Imagining the hunt:
Cutting-edge, collaborative, digitally human & reciprocal

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> The subject does not belong to the world:
> rather, it is a limit of the world.
> Wittengenstein, *Tractatus* 5.633

Abstract. Keynote lectures call for improvisation of their ideas and conversational exchange. This one, by a student of the humanities and professor of humanities computing, rings the changes on the four thematic elements of *Interface 2009*, hence its title. It pays close attention to the words used to describe relations between the digital humanities and computer science because, as the philosopher Hans-Georg Gadamer said in *Truth and Method*, "Being that can be understood is language" (2004/1960: 470; cf. Rorty 2000: 23). Because language is central, computing always in motion and computational models approximate by nature, it advocates risk-taking in dialogue. It takes issue with "cutting edge" but for the humanities argues that the phrase points to powerful forces of change. It demotes the transcendental virtue of "collaboration" to a mode of work in the digital humanities often but not always best. It argues that computer science has a prominent role in an emergent interdiscipline, nowadays usually called "digital humanities", but does not itself constitute that interdiscipline. It concludes that reprocity between the humanities and computer science offers both great benefits.

1. Keynotes and conversations [SLIDE 2]

Allow me to begin by considering what a keynote lecture is for and how such a lecture is supposed to fit into the conference of which it is a part.

The term *keynote* is a metaphor referring in origin to the musical note that forms the basis of a key. Hence it denotes "the leading idea of a discourse, composition, or course of action" (*OED*). The presumption is that a keynote lecture somehow sets the tone for a conference, but since the other papers are written independently, whatever emergent harmony it brings about can only arise improvisationally, in unplanned remarks and informal conversations. We often ruefully note that the point of a conference isn't the papers, rather the social networking which happens in the interstices. We are rueful because we feel obliged to fix our hopes on the formal, quantifiable products of research rather than in the provocations that result. I wonder if this fixation is wise, especially on research, such as ours, that is so immature, tentative and fleeting. But what is much worse than fixation on products

is the notion that we communicate in order to make true statements or take defensible positions. Even humanists, who pride themselves in questioning, lose sight of the fact that the point of the work is to get others to think again, to think better, about what concerns us all. Martin Heidegger remarks at the end of *The Question Concerning Technology* that "questioning is the piety of thought" (1977/1955: 35) – our way of keeping our eyes open to the world by continually testing and abandoning each construction we make of it for one that is more inclusive and more challenging. "Into the same river I step and I do not step", said Heraclitus.

As researchers we are for communicating, and our communications are for provoking ever better questions. This means putting risky ideas and objects into circulation to see what happens, not building defensive works. It means inviting engagement, not repelling it. That's what this keynote is all about.

Fortunately on this occasion the hard task I've just sketched is delimited by the conference organizers, who have supplied us with basis for harmony in their declaration of purpose. *Interface 2009* will, they declare,

> ...bring together postdocs, early career academics and postgraduate researchers from the fields of Information Technology and the Humanities in order to foster *cutting-edge collaboration*. As well as having a focus on *Digital Humanities*, it will also be an important forum for *Humanities contributions to Computer Science*.

I have implied that the most important word here is *forum*, i.e. a place where people stroll about, check each other out and converse. That's your job. I conceive mine, in the remainder of this talk, to pay close attention to that list of four things we're supposed to talk about: (1) *cutting-edginess*, signifying the new or emergent qualities of what we do; (2) *collaboration*, denoting a much celebrated manner of working; (3) *Digital Humanities*, the name now commonly applied to my own academic field; and (4) *Humanities contributions to Computer Science*, which I take as the second half of an open question: what *do* these two areas of enquiry have to do with each other?

2. Cutting edginess [SLIDE 3]

The term *cutting edge* denotes dynamic, invigorating, incisive and competitively advantageous qualities, implying a hopeful if not lustful gaze toward the future. It is often attributed to research as a selling-point for its products, but it is also part of the techno-scientific self-image. C. P. Snow, in his 1959 Rede Lecture at Cambridge, *The Two Cultures*, did not use the term but spoke characteristically of scientists as having "the future in their bones", contrasting them with "the natural Luddites" of the humanities, who respond "by wishing the future did not exist" (1998/1959: 10-11, 22). Similarly, that master at the art of provocation, Marvin Minsky, declared that, "A dynamic science has no need of its past, it forges ahead" (Dupuy 2000: 43). Thus he expresses the common sense that what counts in our techno-scientific culture is the edginess of discovery, the new, the revolutionary. How common this sense is can

be measured by the frequency with which the adjective "revolutionary" is attached to the things we make, the results we obtain, the theories we devise and the claims we advance. Listen for this word in the discourse of the tribe, then ask yourself first if it is true, second why the claim is being made. Why should any academic field be revolutionary? Why should we desire a revolution?

Revolutionaries reject the past as irrelevant to the new order they strive to bring about, even regarding the past as a nightmare from which the oppressed struggle to awaken. (In the early years of Soviet Russia, for example, the prominent musician Arseniy Avraamov proposed that all existing musical instruments be destroyed, on the grounds that everything, including music, had changed; old instruments belonged to the old Tsarist nightmare.) On a more mundane level, we typically take a similar view of a problem that has been solved; indeed, once it is solved we have great difficulty imagining the world prior to its solution. But especially since Thomas Kuhn unwrapped the timeless mummy of science in the early 1960s (Hacking 1983: 1), it has been simply irresponsible to ignore the fact that techno-scientific inventions and discoveries, however revolutionary, are historically contingent. Revolutions, we know, do not abolish history but themselves in time become historical events; consider again Avraamov's proposal: how quaint, how historically fascinating. Euclid's geometry, Newton's physics and Skinner's psychology once denoted cognitive revolutions so effective that they became cosmological, but we now look at them from the outside, knowing more about geometry, physics and psychology and so able to see these conceptions as cultural phenomena – as the ingenious workings out of *as if* simplifications belonging to their time and place.

Ironically, what matters if you wish to be a cutting-edge *participant* in such activity, rather than a mere consumer of its products, is an historical question: how *do* such brilliantly effective simplifications come about? The mathematician, engineer and ACM founder Richard W. Hamming, in a wonderful essay entitled "We would know what they thought when they did it", declared that "As creative scientists we are more interested in the act of creation than we are in what is created.... We wish to learn how to do great things ourselves rather than merely recall what others have done" (1980: 5). He argues persuasively that the history needed to train scientists to their creative role is not the flattering chronology of firsts we usually get in so-called histories of technology, each signal event of which records progress toward the glory of the present moment – but imaginative recreation of the past in its own terms: "we would know what they thought when they did it". What was John von Neumann thinking when he sketched the architecture of the digital computer (1945)? Of course we cannot know exactly, nor could he reliably say if he were alive now, but we can get surprisingly close. The historical knowledge we gain is profoundly important to those who will make the future of computing: it shows that what they are doing has shape, direction and a human context. And thus we begin to see what the humanities can do for computer science.

Minsky's anti-historical declaration that "science has no need of its past" does, however, point to something very interesting about the effects of computing on the humanities – what the cutting-edginess of technological involvement is doing to fields of enquiry devoted to questions as old as humankind, as these recur up to the present day.

On the one hand, computing machinery *does* continually improve. Faster, more capacious, physically smaller and lighter equipment *is* better. The distinction between hardware and software implicit in the Universal Turing Machine, once implemented, opened the door to change in equipment that made the computer different from any previous device or appliance. Furthermore the indefinite mutability of Turing's scheme meant that the computer became not so much an object of desire as a means of being desirous – and a guarantee of never being quite satisfied. Hence computing has awakened and continues to feed an insatiable hunger for the new. This hunger has all the more grip on the soul precisely because progress in technology is no lie and because we do not in fact know how far we can progress.

On the other hand, whatever one may say about the sociology of knowledge or about shifting theoretical fashions, progress has more or less been a stranger to the humanities ever since the printing press became someone else's concern and its miniaturized personal version, the typewriter, part of the scholarly furniture. For a long time progress has been anathema to humanists, helping to define the humanities by that which they are not. No longer. To put the matter in another, less comfortable way, the computer has proved a Trojan Horse – taken into the citadel of scholarship as a gift to further the old ways but secretly spilling out agents of change whose impact on civilization we do not yet understand well. For this reason alone it is mandatory that scholars awaken from their technological somnambulism, as Langdon Winner says (1986: 5), and get to work figuring out what the humanities can be in a computational world – and helping computer scientists figure out what that world should be.

Being in bed with progress is especially disruptive (and enlightening) because in the context of research, computing is experimental, not teleological – at least not in any simple sense. For this reason I choose to speak of *computing*, a present-participial or "action noun" that names a way of intervening in the world rather than a tool of intervention. Actually *computing* should be plural as well, to denote the fact that in principle the forms that it may take are limited only by human ingenuity (Mahoney 2005). Hence – with all due respect to Herbert Simon *et al* – we miss the point of computing when we speak of solving problems, and we go even more awry when we think of solving scholarly problems, since the core problems of scholarship aren't for solving. There is no land of milk and honey at the end of all our wanderings

because there is no end to our wanderings in computerland, or anywhere else here below. In the very short-term the humanist presumably knows what he or she wants software to do, but Turing's scheme also means in principle that what is possible cannot be known or reliably imagined, and that in principle any imagined form of it has unpredictable consequences. As in AI, the incipient attitude has to be – let's see how far we can get.

There's more. Even with shrink-wrapped applications the computing humanist is always on the verge of if not involved in experimenting, as I suggested, and so open to a style of knowing long familiar to the scientist but new in the humanities. (Hence there is for that and other reasons a subversive link between the humanities and the sciences, but this is a topic for another occasion; see McCarty 2007.) Properly speaking experiment, in the technical sense relevant here, involves planning and designing if not building the equipment with which the experimenter then seriously plays. In order for this new style to take hold, and so for the humanist-experimenter's full imagination and intelligence to be engaged, the end-user needs to become an *end-maker* of that equipment. This is partly a matter of educating students of the humanities in programming – the benefits of which are obvious but the way to do it still a matter of debate; partly a matter of increased attention to the question of computational primitives in scholarly work – a fascinating set of problems for the ethnographically inclined computer scientist; and partly the development of interaction design in the sense pioneered by Terry Winograd and Fernando Flores, in their enormously important, philosophically profound book, *Understanding Computers and Cognition*.

I spoke just a moment ago about computing's perpetual dis-equilibrium and the non-existent end of wanderings. Without a quiescent end-point to be achieved, attention turns to method, *how* we do what we do, which in any case is demanded by software. Method that can be spelled out with complete explicitness and absolute consistency, and so implemented in software, is severely limited with respect to phenomena as complex as human behaviour or cultural artefacts. I refer here on the one hand to Alan Perlis' warning against the Turing Tar-pit (1982) and Peter Wegner's declaration that algorithms are autistic (1997), on the other to the enormously promising developments in interaction design. Nevertheless the demand for explicit method in the humanities creates a tension that could be creative if only it were better understood. As Hans-Georg Gadamer explains in *Truth and Method*, the humanities work differently: method is law-like, reductive, universalizing, context-independent; the humanities focus on particulars, on the contexts in which they are found (2000/1960: 3-9), and as Jerome Bruner has said, are concerned with the expansive "alternativeness of human possibility" (1986: 53). What does it mean for the humanities to become methodological or, more precisely, what kind of a relationship to method best suits these disciplines individually?

I trust that it is obvious why the ethnography required successfully to connect computer science to each of the humanities is as difficult as anything else a social anthropologist might attempt on a South Pacific island or in a North African village. The ethnographer of computing must negotiate not only the "beach-crossings" of particular epistemic cultures but also the divergent trajectories of two very different cultural groups, humanists and computer scientists (cf. Dening 2004). The questions asked in such an attempt challenge both the humanist researcher, to reach a level of methodological self-awareness few are prepared for, and the computer scientist, to think formally about incompletely formalizable problems without discarding or devaluing their non-computable aspects. Experience in my department at King's College London suggests that neither party to such a techno-anthropological encounter emerges from it unaffected. Claims of (again this word) a *revolutionary* change of outlook seem anecdotally to be justified, but the necessary studies have not yet been made. Here the social scientists are urgently needed.

My argument, then, is that the genuine cutting edge of relations between computer science and the humanities is (to borrow Peter Galison's term) in the "trading zone" (1997: 781-844), where the one becomes sufficiently philosophical and historical, the other sufficiently adept in tool-making and critically open to experiment, so that the crude pidgin we now employ can become a language. Each has to recognize how the other's questions are daring, exciting and relevant – not simply useful – to its own concerns.

3. Collaboration (and interdisciplinarity) [SLIDE 4]

Meanwhile, as you know, we approximate this trading zone by setting up collaborative arrangements between humanist scholars and computer scientists. Experience shows that these can work quite well, but despite much talk and whole conferences devoted to the topic, we don't yet have a critical understanding of it. This matters because without that understanding we don't see the phenomenon clearly, with results that have big institutional as well as personal and professional consequences.

The fact is that the term *collaboration* has become a transcendental virtue, like *interdisciplinarity*, believed to be good whatever the circumstances. Hence the caricature of the so-called *lone scholar*, a broken, dejected figure of ridicule shuffling off the academic stage as his or her young and vigorous counterpart comes bounding onto it. The resemblance to C. P. Snow's depiction of old-fashioned humanists and upcoming scientists in *The Two Cultures* shows the connection between current rhetoric and the now century and a half elevation of the sciences to cultural dominance. Hence the humanist's insecurity, or what we might call the humanities' penis-envy of the sciences. (I use Freudian vocabulary advisedly to suggest the latent sexism in this rhetoric.) In a somewhat less excited mode, this is

simply bad ethnography – or in a suitably political mode, false ethnography in the service of cognitive imperialism. Here we can finger that other transcendental virtue, interdisciplinarity, which having been made doctrinally good results in the belief that disciplines are bad, hence that distinctions among them should be broken down. We really should know by now that like other cultural entities, epistemic cultures have their own ways of doing things, and that if one is to benefit from all that they have done, these ways must be respected, puzzled out and understood, not raped and pillaged. It would be wrong to say that interdisciplinarity is impossible, but it is *very* difficult to do well.

The questions to ask, then, are these. First, when is collaboration appropriate for the research in question? Second, how is genuine collaboration – not the subjugation of one party to another that often masquerades as collaboration – possible?

The funding situation in our universities and the triumph of managerialism (or, as one colleague puts it, janitocracy) have led to the usurpation of open-ended questioning by contractural arrangements prominently featuring collaborative teams with deliverables. The answer for the digital humanities – though perhaps a cure of insufficient potency – is first to ask how best to carry out each particular research project *according to the nature of the work*. Collaboration certainly has unexpected benefits, such as the challenging dialogue with differently minded colleagues. I am far from denying its importance – indeed, collaboration is central to much of what the digital humanities have to offer and a powerful agent of freedom from solipsistic isolation. Rather I am suggesting that we keep first things first if we want what we continually say we want. A footnote to this answer is to note that much scholarship, as many have said about poetry, is work done in solitude for the benefit of everyone: an act of community-making across time and space, and so a form of collaboration that needs to be asserted against the charge of selfish isolation which that caricature implies. Consider our creative work as analogous to ourselves as creatures: in essence social and normally gregarious but in some cases requiring time by ourselves to be worth knowing.

Collaborative potential varies not just with the individual but also by discipline and by kind of research, as I have suggested. So, as Richard Rorty says in *Philosophy and the Mirror of Nature*, start by asking within the context of a potential collaborator's discipline, what in that discipline "counts as a relevant contribution, what counts as answering a question, what counts as having a good argument for that answer or a good criticism of it" (1980: 320). That's only a beginning, but it is a good one. It will give you some chance of understanding how to help bring about a collaboration with more than just the appearance of research on both sides.

Because collaborative work is by definition social, its genuineness demands social, hence professional equality. Such equality is difficult to bring about for all sorts of

reasons, some of which deserve but seldom get serious consideration. Meanwhile we can at least be honest about the matter and not pretend that true collaboration is happening when the power-relations define superior and inferior positions. A technical assistant may wave aside social inequality on the grounds that unbeknownst to the principal investigator the latter's research is serving the former's own intellectual agenda. But in many if not most cases, coincidence of interests is, I suspect, rare. Can we in fact avoid subordination of the one by the other? Would a solution be to construct something analogous to an apprenticeship system by which junior researchers, acting as technical assistants, receive valuable training, then go on to do their own thing? You might say this is already happening *de facto* where junior academics are employed to work on projects directed by their seniors, but out of compassion alone we should make this situation *de jure*.

Allow me to note that the problems here are not exclusive to collaboration between computing and the humanities. One large step toward healthy demotion of the transcendental virtue into a contingent one would be taken by looking closely at what actually happens in collaborative teams in the sciences. These have been studied extensively, though little attention has been paid to the literature of science studies in the digital humanities.

4. Digital humanities [SLIDE 5]

More terminological confusion remains. What, exactly, can be meant by the term "digital humanities"? I suspect that mostly it is used in a weak sense to denote digital activities by traditionally trained scholars, or in a strong sense to assert the belief that *real soon now* all research in the humanities will be digital. I trust that the *Byte Magazine* columnist Jerry Pournelle's phrase is sufficient to indicate the misleading dreaminess of the strong sense. The weak sense is dismissive in another way. It implies that the trading zone is of no particular interest in itself but is simply an accidental convenience where computing and the humanities happen to meet, and so it can be located anywhere. The historical persistence of institutional centres neither in computer science nor in any one humanities discipline give us pause, however. The contrary, that this zone is an emergent discipline or more accurately interdiscipline, is bolstered by the methodological commonalities that the humanities in fact share, by the amalgam of intellectual resources from across the disciplines that interdisciplinary work has in recent years begun to assimilate and by all the usual institutional signs – professorships, journals, conferences and degree programmes, including a healthy PhD in Digital Humanities in the Centre for Computing in the Humanities at King's College London. Here is a diagram of the situation as Harold Short (my department head) and I see it unfolding at King's:

[SLIDE 6, FIGURE 1]

Note the fields of Application at the top, which interact with, contribute to and borrow from the Methodological Commons, and the fields of Research at the bottom, from which techniques and reflections are drawn to inform the Commons. You will note that computer science has a rather more active role, perhaps wanders in and out of the Commons, taking, depositing and, I say hopefully, sticking around to strike up conversations. But for several reasons this socio-intellectual space does not just happen. It requires dedicated people and an institutional structure, just as does Comparative Literature or Computer Science itself.

It is in the nature of computer science, as I have argued elsewhere, that its practitioners should now be casting possessive eyes on the trading zone, where interesting problems in computing are clearly emergent. But, if one gives proper respect to the trajectory of computer science, the prospects for a felicitous marriage with the humanities directly may not be the best way to approach these problems.

What is that trajectory? Can we say with Peter Denning that the basic question across CS is "What can be automated?" (1985). If not, then how do we characterise the disciplinary amalgam that is computer science? How are its practitioners trained to look on the world? Why do individuals elect to study the subject, then to join a computer science department rather than, say, a department of mathematics or physics or sociology or history or literary studies? I suspect that put together the preferences of individuals add up to the distinctions we make institutionally, and that the particular distinction between CS and the humanities, however digital, is one we will want to keep.

Internationally, in actual institutions, the situation remains unclear for a variety of reasons, despite the fact that humanistic research has been done with computing since 1949. This lack of clarity does not indicate that the interdiscipline I have worried and promoted for the past 25 years is a "degenerating" research programme, to use Imre Lakatos's term (1970/1965). Disciplines change faster than glaciers move but can take much more time to come into their own than a mere half-century, especially when, as is the case here, such profound socio-intellectual changes are afoot. I am not, however, suggesting that you should wait and see. The question to ask is, what do we want to happen? What do our actions suggest that we want to happen? The human being, Gaston Bachelard said in *The Psychoanalysis of Fire*, is not a creature of need but a creature of desire (1964: 15f).

5. Humanities' contributions to computer science (and *vice versa*) [SLIDE 7]

In the late 17th Century Gottfried Wilhelm Leibniz, Newton's competitor for invention of the calculus and designer of a calculating machine, articulated this old and still current dream (in his typical mixture of Latin and German),

[SLIDE 8, FIGURE 2]

Theoricos Empiricis felici connubio zu conjugiren und mit einem des andern defectus zu suppliren, "to join theoreticians and empirics in a happy marriage and so with one to correct the failings of the other" (1983/ca 1671: 538). Changing what needs to be changed, this dream provides an appealing vision of wholeness for which humanists and computer scientists could strive – a strikingly modern partnership of equals, no one on a pedestal, no one calling all the shots. It seems to me, as I have indicated, that the contributions each has to give to the other are sufficiently attractive as easily to make a strong case for institutional as well as individual action.

What are these contributions? I have touched on several in passing, but in conclusion let me summarize.

It is widely rumoured that computer science needs problems to work on and that alliance with the humanities is just the ticket. Again I turn to Richard Hamming, this time to his 1968 ACM Turing Lecture, "One Man's View of Computer Science", in which he takes up the apparently perpetual question of what exactly computer science is. He notes the professional impatience with this question – the feeling that computer scientists should simply get on with *doing* it – and the strong inclination to be absorbed into small, technical problems for which the individual has some hope of making a difference. But looking forward 32 years, to the millennium, when those who were students then would be at the peak of their careers – and who are now, like me, the greybeards, he saw compelling reason to look outward, as we are now, and be practical, as I hope we can be. Apart from the trivialising effects of specialization in a field which he argued is fundamentally connected to the world and centred on physical machinery, Hamming recognized the great principle of reciprocity at work: specifically the urgent need for computer science to deliver "what society needs at the time it is needed", so that society in turn will fund research. His strategic question, then, was not where the interesting puzzles may be found – Hamming was quite impatient with those who want only to play – but how to discover where society is going so that its needs may be met in a timely way.

My inclinations are quite different. Serving society's needs, however admirable, is reactive; it is a laudable outcome of all our work devoutly to be wished for but cannot be the purpose of real intellectual work. Mrs Thatcher's notorious declaration in 1987 that "there is no such thing as society" went (and was taken) too far, but she had a point: the collective noun "society" is an elusive abstraction and can result in actual responsibility being taken by no one. And that abstraction has, since her day, grown ever more elusive. (We speak now, it seems, of "communities" rather than "society", just as we speak of "human beings" rather than "Man".) Even if with the deft exercise of sociological methods "society" could be reliably defined and polled, these methods would at best give us a statistical abstraction of the present as the

polled individuals collectively see it. I think we can do much better by asking not the servant's question, how to be useful, but the teacher's, how human desire may be strengthened and educated. Knowing what the funders are likely to fund is important, but if you want to get beyond a passive-reactive stance, allowing your research to be steered by those at several orders of remove from the action, then your business is (again to echo Bruner) with "the alternativeness of human possibility", i.e. with what the humanities explore. Thus their essential contribution to computer science.

It is also widely rumoured that the humanities are in trouble – that they are so threatened by misunderstanding and by incursions into their territories from aggressive sciences, especially the neurological and computational, that they may vanish or exist only in elite institutions. Signs of confusion and fatigue are not difficult to find and to feel. Allow me to bypass most of the debate on the future of the humanities, however, to take up what Geoffrey Harpham, President and Director of the U.S. National Humanities Center, has called "the problem of the human" (www.onthehuman.org). In the current debate about the human I prefer to think not of threats to the humanities, which assume a position sufficiently weak to be threatened, rather of challenges and opportunities for a great renewal. This renewal is to be accomplished, I suggest, by looking unblinkingly at what it means to be human in the first decade of the 21st Century, and so to study the humanities in their relation to techno-science. The humanities were born out of a declaration of what they were not – a study of that which belongs to humans (the *literae humaniores*) rather than to God (the *literae divinae*). Their renaissance is now offered, I suggest, by a new contrast with what they are not, for which computing provides an instrument of discovery.

The modern idea of computing was, we all know, crystallized in Alan Turing's 1936 paper, in which he used the figure of a "computer" (i.e., at the time, someone who did computations) as a starting point to define his abstract scheme. In 1943 the philosophical neurophysiologist Warren McCulloch and the polymath Walter Pitts, in their landmark paper, "A logical calculus of the ideas immanent in nervous activity", proposed a model of the brain as a Turing Machine in the form of a network of idealised neurons. As McCulloch subsequently indicated, von Neumann used that paper in his design of the digital computing architecture we still use today (1945). In von Neumann's unfinished Silliman Lecture, *The Computer and the Brain* (1958), we can see that model stimulating questions absolutely central to the humanities. Woven through this history is the close-knit Cybernetics Group, in which Norbert Wiener, McCulloch, Pitts, von Neumann and several other luminaries of the day were involved (Heims 1993). The Cybernetics Group proposed a model for the fusion of human and machine that quickly became computational – and which is an intimate ancestor of work in human-computer interaction from the time of Vannevar Bush and Douglas Engelbart. More recently the literary critic Jerome

McGann, drawing on a number of sources from the sciences and humanities, has suggested a role for such interaction design in order to bring computing from its merely helpful role closer to the core of the humanities, the interpretative act itself (e.g. 2003).

Can there be any doubt that computer science has much to offer the humanities?

This may seem much unlike the computer science you know. It shouldn't be, not as far as the humanities are *or should be* concerned. (I express some impatience here, since scholars in the humanities mostly do not get far enough in order to see how profoundly thrilling the implications are.) But considerably closer to what I expect is the day-to-day work of computer scientists are the quietly earth-shaking effects of those ordinary products for which CS takes responsibility. Here the tectonic movement is much faster than glaciers but still subtle enough to escape most notice. Consider, for example, all that it means for a researcher to be faced with the multidisciplinary literature connected to his or her topic by a simple string-search across a collection like JSTOR. (This, my students have told me, is how they *begin* their research projects.) It means, in brief, a strong tendency that favours transdisciplinary breadth over intradisciplinary depth, which in turn favours the developing philosophical idea that there is no one essential truth lying metres beneath where each scholar stands; rather there are multiple variations on themes which have no form apart from them (Rorty 2000). It also means that those of us who teach have an enormously important job ahead of us, showing students how to use such tools as JSTOR responsibly. It does not so much imply the need to improve query languages for greater precision and recall as the need to understand and accommodate the evolution of questioning.

I am not suggesting here a causal chain linking philosophical to computational problems or *vice versa*, rather coeval manifestations of a great cultural change. Whether, or not, the information retrieval folks, the digitizers, the encoders and the JSTOR users are aware of it, they are all part of this change.

What I think computer science in its most practical as well as its most theoretical forms can give the humanities is far greater than fulfilment of the needs we know to articulate or exhibit a desire for. Rather CS offers yeast-like tools (requiring that it keep a very close eye on the bread being made) and approximating models that in their successes and especially in their failures shine powerful light on the deep question of why our machines show no sign whatever of ending our conversations for good, rather show every sign of making them much, much more interesting and worthy.

[SLIDE 9]

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