidence from the scholarly mainstream is sparse at best. Intriguing testimony from the mid 1950s suggests, however, that an “uneasy, half embarrassed... furtive rivalry between man and machine... [was] being fought underground because even to consider the existence of such a contest would be undignified” [50: 482-3]. If this is right (which I think it is) then perhaps we should regard the sparse, scattered signs of anxiety we do find in the professional literature most remarkable. There we come across anxieties over the distortions computing would work on the humanities if taken seriously, for which the words of those who did take it

⁷ See Humanist 27.357, 358, 363, 369, 370, 374, www.dhhumanist.org/cgi-bin/archive/archive.cgi?list=/Humanist.vol27.txt (1/10/13).

⁸ This is a complex historical question I do not have time to unpick here. For the asking of it, see [23], which cites [8], and in the same volume [40].

seriously provided evidence; anxieties over an immanent mechanization of scholarship, leaving scholars little to do; and anxieties over its revolutionary force, threatening to cast aside familiar ways of thinking. Curiously gratuitous reassurances that all would be well, that the scholar still had a function, suggest the very anxieties being allayed. I think what we witness here is fundamentally an existential angst, a “fear and trembling”, as one scholar said [42], quoting Søren Kirkegaard: not so much “Will I have a job?” but “Who am I to become in a world defined by the computer?”

There cannot be any doubt that like everyone else in Europe and North America, scholars of the incunabular period were exposed to the strongly polarized views of the machine that saturated popular media. It would be paranoid to regard these media as broadcasting an orchestrated message, but from the time of Edward Bernays’ influential book *Propaganda* (1928) “[t]he conscious and intelligent manipulation of the organized habits and opinions of the masses” was doctrine in public relations and advertising [4: 9]. In the early days of the Cold War, when fear became a deliberate instrument of social control, Bernays exulted in “this enormous amplifying system” of media “which reach every corner... no matter how remote or isolated. Words hammer continually”, he wrote, “at the eyes and ears” [5: 113]. The marriage of policy, commerce and propaganda then took hold.

Consider in this context the 1982 American dystopian science fiction thriller *Blade Runner* along with numerous other examples. Add the evidence of existential angst attested by the early digital humanists. Add also the many speculations about machines outstripping humans, especially in cognitive performance. Again that voice from the mid 1950s: “We have become used to machines that are more powerful, more durable, more accurate, and faster than we are, but machines that challenge our intelligence are hard to take” [50: 482]. Aren’t they still?

7 The scientific programme as moral programme

Now I want to pull back from the incunabular period, first with the help of Sigmund Freud. Famously, twice in 1919, he declared that scientific research had precipitated three great crises in human self-conception, or as he put it, three “great outrages” (“große Kränkungen”) [11;12]: first by Copernican cosmology, which de-centered humankind; then by Darwinian evolution, which de-throned us, setting in motion discoveries of how intimately we belong to life; and finally by his own psychoanalysis, which showed we are not even masters of own house. Less often noticed is his suggestion (implicit in the German *Kränkung*, from *krank*, “ill, sick, diseased”) that these diseasings of mind can be turned to therapeutic effect. We are apt to see only the physician here, but Freud was in fact showing his inheritance from the whole moral tradition of the physical sciences. At least from Bacon and Galileo in the 17th Century this tradition had identified the cognitively and morally curative function of science acting against fanciful or capricious knowledge – “the sciences as one would”, Bacon called it in *Novum Organum*, (I.xlix). Science for them was a corrective, restorative force: “the moral enterprise of

freedom for the enquiring mind”, historian Alastair Crombie has written [9: 8]. We now know that in its origins science was not anti-religious; its aim was restoration of cognitively diseased humankind to prelapsarian Adamic intelligence [34: 9-11]. The religious language has gone from science, but the moral imperative remains. Freud’s series of outrages is thus radically incomplete: they do not stop with him because the imperative to correct “the sciences as one would” is integral to the scientific programme.

The advance of this programme, in recent decades thanks to the computer, is impressive by anyone’s measure. Consider, for example, philosopher Paul Humphreys argument that because of computing “scientific epistemology is no longer human epistemology” [20: 8]. He concludes in language reminiscent of Milton’s *Paradise Lost*: “The Copernican Revolution first removed humans from their position at the center of the physical universe, and science has now driven humans from the center of the epistemological universe” [20: 156].

The odd echo of Adam and Eve’s expulsion from Paradise, with implicit appeal to our foundational mythology, gives us a deeply ironic clue. It is, if you will, clue to a reach for certainty impelled by the success of the very scheme Turing used to show there could be none. So we are on sensitive ground. Humphreys implication is that all we imagine can only be narcissistic, since consciousness of anything that cannot be effectively computed from external input has to be a self-reflection. He is not alone. Consider, for example, cosmologist and Nobel laureate Steven Weinberg, who like Freud takes aim at this narcissism, proclaiming that we live in “an overwhelmingly hostile universe” [57: 148] whose laws are “as impersonal and free of human values as the laws of arithmetic” [58: 43], “that human life is... a more-or-less farcical outcome of a chain of accidents reaching back to the first three minutes” after the Big Bang. Consider also the words of geneticist and Nobel laureate Jacques Monod, who aims at the same target, proclaiming “that, like a gypsy, [man] lives on the boundary of an alien world that is deaf to his music, and as indifferent to his hopes as it is to his suffering or his crimes” [41: 160].

Grow up and face facts! we are told. But however extreme these two distinguished scientists may be, they are indicative of a much broader sense of a mounting attack of ourselves as scientists upon ourselves as humans. The case is summed up by biological anthropologist Melvin Konner: “It would seem”, he 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?” [25: 120].

This, I would argue, is one of those punctuations of the equilibrium that force us to rethink ourselves. Ah, the postmodern condition, you may think. Yes, but in the *longue durée* of becoming human, this is one among many punctuations. The story told for example by Roger Smith [48] and by Giorgio Agamben [1], who cites Carolus Linnaeus’ 18th-century classification of the human as that species which is perpetually coming to know itself, *homo nosce te ipsum*. And, at the other end of the scale, it is the story of our every moment’s “going on being” in the anxious construction of self that Anthony

Giddens brilliantly describes [15]. It is legible in the attempts, such as René Descartes' in 1637, to counteract the most corrosive discovery of his age, the Great Apes, so physiologically similar to humans, physician Nicolaes Tulp wrote in 1641, *ut vix ovum videris similius*, "that it would be difficult to find one egg more like another" [51: 274].

Recall now Alan Turing's paper of 1950, in which he argues playfully that once we can no longer *tell* the difference between ourselves and our computers, there won't *be* any [52: 433-64].

8 Present and future digital humanities

Now it is time to make the connection with digital humanities and so to conclude.

In a quietly brilliant article Julia Flanders writes of the "productive unease" in textual encoding that foregrounds "issues of how we model the sources we study, in such a way that [these issues] cannot be sidestepped" [10: 22]. She argues that an irresolvable struggle is the point of it all. Literary critic and editor Jerome McGann agrees; he argues that the aim is to fail so well that all you can see is what he calls the "hem of a quantum garment" [38: 201] – the anomalous exception which once taken seriously transforms everything. Now recall Melvin Konner's agonized question, "So what is left of us?" once we face what we now know and have built, or are about to build. Isn't it formally the same question that Flanders' encoder constantly asks, mindful of the "productive unease" from which she struggles to learn? Isn't it the same question McGann has illumined by that reach for the "hem of a quantum garment" when all else but the inexplicable anomaly has been nailed down? Here is a signal of a world outgrown, and a transformed one in the offing, a catastrophe which punctuates the old equilibrium, precipitating a new order of things, a new idea of the human.

Research in human-computer interaction has given us many fine things, including essentials of the machine I used to write these words. I would not easily give it up or surrender its most companionable interface for something less friendly. I treasure my Android phone and sense it becoming a "life companion". But for digital humanities as an intellectual pursuit I am arguing for a different kind of value, existential and cognitive, which comes from internalizing Flanders' "productive unease" in digitizing the humanities. Consider textual encoding further. If I am told by my inability to fit what I think to be an instance of personification into an ontology I have devised, then yes, of course, the ontology needs rejigging. But as my effort to render metaphor computationally tractable continues, the struggle becomes more meaningful, more and more about, as Busa said, "what is in our mouth at every moment, the mysterious world of our words", which is to say, our mysterious self. Consider another example: computational stylistics. The Australian scholar John Burrows after decades of work has amassed mounting evidence that literary style is probabilistic, in other words, that working within author and reader alike is a process identical in important respects to how the physical world as a whole operates. Most attempts to show that a computer

can be creative seem quite silly to me. But this is something quite different, something that calls for one of those existential rethinks.

So I end by asking: how is such work not fundamentally of the humanities? If we claim Roberto Busa, we must also claim Alan Turing for one of our own – and pay attention to them both. Happy birthday Father Busa!

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