Don't Mind the Gap:

Evolving Digital Modes of Scholarly Production across the Digital-Humanities Divide[1]

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The humanities are being swiftly retooled by digital media and methods. More and more material from the past is being digitized, and the record of our current culture is increasingly "born digital" whether we are talking about politics, media and communications, fine arts and letters, or the scholarly record. Some gets printed; much does not. The amount of digital material in existence in 2006 was estimated to total 161 exabytes or 161 billion gigabytes, which amounts to "about 3 million times the information in all the books ever written" (Gantz, "Expanding" 1). This quantity is slated to increase ten-fold by 2011 (Gantz, "Diverse" 1). If one of the primary aims of the humanities is to make sense of the human record and human experience, the rapid shift to digital media for recording, interpreting, preserving, and engaging in human activity is of profound significance. Furthermore, access to digital primary sources as the basis of future humanities scholarship will depend as much on how material is digitized and archived, and by whom, and its ability to be sorted, searched, and to interact with other materials, as it will on what is being digitized. The tools developed for archiving, teaching, research, communication, and dissemination will transform the humanities beyond what we can imagine.

The digital-humanities divide must therefore be crossed in pursuit of what has been characterized as "the most important humanistic project of our time" (Drucker 7). Of course, in a literal sense that divide doesn't really exist: virtually all scholars now working in the humanities in Canada are academic cyborgs: computers are integrated into research methods, teaching practices, and institutional lives. Nevertheless, there exists a gap between "digital humanists" and scholars who suppose that new technologies work is remote from their own concerns. For

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[1] This essay is dedicated to the memory of Norman Feltes, who asked us in his published work and his insistent professional presence to think seriously about the technological, ideological, and economic forces underlying major changes in the production and dissemination of texts. I want to thank audiences who heard and responded to portions of this essay at the Colloquium on Scholarly Publishing, Congress of the CFHSS, Université Laval, Québec, May 2001 and the inaugural Symposium on Digital Humanities: Practice, Methodology, Pedagogy at the Centre for Studies in Print and Media Cultures, Simon Fraser University, May 2007, as well as participants in the Retooling the Humanities symposium at the University of Guelph in October 2006. Many thanks to Isobel Grundy for detailed comments on an earlier draft of this essay.

many, the humanities should focus on critically assessing the impact of the digital turn and preserving the cultural heritage and literacy apparently threatened by it. Digital humanists seem a breed apart, often based within traditional humanities units but apparently removed from usual research practices, and sometimes engaged in projects that seem alien to their supposed disciplinary base (Summit 4). Humanities conferences feature papers on digital undertakings or resources but focus on content rather than method. Debates over digital methods remain confined to the still small group who attend interdisciplinary digital humanities conferences where the particularities of research problems take a back seat to technical concerns, since few beyond the presenter will know the knowledge domain involved in a presentation.

My title thus refers to the divide between the digital and the humanities as categories, and also between generations of digital resources. It invokes the iconic phrase "Mind the Gap" that originated in that slightly ominous Big-Brother-like announcement repeatedly intoned on some London Underground platforms, warning travellers to step carefully between the platform and the carriage in cases where the fit between them is poor. Unevenness developed from having to make a new technology fit the old, as when early rail lines had to curve to follow the existing public roadways above them (Mole). The phrase is now familiar from other cities, including Toronto, but the story of its advent in 1968 has a particular resonance. Here is the Wikipedia[2] version:

> The Underground management chose what was then a new technology, digital recording, in order to be able to save the announcement using solid state equipment that would have no moving parts. As storage capacity was highly expensive, the phrase had to be relatively short. A short warning would also be easier to fit in writing on the platform.

[2] I cite the open and collaborative Wikipedia site as a provocation. As it happened, being familiar with the London Underground announcements and mulling over the possibility of using this phrase in my title, I turned to Google™ to try to discover its provenance. The Wikipedia site was first among the results. I found it a well-sourced article that confirmed the claim that Wikipedia is a good resource for general knowledge, particularly on topics related to technology. But whereas the usual impulse might have been (Warwick "Funeral?"; Sukovic "Scholarly") to obscure my use of electronic resources by citing only the sources to which Wikipedia led me, I decided to cite Wikipedia itself as a nod to the ways that research practices are changing, as well as an acknowledgement of the debate over the value of Wikipedia as a resource for teaching and scholarship (see "Wikipedia"; Davidson). Although the article may be changed at any time by anyone with web access, pages are monitored by the community and most vandalism is corrected rapidly. Wikipedia preserves all previous versions of an article, so by accessing the article's history readers of this essay can view "Mind the gap" as it was when I accessed it on 27 February 2007.

> The recording equipment was supplied by AEG Telefunken. According to the *Independent on Sunday*, sound engineer Peter Lodge (who owned a company called Redan Recorders in Bayswater), working with a Scottish Telefunken engineer, initially recorded a professional actor reading "Mind the gap" and "Please stand clear of the doors," but the actor insisted on performance royalties and the phrases had to be re-recorded. In the event, Lodge read the phrases to line up the recording equipment for level [that is, to adjust the volume] and those recordings were chosen for use. ("Mind the Gap")

Incommensurate infrastructure and technologies throw up problems for users—in the words of Michael Palin, "It's an acknowledgement that the thing doesn't quite work" (iii). These problems plus the pressure for economic "efficiency" spur further innovation to make redundant the human personnel who for years did the job of warning passengers to watch their step. Adopting a pioneering technology has in its turn a profound impact on form and content, throws up intellectual property issues, and blurs the line between expert and technician, content-provider and publisher. The result has reproduced itself virally with greater persistence than anyone could have foreseen, in this case in everything from a plethora of "Mind the Gap" merchandise to book titles, popular songs, films, and videogames. Incorporated into the transnational vocabulary of the well-travelled, "Mind the Gap" gestures at the anxieties associated with navigating a complex network. To me, it speaks strongly to the gap between intention and result in the implementation of new technologies, their diverse impacts on the people whose lives they mediate, and the richly creative response of human culture to such impacts. This resonance is no doubt increased by my strong awareness, arising from feminist critique, that gaps, omissions, and silences should be interrogated for the meaning that may inhabit them as indices of the organization of power, knowledge, and discourse.

I invoke the gap to acknowledge these continuities with our present situation while insisting that it is imperative that humanities scholars not be put off by the digital-humanities divide. The broader scholarly community must address it by engaging with the development of digital tools and methods for teaching, conducting research, and disseminating its results, despite the advertised risks. As the examples of the Underground announcement and the QWERTY

keyboard illustrate, apparently provisional or trivial technological innovations may persist and have broad and unforeseeable impacts.[3] From the insight that humans and artifacts are mutually constituted, we must recognize that work underway now in information and communication technologies will reshape incalculably how work in the humanities will be conducted, indeed how it will be accessed and understood, through much of this century. Although contingency and chaos theory would stress that the outcome cannot be determined, the more those in the humanities assert agency in this process, the more likely that those reshapings will be desirable.[4]

My own experience of this gap emerges from a decade spent developing with colleagues a major digital resource in literary history, *Orlando: Women's Writing in the British Isles from the Beginnings to the Present* (Brown, Clements, and Grundy 2006).[5] Insofar as *Orlando* emerged from the desire to devise new ways to do literary history, this work meant constantly negotiating that gap between the platform of "traditional" research practices and a moving vehicle: the development of second-generation computing tools to support humanities research (Summit 4). Bringing my initial interests in Victorian literature, feminist critique, and literary history into dialogue with that swiftly expanding area now called the digital humanities[6] transformed my research agenda and expanded my sense of the horizon of humanities research. I here survey some key transformative impacts of the digital turn on core activities in the humanities as a basis for arguing that working at the interface between the digital humanities and humanities research must now be understood as one of the most pressing, if also among the most daunting, imperatives on the humanities research agenda.

Critique and Engagement

[3] Whether or not one accepts the disputed view that the QWERTY key layout was designed to slow down typing, it was certainly devised to avoid the jamming of the type bars on mechanical typewriters by separating commonly used letters. The QWERTY keyboard prevails despite the obsolescence of the technology that prompted it (Liebowitz and Margolis 7).

[4] My thinking here is influenced by Lucy Suchman's approach to agency in relation to technologies, which is grounded in feminist theory and a recognition of the particularities of cultural-historical practices (285 and *passim*).

[5] See the Scholarly Introduction at <http://orlando.cambridge.org/protected/svDocumentation?formname=t&d_id=ABOUTTHEPROJECT> for an overview of this literary historical textbase.

[6] This field, concerned, in the language of the newly-founded *Digital Humanities Quarterly,* with "the practice of humanities research in and through information technology, and the exploration of how the humanities may evolve through their engagement with technology, media, and computational methods," covers the expanding terrain of new media, hypertext, text corpora, text encoding and analysis, computational linguistics, statistical models, knowledge representation, visual communication design, game theory, and digital-oriented issues of textuality, interfaces, information browsing and retrieval, and tool development as they affect the humanities ("About DHQ"). For an overview see Schreibman et al.

Suspicion in the humanities of digital technologies is overdetermined by numerous factors. The involvement of the military industrial complex in the development of the Internet in the 1960s—epitomized by the concept, presented by Paul Baran of RAND Corporation, of a decentralized network and automated packet switching (the method by which the Internet moves information about) to ensure communication and information resilience in the event of a nuclear war—has been succeeded by the increasing use of electronic information gathering, tracking, and surveillance in the "war on terror" post 9/11 (Abbate 7–42; Ross 4; Latham). The commerce-driven hype associated with digital culture has met with skepticism within an institutional environment that, in and beyond Canada, conceives of itself as resistant to corporatization. Critiques of capitalism and globalization can crystallize into a healthy skepticism of what Daniel Dinello calls "technologism," "a harmful system of propaganda that serves to support military and corporate demand for unbridled and autonomous expansion of dangerous technologies without questions or moral concerns" (275). Yet, as Dinello argues, discerning such a hegemonic discourse does not excuse technophobia, any more than it leads most of us to eschew technologies such as the World Wide Web, which Thomas Swiss and Andrew Herman remind us is both "an instrument and an activity through which self and world are cast into sense" (2).

Profound regard for print and the forms of knowledge print culture has fostered, as well as a focus on the past, are further reasons why scholars may consider technological issues inimical to their values: the projected "end of the book" and the culture it represents are laid at the feet of the computer (Birkerts). Longstanding investments in imaginaries of the "human" that go back at least as far as the Romantics fuel hostility to technologically-oriented work (Keep). However, as strong as their hold is, even on many who have shed the epistemologies of "humanism," Andrew Ross reminds us of their cost: "A humanism that wants to police its borders with the technosphere carries with it an ugly record of policing the ecosphere. As for its global dimensions, a broader social overview of the humanist project further exposes the degree to which its historical claims have been and still are waged in the interests of white masculine power" (165). Engagement with new technologies opens up, in the words of Lucy Suchman, the "exciting prospect of alternate conceptualizations of what it means to be human…not an autonomous, rational actor but an unfolding, shifting biography of culturally and materially specific experiences, relations, and possibilities inflected by each next encounter" (281).

Yet, recognition of such possibilities is difficult within an institutional context in which the techno-science-driven research funding model has choked funding for the humanities, social sciences, and basic or "pure" sciences, making work that involves technology seem inimical to the interests of the humanities (CFHSS report as referred to in Marjorie Stone's essay in this volume). New information and communication technologies are also implicated in the workload increases, speed-up, and organizational restructuring that have resulted from the underfunding of Canadian universities since the mid-1970s (Menzies and Newson), with the result that engaging with such innovations may feel like abetting the very forces that are eroding the professoriate's labour conditions. Beyond the academy, digital technologies have also exacerbated economic and social inequalities, both globally and within technologized nations (Dean et al., "Symposium"). Thus Donna Haraway's meditation on the technological turn through the figure of the cyborg spans Silicon Valley workers and academics. These and many other aspects of digital culture cry out for assessment by the humanities. A strong sense of the liminality of our era, Vincent Mosco argues, makes us susceptible to mythologies that "stitch together, however strangely and for however brief a time, those powerful, potentially disabling contradictions in life" and shape not only individual lives but whole societies (53). As one of these, the mythology of "the digital sublime" demands rigorous analysis and critique.

But critique is not enough, if it means detachment or evasion. Technologies, broadly defined as the use of tools or machines to interact with or modify the world, have a pervasive and global impact on landscapes, weather, food, and bodies as well as more obvious activities in "high-tech" societies. Notwithstanding the continuing legacy of romanticism's construction of "nature" as beyond technologies, there is no space in the contemporary world—intellectually, institutionally, or materially—free of the impact of technologies. Thus, even resistance to new technologies requires coming to terms with their seductions and should be tempered by recognition of their potential to be other than they are. Although, as Andrew Feenberg has argued, computer systems are hardly neutral and have often strengthened existing patterns of domination and inequity; they are versatile machines that can be put to diverse purposes (15). Indeed, historian Janet Abbate attributes the Internet's success not to its later commercialization but to the "community's decentralized authority, its inclusive process for developing technical standards, and its tradition of user activism" (182). World Wide Web inventor Tim Berners-Lee designed it to foster democracy, individual agency, and social transformation (206; see also

Schuler, Turner). The academy can harness such aspects of digital technologies to desirable ends. Indeed it has, for instance, in circumventing through open-access initiatives the ravenous acquisition of scholarly journals by large commercial publishing firms. Although stemming from the sciences, where journals costs were reaching obscene levels, such initiatives are proving of major benefit to the humanities. They have permitted the founding of online digital journals in new areas despite continuing library cutbacks and the crisis in scholarly publishing; they have made available out-of-print or rare publications; they are making research results more accessible than ever before. This is merely one example of how the academy can foster technological applications that work against the grain of these technologies to create what has been characterized as a "cultural insurrection" (Downes).

The central involvement of university libraries in providing infrastructure for open-access archives, as well as the investment of considerable monies to develop and support tools, demonstrates the institutional flexibility and initiative required to leverage the power of the computer in innovative ways.[7] But equally important are the cultural shifts and support systems that enable such initiatives to thrive and establish user communities. As John Seely Brown and Paul Duguid have shown, digital technologies are caught up in powerful social networks, communities, and institutions that have a profound impact on whether a new technology is adopted. What in a digital resource is readable, knowable, and learnable by whom depends on larger cultural factors ranging from accessibility (a spectrum of concerns including both machine availability—the "digital divide"—and the ability to receive what the machines communicate, which may depend on such factors as language, sightedness, literacy, and education level) through support (from training and IT help to informal social networks) to factors such as age, ethnicity, geography, gender, and divisions of labour (DiMaggio et al.; Gajjala; Harcourt; Kolko et al.; Leung; Selfe and Hawisher; Spender; Star, ed.). Because technologies are embedded in human culture, change happens not just in initial stages of "invention" or "design" but through the iterative processes of human adoption and adaptation of technologies, and the creation of cultures that support them.

Among those aligned with the humanities, creative arts practitioners are trailblazers in the development of new media applications. So are those interested in new pedagogies, whose

[7] The Open Journal Systems developed by the Public Knowledge Project at Simon Fraser University is an excellent instance of a well-conceived and supported open-access tool. On the wide-ranging challenges of the digital archive see Martin and Coleman.

embrace of new technologies should not be dismissed as driven by top-down pressure for efficiencies (although that is in the mix), but as an attempt to keep up with the changing needs and literacies of students, the vast majority of whom—now—were born after the advent of the personal computer. Humanities scholars in general need to learn from such groups how to foster communities of engagement with digital culture. Only thus will the humanities provide analysis and leadership for the remaking of civil society in a digitized world.

Literacies

Critical thinking and literacy are widely held to be crucial to civil society. Reading and thinking are being transformed by the digitization of communications, education, and the public sphere. The ease and cheapness with which digital technologies can produce and disseminate images as well as text are producing a shift from textuality to visuality. Voice and sound technologies such as podcasting are shifting dissemination toward orality, and even much electronic text is perhaps best understood in relation to the oral (Ferris). Stuart Moulthrop draws on Espen Aarseth's work on open and dynamic textualities to characterize the electronic archive as a site for continuously evolving literacies. Contending that it works against "textual fundamentalism" and in favour of "discursive alternatives," he embraces the notion of "a general literacy of pathwork" among alternative possibilities (229, 230).

If the humanities are to contribute to these evolving literacies, if we want to foster active engagement with new technologies rather than passive consumption of them, then scholars in the humanities must energetically engage with new media and technologies (diSessa 27–28; Jones; Selfe). Fostering new literacies does not mean abandoning old ones. At the very least, older literacies need to be preserved as points of access to the past; they will remain crucial to historical interpretative work so that, for instance, it remains possible to read a nineteenth-century novel. But such literacies, as advocates for the humanities have long argued, are broadly applicable and immensely versatile. The humanities have developed enriching literacies involving complex framing and historicizing, which digital environments desperately need to realize their potential. As Shlomo Argamon and Mark Olsen point out, although the Web is a vast set of interlinked materials, its knowledge structure remains largely implicit: genuine "knowledge browsers" will need to leverage precisely the kind of contextualizing, or making explicit the important connections between disparate phenomena, that are the purview of the

humanities (34). Now that huge quantities of existing books and periodicals are being put online, the digital archive presents myriad challenges for contextualization, navigation, and searching. The humanities are best equipped to ensure that the digital universe "enriches everyone's meaningful experience with information, rather than dehumanizes it by possibly omitting its context" (Argamon and Olsen 35).

Even within the academy, we need to invent new literacies and new textualities to foster critical thinking through digital media. Although the codex seems unlikely to die anytime soon, scholarly print publication is in a bad way (Alonso et al.). Within this context, scholars working in the humanities need to consider seriously the claim that "scholarly argument is…fundamentally rooted in print" (Ingraham). The digital era opens up the prospect of unharnessing intellectual inquiry from methods and modes of representation that developed symbiotically with the establishment of print culture.

Archives

The digital turn presents major challenges for documenting culture and cultural transformation. The archive, the raw data of much activity in the humanities, has been fundamentally altered. The immateriality of digital media increases the danger of loss: for instance, informal electronic media such as emails are crucial to future studies in such areas as language, discourse, and history. The flexibility of the medium is also its curse. Electronic publications are far more ephemeral than print, some being updated or replaced daily, and quick changes to technology increase the possibility of obsolescence: even if preserved, electronic data can become inaccessible if the systems for which it was created disappear. Humanities scholars are being asked to participate in the archival project, but few, for instance, archive digital research materials collected with funding from SSHRC.[8]

Libraries are perforce remaking themselves, and we vitally need leadership, co-ordination, and widespread participation in infrastructure development to establish standards to enable archiving, ensure resources for large archiving initiatives, and integrate digital resources with library tools and collections (Humanities). The shift toward electronic scholarly journals

[8] The council's definition of what scholars are required to archive is broadly inclusive: "Research data includes quantitative social, political and economic data sets; qualitative information in digital format; experimental research data; still and moving image and sound data bases; and other digital objects used for analytical purposes." See <http://www.sshrc.ca/web/apply/policies/edata_e.asp>.

concurrent with a model of electronic licensing (usually involving access to a remote server rather than local retention) endangers the ability of libraries to preserve the scholarly record.[9] Maintaining electronic archives poses very different challenges from those associated with print, and providing the resources to establish an infrastructure of archives should be a primary goal of universities, funding agencies, and governments (American Council of Learned Societies). If scholars of the future are to have access to the primary materials for knowing and analysing analyzing culture, we need robust, sophisticated, and well-supported archives. We require a national solution for this problem, given that many major archives and other opportunities for off-site archiving are based in the United States, and hence subject to the USA PATRIOT Act with its sweeping provisions for undisclosed search and surveillance of records, including library records, by law enforcement and intelligence agencies. A further challenge associated with electronic archives, and a far greater one from a technical perspective, is the fact that, in order to engage effectively with their contents, scholars will require new means of sorting and winnowing the mountains of digital materials that are amassing daily, not to mention new modes of analysis, representation, and publication, which is to say, tools for scholarly production and dissemination.

Tools

Increasingly, humanities scholars will use electronic methods not just as hyped-up versions of older technologies and tools—the word processor for the typewriter, the online catalogue for the card catalogue—but as integral to scholarly undertakings in ways that will transform their research activities. That is why we must shape them to our purposes. This is a formidable undertaking, not least because humanities scholars often resist methodological formalization, and because many of our methods rely on close contact with our materials. But that is why we will be poorly served by others' methods and tools, and why what we make will be innovative. Computers have been of great assistance in adapting tools associated with print technologies, but as we strive to forge truly new methods to deal with a previously unimaginable—and certainly unreadable—volume of digital sources, we stand to make immense gains by demanding that computers help us to sift, structure, relate, and analyze cultural material. We want to be able to ask big, complex questions while remaining grounded in particularities, and we want new ways

[9] See "Urgent Action Needed to Preserve Scholarly Electronic Journals," edited by Daniel J. Waters. This statement has been endorsed by the Canadian Association of Research Libraries, the (U.S.) Association of Research Libraries, the (U.S.) Association of College and Research Libraries, and other similar organizations.

of representing answers to those questions. To do so requires new tools for the production of scholarly research from inception to publication. The results will offer new ways of accessing, investigating, and telling the human story.

Just as print publications are highly naturalized technologies for the dissemination of scholarly materials, the tools of humanities research are so naturalized and the language of tools so foreign that we don't tend to consider that part of our job is tool assessment, although we engage in it all the time. Digital research methods pose greater challenges to assessment than more naturalized tools and are equally crucial to research methodology. A familiar example of why such assessment matters is that web search engines operate on different bodies of material and produce relevance rankings according to various criteria, from the revenue considerations that cause some engines to prioritize particular links to the attempt in Google™ Scholar, working on a subset of what is online, "to sort articles the way researchers do, weighing the full text of each article, the author, the publication in which the article appears, and how often the piece has been cited in other scholarly literature" ("About Google™ Scholar"). Critical awareness of our tools requires that we be able to discern how they work.

Such transparency will become exponentially important as we rely increasingly on finding, collecting, and sorting analytic aids. We will come to depend on tools to provide mediated views of archives and bodies of research. Humanities scholars, particularly those whose work centres on texts, have been slow to adopt tools that distance us from our sources, but visualization and other types of mediation are likely to develop as means of interacting with vast sets of digital materials (Moretti; MacDonald and Black). But how well they serve the humanities will correlate with their legibility as systems, and with how involved humanities scholars are in their development. The Extensible Markup Language (XML) markup schema is one good example of a quite transparent digital methodology; when properly documented, text marked up with XML makes explicit the "knowledge representation" that governs how a text operates in a digital environment (Sowa), so that queries can be shaped with great precision. The Text Encoding Initiative (TEI) has developed a set of guidelines to assist in the use of XML to produce archival-quality scholarly editions. *Orlando* employs XML to mediate and provide several modes of access to roughly 50 volumes worth of scholarly prose that no one is likely to read in full (Susan Brown et al. "SGML").

The Networked Interface for Nineteenth-Century Scholarship (NINES) is an experiment in mediation designed to foster new scholarly uses of a thematic digital research collection. Individual researchers can, on the Web, use NINES tools to compile their own mini-collections within a large body of primary and secondary materials located at other sites. Its system allows researchers to exploit both structured markup and social networking features such as a folksonomy that will evolve as researchers apply "tags" to organize their collections (Hammond et al.). NINES enables users to order and annotate their collections, providing the means to create online "exhibitions" in which sources are placed in direct dialogue with commentary or argument ("About NINES"). The NINES peer-review criteria address both the scholarly content and the technical features of materials submitted to the federated collection, institutionalizing best practices that support archiving, repurposing, and linking within a federated collection. An important feature of NINES, in fact, is a series of workshops to actively train and mentor humanities scholars so the collection will grow. As a review remarks, such projects move away from traditional tools to imagine how new kinds of research might take place; as such sites develop more organic interfaces and offer access to expansive thematic collections, they seem "likely to entice very traditional scholars to engage in more robust online research activities" (Knight).

Dissemination

Initiatives such as NINES, the TEI, and *Orlando* respond to the challenges and possibilities that digital media offer to humanities scholarship from its earliest stages through to its publication. They ask what it means to pursue scholarly thought in a different medium, to trouble the distinctions between "primary" and "secondary" sources, among text, markup, and metadata, or writing, reading, interpreting, and arguing. Consider what Jerome McGann has to say about linear historical argumentation:

> Every so-called fact or event in history is imbedded in an indeterminate set of multiple and overlapping networks. The typical procedure in works of history is to choose one or more points in those networks from which to construct an explanatory order for the materials. Furthermore, works of history commonly cast the explanatory order in a linear form, a sequential order of causes and consequences. These procedures are of course

> perfectly legitimate heuristic methodologies for studying human events, but they foster the illusion that eventual relations are and must be continuous, and that facts and events are determinate and determinable in their structure. ("History" 197)

Similar arguments can be adduced about the explication of any complex phenomenon: the multi-valence and social embeddedness of most objects of study in the humanities make their analysis ill-suited to linear exposition, adept as writers of scholarly text have become at using print to invoke multiple perspectives, frameworks, and modes of inquiry that work against simplification, and ironic as this characterization of text may seem to scholars who read far fewer books cover-to-cover than we would like. Perhaps precisely because print textuality is so complex and is itself bound up with technologies that it can be fairly characterized as "cybertextuality," linear print remains the primary tool for modelling the knowledge produced in the humanities (Lancashire).

Online publishing forces the issue, given the reliance of the architecture of the World Wide Web on hyperlinking. Michael Grossberg notes that "electronic publishing—with its propensity for hypertext links and multiple layers of argument and evidence—seems hostile to…linear argumentation and explicit interpretive narratives." Information technologies offer unprecedented flexibility, asking us to rethink our models of analysis and argumentation. But while computer simulation and modeling have revolutionized the sciences (Bement), the humanities have been slow to take up such possibilities (Beynon et al.). This is despite early digital visionary Vannevar Bush's belief that the proper end of technology—indeed the only way to avert war and human self-destruction—lay in the pursuit of wisdom through the human record.

Devising new modes of argument may mean devising new technologies, if those available do not serve the ends of the humanities, for as a scholars from Marshall McLuhan to Andrew Feenberg have insisted, technologies carry meaning, are cultural products, and have profound shaping effects on the worlds in which we live. Critical investigation may reveal startling intersections between certain cultural moments and the architecture of both software and hardware. For instance, Alan Liu has remarked on the congruence between, on the one hand, the refusal by a high cultural criticism invested in "detailism" and "localism" to provide "an orderly discourse of knowledge based on a set of operations for transforming discrete perceptions into cognition" (81) and, on the other, the type of reading associated with the Web, in which readers

flit from "fragment to fragment in a hallucinatory blur of strangely discontinuous discontinuity" (78). Different epistemes may lend themselves to different representational forms and demand different interfaces, software, or perhaps finally even platforms to produce them.[10] But even if we view electronic textualities as more continuous with print textualities than the early hype surrounding hypertext let on, the question of how the electronic environment can best serve the purposes of scholarly argument and dissemination is wide open.

Associative and relational discourse, narrative, and argument are key modes of humanities discourse that are largely opaque to free text searching or mechanistic indexing. This makes tools like Google™ ill-suited to real knowledge work in the humanities, where few terms are unambiguous enough to yield good results when divorced from context. As Jeffrey Garrett has argued, noting that Foucault's *The Order of Things* seldom names the French Revolution as such, "the relevance algorithms most commonly used in…online libraries for full-text searching are based on a blind count of mechanically harvested keywords." This is in contrast to the advanced intellectual undertaking of indexing or cataloguing, in which a human agent often moves beyond the words in a text. Given the dependence of words upon context for meaning, the gap between signifier and signified, and the associative operations of the human mind, such search engines become very blunt tools for the discovery of materials. Garrett argues, "By relying on machine concordances and full-text searching, we are staking much of the future of textual analysis on the results of a relentless, almost instantaneous, but ultimately dumb process performed by machines." Much productive thinking has emerged from engagements with textuality in the context of digital humanities work, but it will be a major and crucial undertaking to imbue technical systems for the humanities with sensitivity to the complexities of language and discourse, an undertaking in which humanists need to be involved.

Research across the Divide

Since digital modes of scholarly production are highly experimental, working at the interface of the digital-humanities divide constitutes, in itself, research, provided that the two aspects of the research seriously engage with one another. This includes archival development, creating generalized digital tools for access or analysis, or developing new pedagogies or critical

[10] The nascent field of "platform studies," heralded by a series from MIT Press (platformstudies.com), probes the impacts of the material features and capacities of computer systems.

literacies. In this essay, however, I hope to bring home particularly the importance of the pursuit and address of "core" humanities research activities, linked to specific disciplines or knowledge domains, by digital means. Such research is needed to move digital humanities work forward, to ensure it serves the humanities at large, and to counter the pressure created by larger trends or technical advances.

Working at the gap between humanities research questions and digital humanities development allows digital tools and research results to emerge from a dialectical relationship, allowing the research processes to change in concert with the production of new modes of engaging in research. Scholars must make explicit the priorities and categories that inform their work, and what they "mean"—at least for what they want a computer to be able to process—in new and challenging ways. Such self-consciousness can work as an extension of much recent theoretically and politically informed work in the humanities, and importantly brings digital methods and tools under scrutiny as well.

Digital humanities work needs researchers who are simultaneously "in" and "out." They must be technologically proficient enough to be visionary about methods and tools but driven by agendas other than technological ones, so that their doubled vision provides a basis for different ideas and perspectives than would otherwise arise in a field that seems curiously insulated from the political engagement that has shaken up other areas of the humanities. Feminist critique draws its power from the same kind of simultaneity of insider and outsider status. Marginality, liminality, and hybridity—all of which concern gaps and unstable affiliations with identities and communities—provide valuable vantage points for engagement with shifting technologies (Star, "Power" 50–53). The border position of humanities researchers who are willing to edge up to the gap combines expertise in the evidence and methodologies associated with particular domains of knowledge with an openness to, but not a complete immersion in, technological concerns. Such scholars must be full participants in the digital aspects of the research, not least because, as Joanna Drucker has argued, "the cultural authority of the computer derives from its relation to symbolic logic at the expense of those inventions and sensibilities that characterize imaginative thought." She advocates instead "speculative approaches [that] seek to create parameter-shifting, open-ended, inventive capabilities—humanistic and imaginative by nature and disposition" (440).

The ability to provide digital materials for analysis by traditional methods is important, but as Willard McCarty has argued, "as far as the humanities are concerned, all meaningful uses of computing are heuristic" (6). Humanities scholars need to overcome the conviction that using computers to do research is a reductive activity, in order for that assumption to become less and less true. Systematic knowledge representation is a facet of digital humanities that grows naturally out of the methods and emphases of computational science, and it has served some areas of the humanities, such as the editing community, quite well, but it is not the be all of digital method for the humanities. As Drucker and Bethany Nowviskie have argued, "The computational processes that serve speculative inquiry must be dynamic and constitutive in their operation, not merely procedural and mechanistic" (431). The Web 2.0 movement, in which user participation feeds back into and modifies the system with which users have been interacting, provides one model for such research (Miller). Experimental digital humanities work that emerges from putting theory into dialogue with practice is crucial to providing diverse, competing models for conducting and disseminating humanities scholarship digitally.

Such dialogue leads to an interrogation of the fundamental activities, outcomes, and uses of humanities scholarship. Orlando Project founders Patricia Clements, Isobel Grundy, and I were initially lured toward computers by the expansiveness of digital media, but our understanding of what could be gained developed only gradually as we began to figure out how to undertake the project digitally. Paradoxically, it seems crucial that we weren't fully conversant with the state of humanities computing at the outset and hence were not in the grip of the paradigms of the field. At that time, the major projects were engaged with textual editing, developing the theory and practice to support the rigorous development of online editions based on existing texts. Within the humanities, in 1995, no one was undertaking the production of what we now call "born digital" scholarly materials that weren't tied to a core set of primary texts. *Orlando* was in its conception a maverick project. We got excellent advice on methods from computing humanist Susan Hockey, who joined the team, and we began to educate ourselves in this new field. But the concurrence of this process with the development of the project opened up real methodological dialogue. *Orlando* became a major experiment in what has been described as a new paradigm within theories of text markup, that of "performative" markup (Flanders; see also McGann, *Radiant* 206).

The methodological dialogue went in both directions: *Orlando* is indelibly impressed by the digital, and the form of the digital was designed to serve its contents. The systems we created impacted everything from the conceptual organization of the materials to the form of our prose, and they dictate what you can do with it. They emerged from the pull between our conceptions and what we could realize practically, and necessitated constant reflection on priorities and methods as we engaged in the exhilarating and infuriating attempt to make technical systems reflect intellectual aims. As the introduction to the project insists, *Orlando* is "literary history—with a difference," and that difference is the extent to which digital methods permeated the design and production of the scholarship and "allowed the history's underlying principles and priorities to be embodied in the textbase" (Brown, Clements, and Grundy, "Scholarly Introduction").

Building *Orlando* was a practical response to the question of how to enact digital historiography. What, for instance, constitutes a "narrative" in a hyperlinked textual environment? Can a set of search results, produced by a user's interaction with a set of texts structured on common intellectual principles, be understood as a new kind of literary-historical narrative? For instance, searching on the Destruction of Work tag through the entire *Orlando* corpus produces a set of micro-narratives, collaboratively written by various project participants, in which the predominance of the destruction of early women writers' works by others reverses over time to a pattern of women destroying their own writings. Can such results be understood, particularly insofar as the embedded structure or tagging is itself making certain claims about the material—that is to say, it is heuristic—as a new kind of scholarly argument, though it is not "authored" by a particular individual? Alternatively, requesting occurrences of the words "Jew OR Jewish" in Cultural Formation discussions, and revealing the tagging context, reveals an overwhelming pattern of representing these terms within the tagging as either a religious denomination or an ethnicity. The two exceptions to these are in the case of mid-Victorian Grace Aguilar, in the context of ideas of nationalism that contributed to Zionism, and Eva Figes, whose Jewishness is represented as race or colour in the context of its reception in the era of Nazism and English racism. The markup here suggests an argument about changing discursive and ideological frames for Jewishness in Britain, one that emerges from the collective tagging of the concept across the history of British women writers. This example reveals the symbiotic relationship between the prose "content" of the project and its digital "structure" within a

complex representational system: the intellectual work weaves its way through both. For these and other reasons, we contend that *Orlando*, despite its surface resemblance to a standard electronic reference work, is a new kind of literary history.

Working in digital technologies led Orlandians to important methodological self-scrutiny regarding numerous aspects of historiography, including causality, chronology, context, coverage, and evidence. It led us to consider the multiple functions of scholarly works, and to try to aim at a broad range of users and uses, from the expert scholar to a student or a general reader. Divorcing the delivery or interface work from the scholarly process would have been impoverishing if not absolutely impossible: interface went to the heart of the research. And our conviction as scholars that this resource was greatly needed fuelled the difficult push from prototype to completion. This matters, since projects brought to fruition become much more useful testbeds for everything from usability research, to experimental publishing and sustainability models, to further technical or content development. They also stand a much better chance than prototypes of convincing more people of the value of digital humanities work.

Interface

Precisely because how we conduct our work is increasingly bound up with how we publish our work, we need widespread involvement in both tool and interface development from humanities scholars in the course of their research. Experimentation in new modes of delivery, the experimental dissemination of scholarly results, should be a major priority. Willard McCarty regards the term *delivery* as metaphorically freighted with connotations of knowledge commodification and mug-and-jug pedagogy (6). However, I would argue that we should mobilize the less stable connotations of delivery as "being delivered of, or act of bringing forth, offspring," which offers a model open to a range of agents and participants, in which the process and mode of delivery have a profound impact on what is delivered. And without getting evangelical, surely too we can revive that earlier sense of "setting free; release, rescue, deliverance" (*Oxford English Dictionary*), in that delivery at this point is in many respects about overcoming the obstacles of rudimentary forms of digital representation and navigation. In this period of transformation, the scholarly interface requires not only experimentation but also careful assessment to see what works to make digital materials amenable to use by those in the humanities.

For that reason, research across the digital-humanist divide must include serious usability work on ourselves as a user population—investigating carefully our habits and needs, and how well particular tools and the interfaces that mediate them suit what we do.[11] This is crucial to prevent interfaces being developed out of an understanding of web habits based on commercial culture, since human-computer interaction work, methodologies, and central tenets about user interest are overwhelmingly driven by corporate interests. Simply porting over the results of studies based on web marketing and other commercial contexts into the development of digital tools for the humanities could warp our approaches. On the other hand, developers of academic sites, often scholars themselves, often proceed with a disregard for usability and design that may mean that the results of their labour go completely unused by others (Warwick et al. 2008). What we need is to distinguish our particular user communities and test the tenets of usability studies to figure out how to design systems that will really work for and with us.

Funding and Institutions

I have been arguing that our need in Canada to work toward a research climate that acknowledges serious engagement in humanities research with digital methods, dissemination, and interfaces constitutes a pressing priority. Responding to the digital turn pushes research towards transformation, innovation, and risk in ways that will benefit both researchers and the profession as a whole as it moves inexorably toward new ways of doing and publishing its work. We need enough highly experimental and groundbreaking work at the digital-humanities divide that we can learn from failures as well as successes (Unsworth). How that climate is supported institutionally, in our national research infrastructure, and in our funding programs, will have an enormous impact on our rapidly changing modes of scholarship. This research environment must be fostered in the face of an awareness that technology adoption is being propelled by a conviction of its economic value and its suitability as a vehicle for a free market capitalism that

[11] Usability studies are an important area of human-computer interaction research that investigate the factors involved in whether, or how, someone can learn a computer system (ranging from hardware to software or a website) and use it successfully. Mainstream usability experts argue that web users won't scroll, read lengthy texts, or engage in sustained thinking or analysis, as indicated by the title of usability guru Jakob Nielsen's book *Designing Web Usability: The Practice of Simplicity*, and his guidelines to "be succinct," "write for scannability," and "split up long information" (Nielsen 101). Pronouncements on usability for higher education purposes echo mainstream usability principles, pushing toward short and simple content and navigation, and stressing the Web as a source of information rather than knowledge (e.g., Shiratuddin et al.). See Susan Brown et al., "Between Markup and Delivery."

is largely hostile to the structure of Canadian public education and libraries, the values that Robert Fulford has identified, one hopes misleadingly, with "The Ideology of the Book."

Electronic publishing offers the opportunity to disseminate alternatives to and critiques of market values rather than scholarly affirmations of them. This means, among other things, challenging the ideology and commodification of "information." The representation of humanities content on the web notably tends toward conservative and unreflective knowledge representation: in the context of literary sites, for instance, static biographical entries on singular authors or topics abound. The "information" age values ungrounded information rather than critical thinking, "just the facts" being the implied methodology of conventional organization into received categories (e.g., in literary studies, via authors and titles). Perhaps the single greatest challenge facing the digital humanities is to develop interfaces that implement, in the words of McGann, "the full dynamic—and decentering—capabilities" of the "radiant textualities" afforded by electronic text (*Radiant* 74).

To meet that challenge, we must recognize experimental interface development and electronic publication as in themselves crucial modes of scholarly inquiry. They need to be understood—and funded—as real research. For electronic publication's much-vaunted cheapness is only true in a limited way: new media can only be "free" if underpinned by some kind of infrastructure for production, sustainability, and archiving. Development costs for producing methodologically innovative scholarship in new media are substantial: its experimentality makes it economically inefficient. Nor should this surprise. Only a few information services such as telephony have demonstrably increased productivity, despite the fact that, as William F. Birdsall has observed, the ideology of information technology rests on the assumption that IT drives a free market economy.

So we need vibrant, adequately funded centres to support electronic resource production—for these are the trailblazers among the electronic publishers—and we must as a community undertake to develop and assess methods of digital publication. We need multiple, competing models with sufficient scholarly content and usability to enable testing of their results on a real user population over a period of time. So, for instance, given the embrace by the young of Web 2.0 social networking systems, we need to investigate how such models might be employed in humanities research and dissemination. But given the skepticism about the cultural impact of Web 2.0 (Keen), along with the uncertain evolution of the Internet economy of trust

and authority (Bilder), we also need to test the extent to which more structured expert-applied indexing of the sort that has traditionally been relied upon in scholarly publishing and libraries can add value to electronic systems. Evaluating competing systems rigorously, so that their success or failure is not a result of promotion or the decisions of non-specialists, will depend upon an informed pool of scholars in the humanities to assess digital initiatives and publications.

The large-scale funding I'm advocating here might seem to pull scarce money away from "core" endeavours in the humanities disciplines under the SSHRC umbrella. In addition, the advance of the digital humanities research and infrastructure in Canada has been indebted to policy-oriented funding programs and agencies, such as the CFI, that stand apart from the traditional research councils and their assessment processes. The efficacy of "bigger" science models right across the academy in Canada requires careful assessment (Atkinson-Grosjean). However, while such patterns exist, they are further reason for yoking humanities computing work to research undertakings within and across disciplines, since such integrated work extends research monies, which might otherwise go to applied or technological projects in other fields, more broadly through the humanities. Initiatives that combine pressing humanities research with more broadly applicable work on information technologies will be positioned to meet the demand by funding councils for transferability or applicability. Such projects offer the possibility to experiment with how "bigger" science models might be re-imagined to support humanities scholarship.

Funding digital humanities work is a multi-faceted challenge in Canada. Despite the perception that we are ahead of the United States in terms of per capita investment in cyberinfrastructure, digital humanities work needs more dedicated funding (American Council of Learned Societies 25). The SSHRC Strategic Plan rightly stresses the need to support the development of "specialized, high-tech tools" (*Knowledge Council* 10). The existing Image, Text, Sound and Technology program is laudable in its desire to increase "researchers' familiarity with, and effective use of, these new tools" (SSHRC). However, this program provides modest, short-term grants that cannot support major initiatives and hence are unlikely to have the kind of transformative impact on researchers that I have described. The program situates the technically-oriented work it supports in silos, away from broader undertakings. Considerable lobbying pushed the CFI toward funding digital humanities infrastructure projects, but funded projects make up a tiny proportion of the overall budget. It is therefore crucial that

SSHRC put major resources behind its commitment to "research tools for the 21st century," which it associates with "deeper understanding" (*Knowledge Council* 13), as well as pursuing partnerships with other agencies such as the CFI for funding the various facets of digital projects.

A substantial portion of this funding should be directed, I am arguing, for hybrid projects that combine tool and interface development with major research endeavours. This grant program will need to be carefully designed, and it may require a different assessment process and particularly flexible program criteria. When large multi-disciplinary projects have a substantial digital component, they can get caught in assessment by traditional humanist assessors who do not understand or are actively hostile to the digital component. The higher costs associated with digital humanities work also work to the disadvantage of junior or even mid-career scholars. If the practice of awarding large collaborative grants in the humanities almost exclusively to full professors persists, paradigm shifts may register more slowly in large-scale research undertakings, a particular concern when digital humanities work is transforming so rapidly.

Collaboration and interdisciplinarity are virtually inevitable in digital humanities work. Such collaborative work can feel foreign to humanities scholars in its resemblance to a science or social science model with a lab, multiple graduate students, and postdocs. Yet this mode of research is rewarding, particularly insofar as it involves graduate students in research beyond activities associated with preliminary or wrap-up phases of projects, integrating them into the research and dissemination activities themselves and providing them with a broader experience. The big research model has significant costs, however, in other ways. For instance, we need to recognize institutionally and in project design that management, direction, grant-writing, and other administrative activities take substantial effort and time. Collaboration often also means collaboration between institutions: it requires good will and innovation at all levels of the university system to foster work across traditional boundaries and create new kinds of relationships. Collaboration among researchers from diverse disciplinary backgrounds and institutions to tackle real research problems in new ways can only emerge from well-funded and institutionally vigorous research environments, so that researchers are not simply forced to fall back on existing models, work with models developed to serve other needs, or abandon projects at the prototype phase.

Interdisciplinarity in practice often means multi-disciplinarity, with people who mediate between diverse disciplinary languages and interests: such key roles are often filled by digital

humanities scholars. For the kind of research I am describing here to flourish, institutions must make digital humanities more than a desirable add-on in hiring priorities and create dedicated positions. The number of Canadian sites at which the integration of humanities and digital research is fostered by research centres with permanent academic and technical staff must be expanded. Humanities programs must also revise their curricula both to train future digital humanists and to produce cohorts of students who are digital adepts. The humanities will have broad social impacts if their graduates boast digital literacies that encompass training in critique, research, and expression, along with the ability to historicize and situate phenomena within complex frameworks. We too will gain from such literacies as we rely on our peers and institutions to assess digital publications for both method and content (Raben paragraph 5; Siemens et al.). This will be all the more pressing as the scholarly print monograph disappears, as it is almost sure to do, as the primary basis for awarding tenure or promotion.[12]

New media and digital technologies offer immense possibilities. This massive shift in signifying practices and the distribution of information is transforming our world and with it the profession of the humanities. It is critical that we engage with this process, with the gap between where we are now and where we need to get to. We need to move toward conducting research with digital tools and publishing in new media, not because we inhabit a society that does not consider the heritage of the past worth material shelf space or scholarly publications worth the paper they were once printed on, but because the digital turn offers genuine opportunities for intellectual engagement and methodological innovation. Although tools and publishing have been regarded as ancillary to the real business of doing research, they are hardly so now. Research engaged with electronic modes of scholarly production will have an incalculable impact on the shape of humanities research far into the future.

The future of digital humanities in Canada depends on many factors including institutional support, granting council policies and programs, and the development of various

[12] The Modern Language Association's 2002 report on "The Future of Scholarly Publishing" lamented the narrowing of criteria for tenure to the "holy grail" of the scholarly monograph, with the accompanying devaluation of other forms of scholarly publication, in the context of the decreasing opportunities for monograph publication (177). Given these findings about the strain the rapid changes in scholarly publishing were creating in the tenure system, and the explicit recommendation that departments develop guidelines for evaluating electronic publications, the *MLA* "Report on Evaluating Scholarship for Tenure and Promotion" reports disturbingly on the "state of evaluation for digital scholarship, now an extensively used resource for scholars across the humanities: 40.8% of departments in doctorate-granting institutions report no experience evaluating refereed articles in electronic format, and 65.7% report no experience evaluating monographs in electronic format" (Modern Language Association).

infrastructures. But it depends first and foremost on achieving widespread participation from scholars throughout the humanities in digital initiatives as an integral part of our research. If we do not as a community achieve a broad understanding of the implications of digital methods and practices, and fail to develop modes of research and publication that emerge from our intellectual activities and needs, we will find ourselves working with tools created for other interests, and for other ends. That would be a major opportunity lost in retooling the humanities. We should not mind the digital-humanities gap, in the sense of being put off by it; instead, we should mine it: recognize it as an abundant site for innovative research endeavours, and make it our own. We will then as a community become active and informed allies in the creation of digital archives and resources that will serve the needs of the humanities and society at large into the future. We will create digital tools, interfaces, and literacies that enable ourselves and our students to take on key cultural roles as the rhetoricians of what Richard Lanham describes as the "attention economy." And we will take our research and the communication of it in unforeseen and transformative directions.

Works Cited

Aarseth, Espen J. *Cybertext: Perspectives on Ergodic Literature*. Baltimore: Johns Hopkins UP, 1997. Print.

Abbate, Janet. *Inventing the Internet*. Cambridge: MIT Press, 1999. Print.

"About DHQ." *Digital Humanities Quarterly*. DHQ, 24 April 2007. Web. 1 October 2009.

"About Google™Scholar." *Scholar.Google.com*. Google, 2009. Web. 1 October 2009.

"About NINES." *Nineteenth-century Scholarship Online*. NINES, n.d. Web. 29 September 2009.

Alonso, Carlos J., Cathy N. Davidson, John M. Unsworth, and Lynne Withey. "Crises and Opportunities: The Futures of Scholarly Publishing." *American Council of Learned Societies Occasional Papers* 57 (2004): n. pag. Web. 1 October 2009.

American Council of Learned Societies Commission on Cyberinfrastructure for the Humanities and Social Sciences. "Our Cultural Commonwealth." *American Council of Learned Societies*. 2006. Web. 1 October 2009.

Argamon, Shlomo, and Mark Olsen. "Toward Meaningful Computing." *Communications of the ACM* 49.4 (April 2006): 33–35. Print.

Bement, Arden L. "Cyberinfrastructure: The Second Revolution." *The Chronicle of Higher Education*, 5 January 2007: n. pag. Web. 3 October 2009.

Berners-Lee, Tim, with Mark Fischetti. *Weaving the Web: The Original Design and Ultimate Destiny of the World Wide Web*. San Francisco: Harper San Francisco, 1999. Print.

Bernstein, Susan David. "Confessional Feminisms: Rhetorical Dimensions of First-Person Theorizing." *Language and Liberation: Feminism, Philosophy, and Language*. Ed. Christina Hendricks and Kelly Oliver. Albany: SUNY P, 1999. 173–206. Print.

Beynon, Meurig, Steve Russ, and Willard McCarty. "Human Computing—Modelling with Meaning." *Literary and Linguistic Computing* 21 (2006): 141–58.

Bilder, Geoffrey W. "In Google We Trust?" *Journal of Electronic Publishing* 9.1 (Winter 2006). n. pag. Web. 3 October 2009.

Birdsall, William F. "The Internet and the Ideology of Information Technology." *Isoc.org*. Internet Society, n.d.: n. pag. Web. 3 October 2009.

Birkerts, Sven. *The Gutenberg Elegies: The Fate of Reading in an Electronic Age*. Boston: Faber and Faber, 1994. Print.

Brown, John Seely, and Paul Duguid. *The Social Life of Information*. Boston: Harvard Business School P, 2000. Print.

Brown, Susan, Patricia Clements, Renée Elio, and Isobel Grundy. "Between Markup and Delivery; or, Tomorrow's Electronic Text Today." *Mind Technologies*: *Humanities Computing and the Canadian Academic Community*. Ed. Raymond Siemens and David Moorman. Calgary: U of Calgary P, 2006. 15–32. Print.

Brown, Susan, Patricia Clements, and Isobel Grundy, eds. *Orlando: Women's Writing in the British Isles from the Beginnings to the Present*. Cambridge UP, 2006. Web. 3 October 2009.

---. "Scholarly Introduction: Going Electronic." *Orlando: Women's Writing in the British Isles from the Beginnings to the Present*. Cambridge UP, 2006. Web. 3 October 3009.

Brown, Susan, Sue Fisher, Patricia Clements, Katherine Binhammer, Terry Butler, Kathryn Carter, Isobel Grundy, and Susan Hockey. "SGML and the Orlando Project: Descriptive Markup for an Electronic History of Women's Writing." *Computers and the Humanities* 31.4 (1997): 271–85. Print.

Bush, Vannevar. "As We May Think." *The Atlantic Monthly*. The Atlantic, July 1945. Web. 3 October 2009.

Davidson, Cathy N. "We Can't Ignore the Influence of Digital Technologies." *Chronicle of Higher Education*, 23 March 2007: n. pag. Web. 4 October 2009.

Davidson, Cathy N. and David Theo Goldberg. "Engaging the Humanities." *Profession* (2004): 42–62. Print.

DiMaggio, Paul, Eszter Hargittai, W. Russell Neuman, and John P. Robinson. "Social Implications of the Internet." *Annual Review of Sociology* 27 (2001): 307–36. Print.

Dinello, Daniel. *Technophobia!: Science Fiction Visions of Posthuman Technology*. Austin: U of Texas P, 2005. Print.

diSessa, Andrea A. *Changing Minds: Computers, Learning, and Literacy*. Cambridge: MIT Press, 2000. Print.

Downes, Daniel M. "New Media Economy: Intellectual Property and Cultural Insurrection." *Journal of Electronic Publishing* 9. 1 (Winter 2006). n. pag. Web. 3 October 2009.

Drucker, Johanna. "Rev of *Humanities Computing*, by Willard McCarty." *Digital Humanities Quarterly* 1.1 (Spring 2007). Web. 3 October 2009.

Drucker, Johanna, and Bethany Nowviskie. "Speculative Computing: Aesthetic Provocations in Humanities Computing." *A Companion to Digital Humanities*. Ed. Susan Schreibman, Ray Siemens, and John Unsworth. Oxford: Blackwell, 2004. Web. 3 October 2009.

Feenberg, Andrew. *Transforming Technology: A Critical Theory Revisited*. Oxford: Oxford UP, 2002. Print.

Ferris, Sharmilla Pixy. "Writing Electronically: The Effects of Computers on Traditional Writing." *Journal of Electronic Publishing* 8.1 (August 2002). n. pag. Web. 3 October 2009.

Flanders, Julia. "The Rhetoric of Performative Markup." *Digital Humanities Conference 2006 Abstracts*, 248–49. Web. 7 July 2006.

Fulford, Robert. "The Ideology of the Book." *Queen's Quarterly* 3 (Winter 1994): 801–11. Print.

Gajjala, Radhika. *Cyber Selves: Feminist Ethnographies of South Asian Women*. Walnut Creek: AltaMira Press, 2004. Print.

Gantz, John F. et al. "The Diverse and Exploding Digital Universe: An Updated Forecast of Worldwide Information Growth by 2011." *emc.com*. IDC, March 2008. Web. 3 October 2009.

---. "The Expanding Digital Universe: A Forecast of Worldwide Information Growth Through 2010." *emc.com*. IDC, 2007. Web. 3 October 2009.

Garrett, Jeffrey. "KWIC and Dirty? Human Cognition and the Claims of Full-Text Searching." *Journal of Electronic Publishing* 9.1 (Winter 2006). n. pag. Web. 3 October 2009.

Grossberg, Michael. "Devising an Online Future for Journals of History." *The Chronicle of Higher Education*, 21 April 2000: n. pag. Web. 3 October 2009.

Hammond, Tony, Timo Hannay, Ben Lund, and Joanna Scott. "Social Bookmarking Tools (I): A General Review." *D-Lib Magazine* 11.4 (April 2005): n. pag. Web. 3 October 2009.

Haraway, Donna. "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century." *Simians, Cyborgs and Women: The Reinvention of Nature*. New York: Routledge, 1991. 149–81. Print.

Harcourt, Wendy. *Women@Internet: Creating New Cultures in Cyberspace*. London: Zed Books, 1999. Print.

Hawisher, Gail E., and Cynthia L. Selfe, eds. *Global Literacies and the World-Wide Web*. London: Routledge, 2000. Print.

Glasgow, and the National Initiative for a Networked Cultural Heritage. "The NINCH Guide to Good Practice in the Digital Representation and Management of Cultural Heritage Materials." *New York University*, 2002. Web. 3 October 2009.

Ingraham, Bruce Douglas. "Scholarly Rhetoric in Digital Media." *Journal of Interactive Media in Education* (2000): n. pag. *JIME*. Web. 9 August 2006.

Jones, Donald C. "Thinking Critically about Digital Literacy: A Learning Sequence on Pens, Pages, and Pixels." *Pedagogy* 7.2 (2007): 207–21. Print.

Keen, Andrew. *The Cult of the Amateur: How Today's Internet is Killing Our Culture*. New York: Doubleday, 2007. Print.

Keep, Christopher. "Of Writing Machines and Scholar-Gypsies." In "Readers' Forum: What's Left of English Studies?" *English Studies in Canada* 29: 1 & 2 (March/June 2003): 55–66. Print.

Knight, Kim. "Collex: Research Report." *Transliteracies Project: Research in the Technological, Social, and Cultural Practices of Online Reading*. Santa Barbara: U of California at Santa Barbara, 2006: n. pag. Web. 3 October 2009.

Kolko, Beth E., Lisa Nakamura, and Gilbert B. Rodman. *Race in Cyberspace*. New York: Routledge, 2000. Print.

Kramarae, Cheris, ed. *Technology and Women's Voices*. New York: Routledge and Kegan Paul, 1988. Print.

Lancashire, Ian. "Cybertextuality." *Text Technology* 13.2 (2004): 1–18. Print.

Lanham, Richard. *The Economics of Attention*. Chicago: U of Chicago P, 2006. Print.

Latham, Robert, ed. *Bombs and Bandwidth: The Emerging Relationship between Information Technology and Security*. New York: New Press, 2003. Print.

Leung, Linda. *Virtual Ethnicity: Race, Resistance, and the World Wide Web*. Aldershot: Ashgate, 2005. Print.

Liu, Alan. "Local Transcendence: Cultural Criticism, Postmodernism, and the Romanticism of Detail." *Representations* 32 (1990): 75–113. Print.

MacDonald, Bertrum H., and Fiona A. Black. "Using GIS for Spatial and Temporal Analyses in Print Culture Studies: Some Opportunities and Challenges." *Social Science History* 24:3 (Fall 2000): 505–36. Print.

Martin, Julia, and David Coleman. "Change the Metaphor: The Archive as an Ecosystem." *Journal of Electronic Publishing* 7.3 (April 2002). n. pag. Web. 3 October 2009.

McCarty, Willard. *Humanities Computing*. London: Palgrave Macmillan, 2005. Print.

McGann, Jerome. *Radiant Textuality: Literature after the World Wide Web*. New York: Palgrave, 2001. Print.

---. "History, Herstory, Theirstory, Ourstory." *Theoretical Issues in Literary History*. Ed. David Perkins. Cambridge: Harvard UP, 1991. 196–205. Print.

McLuhan, Marshall. *Understanding Media*. New York: New American Library, 1964. Print.

Menzies, Heather, and Janice Newson. "No Time to Think: Academics' life in the globally wired university." *Time & Society* 16.1 (2007): 83–98. Print.

Miller, Paul. "Web 2.0: Building the New Library." *Ariadne* 45 (October 2005): n. pag.Web. 3 October 2009.

"Mind the gap." *Wikipedia*, n.d. Web. 27 February 2007.

Modern Language Association. "Report on Evaluating Scholarship for Tenure and Promotion." *MLA.org*. MLA, 2006. Web. 22 July 2008.

Modern Language Association Ad Hoc Committee on the Future of Scholarly Publishing. "The Future of Scholarly Publishing." *Profession* (2002): 172–86. Print.

Mole, The. "Mind the Gap." *h2g2*. British Broadcasting Corporation, n.d. Web. 19 February 2002.

Mooney, Chris. "Learning to Speak 'Science.'" *Seed Magazine*, 13 February 2006: n. pag. Web. 22 July 2008.

Moretti, Franco. *Graphs, Maps, Trees: Abstract Models for a Literary History*. London: Verso: 2005. Print.

Mosco, Vincent. *The Digital Sublime: Myth, Power, and Cyberspace*. Cambridge: MIT P, 2004. Print.

Moulthrop, Stuart. "What the Geeks Know: Hypertext and the Problem of Literacy." *HT'05: Proceedings of the sixteenth ACM conference on Hypertext and hypermedia*. New York: ACM Press, 2005. 227–31. Print.

Nielsen, Jakob. *Designing Web Usability: The Practice of Simplicity*. Indianapolis: New Riders, 2000. Print.

Open Journal Systems. Public Knowledge Project, Simon Fraser University, n.d. Web. 3 October 2009.

Palin, Michael. Foreword. *Mind the Gap*. By Simon James. London: Harper Collins, 2001. ii–iii. Print.

Raben, Joseph. "Tenure, Promotion, and Scholarly Publication." *Digital Humanities Quarterly* 1.1 (Spring 2007). Web. 3 October 2009.

Ross, Andrew. *Strange Weather: Culture, Science, and Technology in the Age of Limits*. London: Verso, 1991. Print.

Schreibman, Susan, Ray Siemens, and John Unsworth. *A Companion to Digital Humanities*. Oxford: Blackwell, 2004. Print.

Schuler, Douglas. *New Community Networks: Wired for Change*. Reading: Addison-Wesley, 1996. Print.

Selfe, Cynthia. *Technology and Literacy in the Twenty-First Century*. Carbondale: Southern Illinois P, 1999. Print.

Selfe, Cynthia L., and Gail E. Hawisher. *Literate Lives in the Information Age: Narratives of Literacy from the United States*. Mahwah: Lawrence Erlbaum, 2004. Print.

Siemens, Ray et al. "The Credibility of Electronic Publishing: A Report to the Humanities and Social Sciences Federation of Canada." *Internet Shakespeare Editions*. University of Victoria, n.d. Web. 3 October 2009.

Social Sciences and Humanities Research Council of Canada. "Image, Text, Sound and Technology Research Grants." SSHRC, 2009. Web. 3 October 2009.

Sowa, John F. "Preface." *Knowledge Representation: Logical, Philosophical, and Computational Foundations*. Pacific Grove: Brooks Cole, 2000. Web. 3 October 2009.

Spender, Dale. *Nattering on the Net: Women, Power and Cyberspace*. Toronto: Garamond, 1996. Print.

Star, Susan Leigh. "Power, technology, and the phenomenology of conventions: on being allergic to onions." *A Sociology of Monsters: Essays on Power, Technology and Domination*. London: Routledge, 1999. 26–56. Print.

---, ed. *The Cultures of Computing*. Oxford: Blackwell, 1995. Print.

Suchman, Lucy A. *Human-Machine Reconfigurations: Plans and Situated Actions*. 2nd ed. Cambridge: Cambridge UP, 2007. Print.

Sukovic, Suzana. "Scholarly (R)evolution: Roles of E-texts in the Research Process in the Humanities." *Digital Humanities Conference 2007 Abstracts*, n. pag. Web. 4 October 2009.

"Summit on Digital Tools for the Humanities. Report on Summit Accomplishments." Institute for Advanced Technology in the Humanities, n.d. Web. 4 October 2009.

Swiss, Thomas, and Andrew Herman. "The World Wide Web as Magic, Metaphor, and Power." *The World Wide Web and Contemporary Cultural Theory*. Ed. Thomas Swiss and Andrew Herman. New York: Routledge, 2000. 1–4. Print.

Turner, Fred. *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism*. Chicago: U of Chicago P, 2006. Print.

Unsworth, John. "Documenting the Reinvention of Text: The Importance of Failure." *Journal of Electronic Publishing* 3.2 (December 1997). Web. 22 July 2008.

Warwick, Claire. "Whose funeral? A case study of computational methods and reasons for their use or neglect in English literature." CaSTA 2004—The Face of Text. McMaster University. 19–21 November 2004. Conference presentation.

Warwick, Claire, Melissa Terras, Paul Huntington, and Nikoleta Pappa. "If You Build It Will They Come? The LAIRAH Study: Quantifying the Use of Online Resources in the Arts and Humanities through Statistical Analysis of User Log Data." *Literary and Linguistic Computing* 23.1 (2008): 85–102. Print.

Waters, Daniel J., ed. "Urgent Action Needed to Preserve Scholarly Electronic Journals." *Digital Library Federation*. Digital Library Federation, 15 October 2005; updated 12 July 2006. Web. 4 October 2009.

"Wikipedia Founder Discourages Academic Use of His Creation." *The Chronicle of Higher Education*, 12 June 2006. Web. 4 October 2009.