\uparrow "Steaming down the sunlight"

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Let the snake wait under his weed and the writing be of words, slow and quick, sharp to strike, quiet to wait, sleepless.

- through metaphor to reconcile the people and the stones.

Compose. (No ideas but in things) Invent!

Saxifrage is my flower that splits the rocks.

William Carlos Williams "A Sort of Song" (1948)

1. A parable

In his poem "Damson", published in *The Spirit Level* (1996), Seamus Heaney metamorphoses a bricklayer standing "with his big bright trowel" high on a ladder, marveling at his bloody injured hand, into Odysseus, in the Homeric *katabasis* of the Odyssey, book 11, driving off the souls of the dead as they emerge from the lower world to drink the blood of his sacrifice. In a characteristic modulation of imagery, the poet moves from trowel, ladder and bleeding hand to sword, ditch and bleeding sacrifice, from remembrance of a robust workman now dead to recollection of a robust hero's vision of dead souls, and from that Homeric sight back to the workman's packed lunch with its blood-like stain, and so to

The smell of damsons simmering in a pot, Jam ladled thick and steaming down the sunlight.

Here, asked to give you "a more theoretical lecture... on the benefits and challenges to research in the humanities provided by textual digitization", I choose to begin with my favourite living poet's words, and these ones in particular, for two reasons.

My first reason is that scholarship in the humanities (at least in my idealistic sight) begins and ends with artefacts whose transcendence it opens up to us. They are transcendent in the sense that they are endlessly fruitful both to critical reflection and to responsive action. We can never get enough of them, never say enough about them. Contrary to the entropy that rules the non-

living, the humanities, like life itself, show order emergent from the disorder of the world. Even when the poet declares "fragments... shored against my ruins" (*Wasteland* 431), he or she is building new worlds of imaginative possibility.

My second reason – why I thought of *this* poem – is anticipated by the American poet William Carlos Williams' dictum: *no ideas but in things*! Thus the transcendence of Heaney's "Damson" comes straight out of the most practical and concrete things: the tools of the bricklayer's trade; the abrasive, hard-edged reality of bricks; torn flesh and blood; a packed lunch; and the colour and smell of damsons, steaming in a sunlit kitchen (but – notice! – "steaming *down* the sunlight"). Here is data and more than data, but a "more than" that requires the data, and is what we are drawn to study by means of the data. A parable for our situation.

All well and good – but the parable needs interpretation. My reading of it in this talk will imitate how research in the digital humanities ideally proceeds: from the artefact to the tools, then from the results these tools generate back to the artefact and perhaps also back to the tools, which may need adjusting or replacement. I want to establish that the artefact comes first in importance as well as in sequence, whatever the tools. I want to depict what I will call the "trajectory" of research in the humanities, hence to be in a position to theorize the situation computing has put us in. And because the social imaginary is crucial, I want to emphasize the fact that computing puts us into the company both of friends and of strangers (to whom Homer's Zeus and Irish hospitality demand that we be kind).

2. Computer science and the humanities

Computer scientists, for example. Their complementary trajectory is on the whole very different from ours. Where it touches on artefacts such as ours, it travels away from them, taking certain abstract problems derived from them back to the laboratory where better processes are designed and better software machines built. These processes and machines are in some cases designed specifically for analysis of the things we study, but the trajectory of the research that lies behind them goes in the opposite direction to ours. It is complementary to our own because we benefit from it, chiefly in the form of products made with the tools it informs. But I emphasize the difference between literary scholar and computer scientist because there is no productive dialogue with someone whose interests and motives you do not understand and so cannot know to respect. And we are very much in need of productive dialogue with them.

Nowadays, fallen on harder times than in their great heyday, computer scientists are rather more eager to talk to humanists. As you may know, individuals from both sides have been talking and working together for a long time, producing some very good work, but the interactions have been relatively rare – that is, rarer than they need to be if we are to make best use of computing. Thanks in part to the newfound eagerness for dialogue that has been building over the last decade, conferences devoted to examining the intersection of computer science and the humanities are now unsurprising. If you listen to what is said at and about these conferences, however, you might conclude that successful collaborations have been more or less accidental, i.e. hugely dependent on the accidentals of character, friendship, institutional proximity and so forth. Only at a very few places has anyone been able to stake out an institutional common ground where they could regularly encounter each other. Even then, the happiest of stories would appear to involve projects already with the "capacity to inspire different 'problem statements' that sound normal for each discipline" involved, as one colleague put it. While happy stories are not to be dismissed, this one's value lies in the question with which it leaves us: how to translate problem statements across the divide. I invoke Umberto Eco's sense of that act of translation: the interpretation of a text in two different languages, involving the culture of each (2001). How can you do that unless you know both cultures?

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For a diagnosis of the situation, take, for example, the remarks of Dan Cohen, a commentator on the 2006 Chicago Colloquium on Digital Humanities and Computer Science (which met again for the second time about a month ago).² Cohen quotes a mordant joke made at the 2006 conference by Martin Mueller, a distinguished professor of English and Classics who has been deeply involved in the digital humanities for many years. "I will go away from this conference", Mueller remarked, "with the knowledge that intelligence analysts and literary scholars are exactly the same." There was laughter, and then "the core truth of the joke settled in". Commonalities of method are beneficial, in that they allow practitioners to exchange techniques and tools, but from scholars you might expect to hear much more about what makes their practices distinct from the spooks'. You might expect methodological self-awareness – that is, were it not for the prevalent tendency throughout the humanities to keep method tacit, however methodical the research may be, even if (as in some cases) the method can be spelled out. In other words, the Chicago Colloquium does not present a surprising, perverse or even unusual case, but one more serious, widespread and consequential.

¹ Joseph Gilbert, quoted by Bethany Nowviskie, e-mail, 12/10/07, here by permission.

² For Cohen's commentary, see www.dancohen.org/2006/11/13/intelligence-analysts-and-humanities-scholars/; for the Chicago Colloquium, dhcs2006.uchicago.edu/program.



3. The humanities and method



At the beginning of Warheit und Methode (2000/1960) Hans-Georg Gadamer explains this silence about method as integral to the particular way of apprehending the world characteristic of the humanities and contrasts it with that of the sciences. "[T]he specific problem that the [humanities] present to thought", Gadamer remarks, "is that one has not rightly grasped their nature if one measures them by the yardstick of a progressive knowledge of regularity", as in the sciences. Research in the humanities "does not endeavour to grasp the concrete phenomenon as an instance of a universal rule", he goes on to observe. "The individual case does not serve only to confirm a law from which practical predictions can be made. Its ideal is rather to understand the phenomenon itself in its unique and historical concreteness" (2000/1960: 4f). Since finding regularities is not the point of humanities research but at best a means of highlighting the unique, the instantiation of regularity in investigative procedure, which we call method, is quite secondary. By emphasizing it, many would say, one goes in the wrong direction.



We reach much the same conclusion via cognitive psychologist Jerome Bruner's rather different argument. He begins by pointing out that both the sciences and the humanities generate imaginative hypotheses, but they differ crucially in what they do with them. Scientific research attempts to falsify hypotheses in order to come to a singular abstract law by which phenomena of the physical world may be explained. Research in the humanities demands not that hypothetical constructs are falsifiable but that they are verisimilar to human experience – that they are *humanly possible*. The goal of that research, Bruner argues, is not to zero in on the particular and unique so much as to explore "the alternativeness of human possibility" – to follow the imagination wherever it may lead, to foster what William Blake called "expanding eyes". To use common philosophical language, the humanities are concerned with possible worlds, the sciences with "the possible world we happen to live in" (Sparshott 1990: 7).

If method, then, is a investigative form of the law-like behaviour for which the researcher is looking, we might conclude that it suits the sciences down to the ground but the humanities not at all, or only as something to be held suspiciously at arm's length. Looking more closely, however, neither turns out to be quite that simply true. On the scientific side, ever since Thomas Kuhn started the historicization of the sciences and Paul Feyerabend the recognition of scientific method's plurality, we have begun to see something much closer to the humanities than previously, though the trajectory of

scientific research still moves toward singular law, and explicit method, though plural, remains an important aspect of scientific practice. My purpose here, however, is to question how computing has altered the humanities' relationship to method. That it has brought the humanities and the sciences closer together is a very important result, to which I will return briefly later, although it is not my topic on this occasion.

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4. Athens and Jerusalem



Since a very strong analogy connects physical law (expressed mathematically) and computational procedure (stated algorithmically), the foreignness of explicit method in the humanities may be extended to the present case. To echo Tertullian's famous question – *Quid ergo Athenis et Hierosolymis?*, "What therefore does Athens have to do with Jerusalem?" (*De prae. haer.* 7.9) – we can ask, what therefore can computing have to do with the humanities? European culture has, I think, answered Tertullian abundantly. Computing remains in question.

You may well be eager to point out that this question has a one-word answer, namely "Behold!". Where indeed in the arts and humanities is computing *not* to be found, except perhaps in the studies of a very few retired Oxbridge professors? Recall nevertheless Martin Mueller's joke at the Chicago Symposium, provocation to which can be found throughout the episodic history of interactions between humanists and computer scientists. We may be able to demonstrate with authority that humanists' lack of methodological self-awareness has solid justification, but computing changes the situation profoundly by requiring that the method to be implemented be spelled out. When we pick up computational tools, we're rarely if ever picking up instruments embodying our own ways of working. They're far more likely to embody rather different working methods and goals. Furthermore, the historical development of computing itself is increasingly toward empowerment of an end-maker of tools and away from mere facilitation of a passive end-user. Hence I think myself justified in asking blunt questions. Why are we being so dull-witted to our own ways of knowing and to the demands of computing as to be methodologically indistinguishable from the spooks? Why, to echo Jerome McGann, are we at the beginning of the 21st Century so much like Henry Adams at the end of the 19th, whose humanistic training "left him unprepared for the dynamo of the twentieth-century"? (2005: 105-6). "For the interesting puzzle in our times", political scientist Langdon Winner has written, "is that we so willingly sleepwalk through the process of reconstituting the conditions of human existence" (1997/1986: 61).

Even if we were able to drug curiosity, even if it were possible to relegate computing strictly to the role of a vending machine for information to be applied in traditional ways, there would still be revolutionary trouble for the old and by now cozy two-cultured arrangement. As in the European Age of Exploration, the volume and variety of primary data now available is challenging old taxonomies, and semantically insensitive searching across large collections of secondary literature is bringing scholars into contact with ways of thinking and speaking that their *Doktorväter* would hardly recognize. To use the language of economics, it is impossible (or at least *very* difficult) to alter a component of a tightly interrelated system, such as the academy, without causing system-wide effects. One does not have to go very far to find these.

Two illustrative anecdotes.

- (1) A classicist friend of mine, who once jokingly exclaimed, "Thank God the Library at Alexandria burned!", now must cope not only with the *Thesaurus Linguae Graecae* (extended to the fall of Constantinople in 1453) but also with the masses of epigraphic material coming online from sites throughout SE Europe and the Middle East. No longer can he confidently stick to a rather limited canon of edited texts or can he breezily separate literature and inscriptions into conveniently distinct genres.³
- (2) When I look for secondary literature online, I now make little use of the common techniques for refining a search – which have never worked very well anyhow. Technologically naïve or otherwise deliberately wide searching allows me to see in what disciplines my topic surfaces, to locate prominent writings from each and so to benefit from the often considerable ethnographic variety of ways in which the topic is treated. Whether quite so deliberately, whether judiciously handled, the same must now be a common occurrence. It does not take much imagination to see what must be happening to disciplinary boundaries, indeed to our whole conception of disciplinarity, as a result of relativizing encounters with variant discourses. This was, of course, going on before the Web. Back in 1980 American anthropologist Clifford Geertz took time out to notice "the enormous amount of genre mixing in intellectual life", interpreting it as a sign of "the refiguration of social thought" (2000/1980: 19). The lesson to learn here is that the Web didn't cause genre-mixing, rather it gave very long leash to an already strong desire to expand the scholarly mind into the wide-open fields of academic heteroglossia.

³ For the breakdown of these genres, see Roueché 2008.

In any case, we cannot protect our disciplines against curiosity, at least not all of the time, nor our research against the intimations of a much greater promise. If we are to do any better than the Chicago Colloquium, as I think we must, we have to confront the question of what computing's Athens has to do with poetry's Jerusalem on the most fundamental level of the research that we do. It's my principle aim here to suggest what kinds of responses are underway or at least possible.

There are, I think, two: the analytic and the synthetic.

5. Analytic computing

The analytic response begins by noticing that to render anything at all computable, a model of it must be built, and that the components of this model must satisfy two rigorous criteria: complete explicitness and absolute consistency. A representation is always different from the reality that it represents, but a computational model is radical in that respect. To get some idea of how radical the difference, attempt to imagine the rendition of a poem that makes its meaning completely explicit and expression of that meaning absolutely consistent from one instance to the next. That's the down-side. The up-side in this characteristic trade-off is the manipulative power that computing brings. This power derives from the fact that to use a musical analogy, "there is no melody, there is [only] melodying", as David Sudnow wrote about jazz improvisation (1978: 146; cf. 2001: 126). In other words, what matters in this process is not the model but its perfective iteration at the hands of the modeller. What matters is not the model but the *modelling*.

I just used the term "perfective". By that I mean iteration and adjustment of the model to the point at which the so-called "law of diminishing returns" kicks in. When that happens, the modeller is left with something that works fairly well but which (computational representation being as it is) leaves a certain residue of instances that won't fit the overall scheme. There is a gap between the representation and the reality. We know from the example of digital audio production, e.g. on music CDs, that this gap can in at least some instances be reduced to such a fine degree of granularity as to become unnoticeable – in the case of audio signals, below the level at which the human ear functions. We know from participatory virtual reality environments, such as Second Life, that the gap can simply be ignored. (One suspects that its disappearance is only a matter of time.) The whole point of analytical digital scholarship, however, is not to make the gap between representation and reality unnoticeable or to overlook it but to track it to the point at which perfecting and iterating the model fails to make any significant improvements, then to inspect the residue. The job is well done when that

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residue turns out to be, in McGann's words, "the hem of a quantum garment" (2004: 201)– something that transforms the critical world in which one is operating.

That's the analytic response. As Johanna Drucker has pointed out (2007), it is fundamentally reductive. It works by *mathesis*, the Foucauldian "science or practice of establishing a systematic order of things" (*OED*), then by comparison with reality as we know it, in order to raise the epistemological question of *how we know what we somehow know*. It foregrounds method.

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6. Synthetic computing

The synthetic response to the question of computing's Athens versus poetry's Jerusalem is more difficult to talk about – possibly in part because the reductive language essentially derived from physics has dominated our intellectual culture for a long time. By my reckoning, there are three emergent paths along which to develop the synthetic response.

The first, championed for example by the Canadian scholars Andrew Mactavish and Geoffrey Rockwell (2006), is toward the arts. The visual arts are engaged because of rapid development of tools for visualisation and construction of the virtual reality spaces that I just mentioned, with far greater importance these put on aesthetics and design than been true for computing previously. The performing arts are engaged through developments in local hardware and communications technologies, which allow computing to involve multiple actors performing in real-time and virtual space – again, in Second Life or similar environments. The plastic arts and the crafts are engaged by the essential role of interface objects, both physical and virtual, which involve kinaesthesis or, cognitive scientists now teach us, kinaesthetic memories. The media arts, where the others combine, make kin of a long lineage of media artists and explorers, as the German scholar Siegfried Zielinski has shown (2006/2002). Engineering, with its characteristic, creative agon of "design under constraint" (Wulf 2000), becomes a close relation. Quite suddenly we need to hear from artists and craftsmen, performers, engineers, instrument makers and, from before our time, natural historians, as well as from palaeographers, book historians and other scholars of material culture. They all have something to teach us.

The second path turns to studies in language (sociolinguistics and pragmatics, poetics and literary theory) and to improvisational musicology. The chief strains of linguistics relevant to this path are the conversational and anthropological, with their focus on how discourses are dynamically generated and shaped, as in the work of Harvey Sacks (1995), Emanuel

Schlegoff (2006) and Alessandro Duranti (1997). The poetics and literary theory of most interest comes, for example, out of Mikhail Bakhtin's notion of "heteroglossia", or the existence of texts in "a world of other's words" (1986: 143); reader-response and performative theories of language; the semiotics of Umberto Eco (1984/1979); the poetics of Lyn Hejinian (2000); and the critical theorizing of Jerome McGann (2003). The bridge to musicology, which Eco briefly hints at, is provided both by jazz musicians, who themselves speak in terms of conversation (Berliner 1994), and by those whose interests span both, such as Duranti and David Sudnow (1978; 2001), a student of Sacks'. Broadly speaking, the diverse concerns of this path converge on the question of how in language or in music new arises dynamically, interactionally from old – for example, how we continue a conversation that remains recognizably the same conversation, or how text and reader co-create a "textual field", as McGann says, defined by a co-dependent relation that somehow the text has anticipated (2003). The question for computing is how such textual phenomena may be modelled.

The third path draws from biology and related fields, including biological anthropology and evolutionary theory. It strays furthest from the sights and sounds familiar to humanists, but like the musicology of improvisation and the literary theory of co-dependent relations, it also is concerned with how the new emerges from the old dynamically and interactionally in the absence of teleological determinism. Instead of asking, how does the jazz musician know what next to play, or how do new readings of a text come about, the biologists ask, how is it that life emerges out of the non-living? How is it that living systems continue to bring order out of disorder, contrary to the otherwise universal rule of entropy? In a series of lectures given not far from here, in Dublin in 1943, and later published as *What is Life?*, the theoretical physicist Erwin Schrödinger responded to the failure of physics to deal with living systems. He gestured prophetically toward what he called a "new physics".

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Biologist Robert Rosen argues that we have only recently begun to explore the path Schrödinger glimpsed (2000). Three overlapping ideas are now variously used to characterize it, especially with reference to living systems. The first is *self-organization*, or the ability of a system to increase in complexity without external assistance. The second is *emergence*, which focuses on such a system's ability to generate new properties (Deacon 2006). The third and both most comprehensive and challenging is *autopoiesis* (lit. "self-making"), in which the components of a system continuously both re-generate the processes that produced them and constitute the very system that realises them as a network. Systems which exhibit such behaviour are said to be "complex" – meaning not intricate or complicated but in a dynamic relation of co-dependency with their components. In logic they are said to be "impredicative", or indefinable

except in terms of a totality of which they are a part (Rosen 2000: 82-95). Bertrand Russell, writing as a mathematical logician, invoked the "vicious circle principle" to condemn all such self-referential formulations (1908: 237). We may simply find them paradoxical. But as the Chilean biologists who developed the theory of autopoiesis say, we need new words in order to talk about such matters lest we fall "into the always gaping trap of not saying anything new because the language does not permit it" (Maturana and Varella 1980/1972: xvii).

"What remains indubitable", Russell remarked in his memoirs, "is that the new is never as mellow as the old, and that therefore the worship of mellowness is incompatible with new excellence" (1958/1956: 93). In other words, we're in for a very rough ride – and more. Our very difficulty in struggling to generate, understand and adapt such new ideas gives the lie to our tiresomely constant, bland and naively optimistic talk of innovation. The ancients feared *res novae* for a reason. We welcome the new but should be under no illusion that it comes easily or undemandingly.

It may be too early to say very much about the probable yield of "new excellence" from my three emergent paths toward a theory for synthetic work in the digital humanities. But two things seem clear to me from my own experience with literary computing.

First is that current tools for text-analysis are woefully inadequate. The chief problem I have encountered is their assumption that context can defined, and so digitized, or ignored altogether. Hence context is either arbitrarily limited or enters through the cognitive back-door, in the form of whatever scholar-users happen to know – but may not know that they know.

Second is that highly promising work is proceeding nevertheless, and attempts are being made to put together a discourse for talking about the problem. Already McGann has drawn from the second and third of these paths to explain his implementation in the *Ivanhoe Game* of an authorial "inner standing point" for literary criticism (2003). My own theory of modelling for the digital humanities, though focused on the analytic side of the street, draws heavily from the first path and so is directly applicable to synthetic work. But we need much more. Robert Rosen's call to turn from the "mind-set of reductionism, of looking only downward toward subsystems, and never upward and outward" (2000: 2), though specifically addressed to biologists, seems to me an imperative for all the digital humanities.

In obeying that imperative we simply must reach out for help wherever it may be found. Such reaching-outs are easy to ridicule, as bad science, or

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7. Conclusion

Computing fundamentally involves us in thinking of one thing in terms of another: first, whatever question we're pursuing, in terms of computational data and modelling techniques; then, our conventional practices, in terms of methodologically similar ones borrowed from elsewhere; finally, our artefacts, in terms of other social and physical phenomena studied well outside the humanities. Hence my argument comes down to this: that computing invites us scholars to draw analogies and to reason with them. It is medium for discovering and implementing analogies. "Whenever an object's internal workings are too strange, complicated, or unknown to deal with directly," Marvin Minsky explains, "we try to extract what parts of its behavior seem familiar – and then represent them by familiar symbols – that is... the names of things we already know which we think behave in similar ways" (1986/1984). The "internal workings" of the objects on which humanities scholarship focuses are forever strange, complicated and imperfectly known. Since our cultural heritage is the product of such enigmatic workings, it must not only be preserved, like last season's fruit, but with each generation reformed for that generation. In this generation, and it seems likely for those to come, computing is at the centre of that cultural reforming.

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Hence, as Johanna Drucker recently declared, humanities computing "may even be the most important humanistic project of our time" (2007: 7). Here I must make a distinction between the "digital humanities", which is the collective name for our traditional fields of study in their digital aspect, and "humanities computing", which studies and cultivates the methodological common where they intersect. Without the extra-disciplinary perspective which humanities computing makes possible, that common would not be visible. The digitized disciplines, by virtue of their disciplinarity, are constrained from asking the questions that occur only in that common, where methods are brought out into the open and can be interrogated before they disappear into tacit use.

The pervasive sin throughout the digitized humanities is to regard the computer as a "knowledge jukebox" that, as Drucker says, "simply plays whatever text or artifact [scholars] google on the screen." The doctrine of

ever-greater accessibility "has blinded the academic community", she writes,

But the shape of knowledge as we will know it is being modeled in digital environments and instruments. The tools for understanding the interpretive force of choices made in structuring these environments will come from every field of critical, cultural, media, and visual studies. But only for those sensitive to the basic condition of all knowledge as mediated representation. You would think that would include all humanist scholars, as well as administrators — wouldn't you? That it doesn't shows how far we have to go with the crucial social tasks ahead — to make the arguments within the culture of academia that will make clear to the current and next generation of humanists the extent to which the mediated condition of all knowledge is now shifted into digital frames — and that any humanist encounter with such knowledge has to begin with a critical understanding of how the very modeling on which artifacts appear to us in digital form works to constitute the objects of our collective inquiry (2007: 7-8).

If I may say so, you have come to all this at a very good time, when the case for the digital humanities is no longer so hard to make but when its institutionalization remains sufficiently inchoate that you have no choice but to grow your own – with the help of some examples. Make no mistake, however: reconfiguring ourselves to meet the challenge inherent in the very idea of digital humanities is both daunting and unavoidable if the humanities are to survive the current anti-intellectual attack. In North America and the UK, at least, institutions of higher education have responded very poorly, adopting (perhaps unavoidably) the discourse of their pay-masters. Etched across the glass on the front of the Strand building of my institution, King's College London, is the declaration that we "serve society". The name of your project similarly declares its aim for the "Humanities [to be] Serving Irish Society". A noble aim, but on whose terms? I will not say with Mrs Thatcher, "there is no such thing as society" – society is perhaps the most important imaginative creation of our kind – but I will ask, Who in this case *is* society? Who speaks with its voice? And when *we* are called upon to speak, what do we say?

If my own recent experience is any guide, Society may well appear before you as a young and quite eager marketing person with little experience of higher education and no advanced degrees, who wants to *sell* your pedagogical services to a wider public and may wonder, for example, which sessions of which courses might be marketable? I mention this scenario not just because it is happening but also because digitizing the humanities makes our disciplines more attractive to that wider public and more expensive. Hence

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simultaneously their appeal, visibility and accountability are increased. To meet the enormously important social challenge of responsiveness to the society of which we are a part, we need to begin by educating that eager marketing person. To do that, and to communicate successfully to students, colleagues, administrators, paymasters, taxi-drivers and whomever else we chance to meet, who want to know, "what is digital humanities, and why should I care?", we need clear and persuasive arguments that render our beloved arcana into plain terms. We need to be able to speak with experience and concern made articulate in conversation with each other, on the methodological common of humanities computing. We need to have had our hands on the reforming of cultural knowledge, so that we speak with authority as active end-makers of that knowledge, not as passive consumers with no real claim on anyone's attention. We need to be informed by the best work from across the disciplines, not just within our own. We need to be disciplinary polyglots so as to understand that work in its own terms.

This is our beginning in the digital humanities.

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