TECHKNOWLEDGE:

LITERATE PRACTICE AND THE DIGITAL WORLD

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A thesis submitted to the Department of Education
in partial fulfillment
of the requirements for the degree of
Master of Arts in Education

August 2000

For my Nan.

Eleanor Elaine MacNevin Moore
1904-2000

who lived almost a century of techknowledge
and who believed in me.

Abstract

This thesis explores the concepts and discourses of knowledge and technology in contemporary society and in historical contexts, and the interrelationship between the two. It is premised in the assumption that both knowledge and technology are cultural practices, with attendant literacies and discourses, and that it is these literacies and discourses — literate practices of knowing and doing — that regulate meaning, subjectivities, and senses of possibility in society.

The thesis centres around the construct of techknowledge, which represents the cultural site of intersection between knowledges and technologies, and through which the two are mutually shaped and constituted. Its focus is techknowledge change, or periods of significant shift in ways of knowing and doing within culture. Three periods of shift are examined: the introduction of writing to ancient Greek city states, the medieval development of the printing press, and the contemporary digital revolution.

Located within the epistemological frameworks of postmodernism and constructivism, the thesis examines how techknowledge change affects practices and discourses within the cultural context. It explores ways in which digital technologies and postmodernity are coterminally impacting the intersection of 21st century techknowledge, as well as ways in which digital technologies are embedded with the ontologies and discourses of modernism and the Enlightenment. Overall, it offers an exploration of the ways knowing, being, and doing are constructed and re-constructed in culture.

Acknowledgements

A thesis doesn't get written in isolation. This is, to borrow Donna Haraway's words, a "visible sign of the contributions of an extended web" (Haraway, 1997, p. vii) of, in my case, professors, colleagues, friends, and family members, who have been patient, generous with their ideas, and tolerant of my attempts to learn an entire new vocabulary and practice it on them.

My thanks to Ursula, for her extensive support, her ideas and feedback, her friendship, and her excellent editing. Thanks to Andy and Blye for their contributions and their questions, to Carolyn, for her interest in actually reading the final product, and to Kevin, for his loan of half his library and his efforts to find me material.

Thanks especially to Jeremie, who learned most of my new vocabulary with me, and who has been a friend, partner, and digital consultant all through this journey. Thanks to my mum, Barb, for having such faith and pride in me, and such an abiding interest in the project despite her inability to remember the topic. To Elise, for reassuring me that she was using *Zen and the Art of Motorcycle Maintenance* in her thesis, too, and to Tom, Anne, Julie, Sarah, and a host of others, who have been there for me in their own ways. A special thanks to Treena and Lisa, whose visit during the final week of my writing could not have been worse-timed or more fun, and to Dave, my favourite editing partner, who no longer owes me.

And finally, to Lola, for sitting on my lap while I wrote, and for purring.

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Introductory Notes

This thesis is an exploration of knowledge and technology and truth as cultural practices: as fluid and contextual entities made tangible — or at least usable — by discourse. It is an exploration of changing practices; an analysis of the ways knowing, being, and doing are constructed and re-constructed in culture, in every time and place. It is an overtly — and perhaps overly — theoretical account; a place of beginning rather than summation, of questions and ideas rather than answers. The primary question behind it is "what will it mean to know in the 21st century; in the digital age?" And its primary aim is to offer a contribution to the cultural conversation predicated *by* that question; a foray into the broad realm of possibilities that the query opens. In its focus on practice, the thesis represents an effort to breach the boundaries within which questions of "knowledge" and "technology" are popularly taken up, and to formulate an approach to the conversation that allows these concepts and their relationships to be examined in the cultural context.

As a text, the thesis is designed to be both rhetorical and ironic in its tone. My intent has been to assemble a reflexive text that acknowledges its own construction without dissipating into abject self-focus, and that formulates thought-provoking positions and ideas, but without demanding dogmatic allegiance to the precepts it explores: incredulity toward absolutes, even those of its own construction, informs the narrative. I have structured the thesis around short essay installments, each an examination of some aspect

of the primary question of knowing and context: what do I mean by knowledge and technologies? How have changes in these aspects of culture, in other eras, changed cultural conceptions of the concepts themselves? What resonance do epistemologies of past and present have for the ways in which culture knows itself today? These questions shape the perimeters within which the thesis operates, though the sections are not entirely cumulative in their collectivity or their goal: the main purpose of the text is to explore rather than to argue for particular answers, and thus the convergence in focus required for the drawing of succinct conclusions has been rejected in favour of more divergent cogitation.

I have also interspersed the thesis with asides, or hyperlinks: side-notes taking up issues of text and the text itself, and my relationship to these. The links are both a deliberate reflection of the digital conventions of hypertext and non-linearity, and an attempt to locate my contributions to the conversation on the digital world in their own cultural and personal contexts. The premises of cultural constitution and negotiated meaning in which my analysis is based are premises of postmodernity, and within postmodernism, both the situatedness that the links emphasize and the "pastiche" organization that they lend to the thesis are foregrounded concepts. This structural allusion towards postmodernity is intended to temper — at least in part — the modernist and unifying tendencies of my inclination towards flights of rhetorical polemic, and to keep the focus of the work broad and exploratory.

1. Techknowledge

"Despite the hype, it is clear that technological and social developments in the last two decades of this century have indeed presented our global community with an ontological shift, a shift in the way we think of existence and the nature of reality, inaugurating a new reality and new ways of thinking about multiple realities." (Jackson, 1998, p. 1)

How do "new realities" and new ways of thinking take hold in a culture? What implications do contemporary technological developments hold for society and for what it means to "know" in the 21st century?

On the increasingly globalized world stage, the Internet and other information technologies are changing the ways in which business is done, communications are relayed, and learning and education are understood. These shifts in society, and the information revolution they are said to herald, are likely to impact everyone, in some way or another, soon enough. And yet the question of *how* this digital revolution will play out is not one that I expect to find a succinct answer to in this lifetime, let alone this thesis. My opening questions are questions of conjecture, and intended to be so. They are questions that will be answered differently each time they are asked, depending on the people who try to respond, and the perspectives and subjectivities they bring to the issue.

Inherent in those opening questions, however, and in my premise for the thesis itself, is the assumption of a significant relationship between technology and society, particularly around ways of learning and knowing. I use the term "technologies" broadly, to mean societal tools as diverse as the wheel, the alphabet, and the computer, and I consider all technologies to be both cultural influences and cultural products. This emphasis on the cultural aspect of technologies is supported by Judy Wacjman: "At the most basic level technology refers to a set of physical objects...[but] to see these objects as nothing other than inanimate items...ignores the fact that they are developed, manufactured and marketed as part of economic and social activity" (Wacjman, 1994, p. 6). As technologies and their uses change, my argument goes, so the societies using them, and the concepts by which they make sense of them, also change, in a mutually constitutive relationship. And as societies begin to make sense in new ways, using different technologies, so their frames of reference for knowledge change, too. Both knowledge and technology are embedded in cultural contexts, and they shape specific societal discourses and values while at the same time being shaped by them.

One of the primary purposes of this thesis is to explore that process of mutual constituency and change, that relationship between technology and knowledge forms. To facilitate that exploration and represent, at least in part, the mutually constitutive relationship of technology and knowledge, I posit the term "techknowledge" as a way of conceptualizing what it is that

actually changes when cultural shifts occur. Techknowledge, for me, is the intersection of technologies and knowledge in the cultural context, through which meaning is created and attributed to each partner in the process: the term "techknowledge" signals the multiplicity and complexity of that process. Technologies, whether microlectronic or as primitive as counting sticks, act as delivery systems for knowledge, since knowledge can only be expressed or demonstrated through technological capacity of some form. And both are accorded meaning only within the parameters of cultural context: through discourse and literate practice. I like the term "techknowledge" as a representative for this process and its products because the hybrid signifier foregrounds not only the interconnectedness of technologies and concepts of knowledge and the known, but the processes by which knowledge is produced, sanctioned, and understood within cultures. Techknowledge is a meta-account, in a sense: both an analytic construct for exploring the ways in which technologies and knowledge contribute to culture and each other, and, as an intersection of doing and conceptualizing, a specific example of itself, mobilizing and converging forms of knowing to make them available for analysis.

Within the intersection of techknowledge, technologies not only shape knowledge and cultural practices, but subjectivities, too, regulating what is perceived as possible in a given time and place: marking a culture and the identities available within it through discourse. Roger Simon calls subjectivity an "[O]ngoing construction, the effect not of images or texts that

simply impose particular ideas or values, but rather of the personal, subjective engagement of social reality within discursive regimes that lend significance (value, meaning, and affect) to the events and conditions of everyday life" (Simon, 1992, p. 59).

The cultural practices of signification and regulation emphasize elements of power working on and through individuals in their cultural identifications: "Power inheres in the forms of knowledge and desire that guide the possibility of conduct and order possible outcomes of certain forms of action...productive power enables and regulates possibility through structuring of the field of action of others" (Simon, 1992, p. 37). I want to explore the "how" of this regulation, to trace the impacts of techknowledge intersections on historical and contemporary societies, and to consider these impacts and intersections in light of my opening question on digital technologies and implications: what is being constructed as techknowledge in the 21st century, and what practices and subjectivities does this construction encourage?

Techknowledge, despite its catchy and current-sounding handle, is not a concept that can be applied only to cyber technologies or the contemporary context — indeed, while all instances or examples of techknowledge are culturally and temporally specific, the term itself can be applied to any era and to any practice of meaning-making that draws on the cultural intersection of technology and knowledge. But the specific techknowledges

of one era are seldom the techknowledges of another: the intersections are reconstituted as the intersectors — and thus the meanings attributed to them — shift. Once, the concept of the geocentric universe was a central foundation of knowledge for Christian European society: it reflected not only the capabilities of the technologies of the day, but also the prevailing cultural practices and understandings. Today, knowledge of a geocentric universe is not knowledge at all: it is history or allegory, a construction of technologies and worldviews long since dismissed as obsolete, or — at best — a modernist metanarrative for society's progress on the great purported continuum of knowing. It has no generative meaning within contemporary discourses or constructs of validity; it has no place in the digital world. It remains a societal marker of techknowledge of the past, but it is defunct: changing technologies and cultural concepts of knowledge and meaning have shifted, re-intersected, leaving the geocentric universe beyond the pale of relevance except as a reflection of change itself.

As cultures — given times and places — change, then, so too does the techknowledge associated with them, and vice versa. I am interested in how these changes occur and have occurred in other eras of profound technological and techknowledge shift: I want to examine the ways in which the technologies of writing and print, which I distinguish according to contexts of production, changed the social structures into which they were introduced and thus the practices and subjectivities available in those cultures. In recognition of the mutual constitution of culture and

techknowledge, I also want to take up ways in which the prevailing discourses and concepts of knowledge in those historical contexts shaped how writing and print came to be used and passed down, in a manner similar to the ways that dominant social structures of the late 20th century have shaped the development of information technologies and cyberculture.

The historical contexts I use to examine techknowledge changes surrounding writing and print developments centre — rather ironically, given the text's postmodern elements — around two of the grand mythic figures of so-called Western history: Socrates and Gutenberg. In the spirit of my stance of incredulity, I challenge the East/West divide reified by the construct of the "Western" world, and I am wary of reinforcing that dualism. Yet at the same time, I am also aware that lived cultural realities of knowledge and technology are not universal, and thus I reference my exploration in the context in which I am literate, both in terms of personal experience and cultural reference. The contradiction of that dualism and my negotiation of it remains, but my choice of contexts is intentional.

I use the term Western, then, to refer to a view of the world centred in European and North American colonial versions of history and value, with status accorded to patriarchal and militaristic perspectives and to economic activities sanctioned as necessary or contributory within those perspectives, as well as to select cultural achievements and figures in ancient Greece and Rome. As has been pointed out in feminist and academic circles over at

least the past two decades, this narrow definition of "Western" is a construct selected from a far wider range of histories played out in the geographic areas involved, and one that has political effects: it excludes alternate histories, including those of whole groups of citizens, and it reinforces the apparent importance of patriarchal and militaristic values by repeatedly deeming them worthy of study. Thus, any cultural historical "knowledge" grounded in this construct of "Western civilization" is highly fractured and partial. I understand my own analysis in much the same vein: tentative, rather than summative. My hope, simply, is that techknowledge, representing multiple factors in the mythos of a time, will prove an adept if partial metaphor for exploring the complexity of the interrelationship between culture, knowledge, and technology.

I do not imagine the technosocial changes of my focus to be clean delineations between eras: I am mindful of James O'Donnell's warning about reconstructing the past in too simple a manner. As he says, "The great mistake is to imagine a sharp boundary created by a single development in society separating before and after. The lesson of historical investigation is that change brings complexity, and a suitable metaphor for social change will be multidimensional and disorienting — as disorienting a model as the real thing would be to have lived through" (O'Donnell, 1998, p. 25).

I am interested as much in technology as a concept within culture as I am in any specific technologies, so-called high-tech ones or otherwise. I am

interested in technologies as sociocultural, as iconic, as both products of culture and actors *in* culture: constitutive and constituent, signifier and signified. I am interested in technology's interface with the social realm, with human uses and desires, with conceptions of meaning and knowledge. And I am interested in technology as culturally and ideologically embedded, as part of a "system of relations" (Bruce, 1997, p. 250), rather than something separate, unimplicated, or neutral. From the uncertainty and entanglement of my own immersion in the matrix or miasma of this technophilic culture, I want to inquire into both the impact of previous technologies on knowledge and society, *and* the implications of current developments for our contemporary sacred cows and ways of being. What have been the relationships, historically, between cultural practice and techknowledge, and what significance, if any, do they bring to bear on the question of digital technology's societal implications?

Questions about significance and knowledge forms raise questions of epistemology: of the assumptions informing my approach to the topic and my sense of how such research should be conducted. Usher claims "All approaches to research are a reflection of cultural beliefs about the world we live in and want to live in" (Scott and Usher, 1996, p. 25). Research is a construction — a complex process of shaping and marking ideas, and presenting them in such a way that they can be shared, discussed, revisited, argued. And I consider my cultural beliefs a mish-mash: a cobbled compendium of ideologies leaning toward the postmodern, toward emphasis

on culture and construction in general. Coming from that epistemological address, I do not want to — and do not believe I *can* — approach my research as value-neutral or objective. This thesis will explore the concept of knowledge, of what it means "to know" in a given cultural context, but it will be a subjective exploration, and my own subjective identifications and interpretations will be inscribed on knowledge throughout the thesis text. I position it in terms of Donna Haraway's "view from a body" (McLaren, 1991, p. 152): I do not claim authority of a "God's eye view" of the world, or of techknowledge in any era or context. As Myles Horton states in *We Make the Road by Walking*, "As soon as I started looking at the word neutral and what it meant, it became very obvious to me that there can be no such thing as neutrality. It's a code word for the existing system" (Horton and Freire, 1990, p. 102).

I want to draw on the constructivist tradition in conducting this tracing of what it means to know and meant to know; this exploration of accounts of the process of knowledge shifts. Constructivism foregrounds practices and contexts, which are the objects of my study, and interpretation, which is the practice I'll be engaging in as I read and write across different time frames and cultures. The constructivist approach also takes up the concept of knowledge in a way I want to be mindful of, as I compare knowledges and write them into the text: within constructivism's interpretive framework, according to Robin Usher, "[K]nowledge is perspective-bound and partial...knowledge therefore is always a matter of knowing *differently* rather

than cumulative increase, identity, or confirmation" (Scott and Usher, 1996, p. 19). Such a representation of knowledge works fluently with my own notion of techknowledge as a culturally specific intersection, with no potential for cumulative increase but apparently infinite capacity for re-presentation in new form.

Postmodern epistemology will inform the thesis as well, both through my stated emphases on subjectivities and partiality, and through my focus on the "languaging" of knowledge in different historical contexts. Not only will I be languaging a particular version of history into being with my imposition of linearity and closure on the field of my historical analysis, but I will be exploring how other eras languaged their own concepts and referents for knowledge and literate practices into textual forms, some of which are still accessible, though perhaps entirely separated from their original discourses and intended significations, today. I will also be drawing on the contested construct of postmodernity as a contextual lens through which to view digital technology, and as a delimiting context in the shaping of 21st century techknowledge itself.

I think these traditions of constructivism and postmodernism, intertwined as they are, work appropriately with my exploration of techknowledge and cultural shifts: constructivism because of its focus on practice, which is central to my analysis of techknowledge within cultures, and postmodernism because of its emphasis on the constructed nature of the

world, on which the very concept of techknowledge depends. Techknowledge, and its underlying premise of mutual constitution of culture, technology, and knowledge, challenges the notion of a determinate world where what is known is "out there" waiting for empirical validation. Without postmodern thought and its deconstruction of the conventions of the "real," I suspect that the discourses which allow me to talk about techknowledge might not exist.

Constructivist and postmodern approaches also emphasize a rejection of definitives and universals that seems only appropriate to an exploration of technologies as ephemeral as information technology and cyberspace. The locations they offer allow me to explore techknowledge over variant historical contexts without trying to make the concept into a universal. Digital technologies are relatively new cultural players, "new media," even by name, and specific operations and capacities become obsolete on a daily basis. They do not, therefore, lend themselves well to universal definitions and generalizations based in more positivist approaches to research, since specific empirical observations of a given technology may only be able to claim validity for a fraction of a moment before being swept aside by the changes of innovation and reconfiguration. Techknowledge is always contingent upon the cultural context of time and place, and does not make for tidy analysis from any one lone area of its constitution. Carmen Luke discusses the folly of trying to apprehend the sweeping techknowledge shifts of contemporary society from the perspective of a single epistemology or

disciplinary perspective: "Pivoting on the threshold of a 'revolution' that implies more than just information, we are in fact hip-deep in *the* interdisciplinary moment of our time where the metaphors and realities of socio-cultural, technological, and media empire convergences can no longer adequately be understood or analysed through single-lens disciplinary or theoretical positions" (Luke, 1996, p. 2).

link — origin stories

"An origin story in the 'Western' humanist sense depends on the myth of original unity, fullness, bliss and terror, represented by the phallic mother from whom all humans must separate, the task of individual development and of history" (Haraway, 1991, p. 151).

I am really not sure where this thesis began. In an early version of my proposal for the project, I felt it important to begin by tracing a narrative of the origins of my own interest in the topic. So I told the story of a young teacher in her first classroom — or in the first classroom she was paid to be in, her first full-year professional contract, her first "class of her own" without cooperating teachers or sick teachers present despite their absences — who found herself faced with eight shining brand new Power Macintosh computers she didn't know how to turn on. And I told of evolution: of learning and coming to embrace computers, of shedding technophobia or whatever those nagging feelings may have been about that nasty male domain, of eventual integration of email and word processing into the fabric — the clean expanse of fabric that a professional narrative demands be woven for view — of my life. I positioned myself as a late techno-bloomer, a grateful convert, a pragmatic, hoping to protect myself against redundancy in the shifting and unstable world of the new millenium. I laid reasons down in stepping-stone order, tracing a teleology of seeds sown and watered and blossomed into skill and fascination with technology and with its implications for education. And it was all, in a sense, true, but the story

was a performance of discomfort for me, and I could not, in the end, decide why I was telling it. The story was no more than one truth possible among many, and it was one that elided the complexity and contradictions of the journey towards this thesis. There has been no seminal — or fallopial, should you prefer — moment for me on the journey, no clear separation between before and after in terms of my experiences with digital technologies, and no unity or wholeness of subjectivity on either side of the arbitrary boundary. Digital technologies are a part of my life, and are alternately the sites of excitement, relief, ambivalence, frustration, anxiety...dependent on the contexts in which I use or think about them.

The origins of this thesis are not in the topic, then, but in me, or more broadly in the location of my own particular and personal experiences of techknowledge intersection. My origin story does not focus on temporal beginnings but situated ones, pieces of locatedness that meet and cross, shaping each other and my understandings of the world. My techknowledge did not form whole, or in a linear fashion. It is an amalgam of experiences, exposures, and investments, and it reshapes and re-intersects frequently, lending new constructions of meaning to my thinking and my research. Over the months that I've worked on this text, for instance, I've experienced an appreciable gain in my own online searching and researching skills, and an equally appreciable shift in my understanding of research and how to go about it. My personal techknowledge constructions, like those of the culture I observe and inhabit, are constantly in flux, and the discourses and

subjectivities available to me through techknowledge intersections are always changing and shifting as well.

The subjectivities I bring to this work are multiple beyond my articulation. Some have overt connections to my interest in technologies and techknowledge: perhaps most prominently, I am in my late twenties, and expect to work within the touted digital revolution of the 21st century for at least the next thirty years. As an educator, the shifts in knowledge and literate practice that mark this revolution are directly relevant to my own understanding of my roles of teacher and academic and citizen, and thus considering ideas about what the digital age may herald is both of interest and of value to me, in all senses of the latter term. I am also a woman, and white, and the variant significations of privilege and disadvantage that these two subjectivities confer within the discourses of existing techknowledge have been sites for me to examine and experience the practices and impacts of cultural hierarchies. In the thesis, my focus is in many ways a broader-scale exploration of the same processes and practices.

I grew up in a female-headed family, too, in economic circumstances of limited privilege (at least by North American measure), and that dual locatedness effectively circumscribed my direct experience with digital technologies until — in demographic terms — relatively late in my young adulthood. The discourses by which this occurred were discourses of power and domain, of gatekeeping, and they were discourses which retained

influence over my own senses of adequacy and ability even after the tangible barriers between myself and digital technologies had been broken down. My research for this thesis project, and the extended grappling with discourses that I've had to do in order to formulate my ideas, has impacted my own techknowledge to such an extent that those discourses of exclusion and inadequacy have been rendered impotent, for me: I am able to expose them, diminish them, think my way around them. Nonetheless, I argue that they remain powerful in the culture at large, in a variety of incarnations, and the emphasis I place in the text on the complexity of access is a consequence of this particular experience of situatedness.

Situatedness permeates the thesis perhaps most powerfully in the area of epistemology, both explicit and unarticulated: in the previous chapter, I discussed how postmodernism and constructivism inform aspects of my thinking and therefore my writing. This section — this divergent hyperlink that breaks the continuity of the narrative and overtly draws attention to the constructed nature of the thesis — is itself situated in the assumptions of those particular epistemologies, in their emphasis on explicit valuing of knowledge and the positioning of the researcher within the text. These premises are part of my techknowledge, my construct of meaning, and from them I draw not only the form of this section, this "aside," but also the content. Within constructivist and postmodern conceptions of narrative, the subjectivities of the writer inhere in the text and cannot be separated from the ideas s/he explores: there is no "possibility of 'disinterested' research

and value-free knowledge" (Scott and Usher, 1996, p. 29). In locating origin points of this research project, I aim to avoid "bracketing myself out" of the text:

> Most...research leaves the author out of the text...This omission is not the result of forgetfulness, but rather reflects the assumption that to present data that will be convincing and deemed legitimate, attempts must be made to bracket out the subjective...However, the author is part of the research...For research to be authentic, the relationship between what is said and the person(s) doing the talking must be made apparent. (Gitlin, 1994, p.187)

I believe in — and will spend a proportion of the thesis exploring — the concept of located truths and ways of knowing. The quotation itself, though, highlights the contradictions of situating myself and my work within the intangible and transient boundaries of postmodernism: the same location that makes bracketing myself out of my text untenable also makes the authenticity that Gitlin and Russell ascribe to inclusion rather suspect, since postmodernism challenges the notion of the essential and authentic subject, even when the subjectivity is that of postmodern researcher.

2. Knowledge as Cultural Practice

The technologies that mobilize cyberculture and its techknowledge are myriad in their specific purposes and effects, but have one central commonality: they are digital. These digital technologies, which encompass the categories of artificial intelligence and information technology, and encroach in certain circumstances upon the arena of biotechnology as well, rely on computer code combinations of zeroes and ones rather than visible mechanical or analog processes for operation. These code combinations make it possible for digital technologies to perform an almost infinite variety of informational and operational tasks, and for them to communicate any relevant results faster, and across broader distances, than analog technologies can. As the world comes to rely more and more on digital networks for communications in particular, the ability of the human species to cross time and space is dramatically increased. It is this ability, this capacity for communication through digital technology, which particularly interests me: how does such a conflation of distance impact how cultures understand themselves, or how knowledge gets constructed and understood? Dale Spender emphasizes how it is technology *effects* — technological literacies and their cultural impacts, rather than the objects themselves — that represent marked changes in social order, when she discusses the incursion of digital technologies into contemporary life:

> I am sure that all the discussion on broadband vs. narrowcasting, rams, bytes and fibre optics deals with important issues, and is of immense fascination to some members of the public. But these are no more the substance of the electronic revolution than the

> emergence of the factory was the industrial revolution; in both cases it is the change in society — the shifts in power, wealth, influence, organisation and the environmental consequences — that matters to us all as individuals, and as communities. (Spender, 1995, p. xiv)

Bertram Bruce — courtesy of Dewey — theorizes: "[C]ommunication is what makes community possible" (Bruce, 1997, p. 304). Outside of some concept of community, communication and communication tools become unlikely and irrelevant: likewise, outside of some conception of communication, community becomes difficult to imagine. The two words share a common Latin etymology, in the root "com," meaning "together" (Barnhart, 1995, p. 143), and, in many senses, they can only be seen as meaningful when taken together, understood in relation to each other. I want to explore this togetherness: to examine specific communities in terms of their communications technologies, and the perspective-bound knowledges — the techknowledge — those technologies have helped make tangible.

But what do I mean by knowledge? And what is the process by which communications technologies contribute to the creation of knowledge? It is a concept whose power to regulate is often masked by its apparent self-evidence: "Like other cultural assumptions, the definition of 'knowledge' is rarely explicitly discussed because it has been so long a part of the culture that it seems a self-evident truth to many, simply another part of the way things *are*" (Hinchey, 1998, p. 36, emphasis original). It is likewise a

concept that is difficult to pin down because its content is ever-changing: "If the act of knowing has historicity, then today's knowledge about something is not necessarily the same tomorrow. Knowledge is changed to the extent that reality also moves and changes...It's not something stabilized, immobilized" (Horton and Freire, 1990, p. 101). Within my construct of techknowledge, such mobility on the part of knowledge is essential, since an intersection whose constituents become permanent and stable itself becomes frozen, and can no longer represent something as fluid and multiple as culture.

The word knowledge, in familiar form, has been a part of the English language for almost a millenium, and is thought to have multiple origins, drawing from Old English and Old High German versions of to know, or to recognize, and from the Old Icelandic *knà*, meaning "I can" (Barnhart, 1995, p. 415). This emphasizes, for me, the relationship between knowledge, power, and agency. Roger Simon talks about how the technological process of knowledge construction shapes these senses of recognition and "I can":

> Rather than determining particular meaning effects, cultural technologies frame...acts of representation and comprehension and recognition...cultural technologies assemble positions from which people construct visual, written, aural, or gestural forms of 'textuality' and address others through such textualities. But as well, such technologies also assemble positions from which people may attempt to grasp and hence mediate the symbolic fields that surround them. (Simon, 1992, p. 43)

The positions to which Simon refers are positions of knowing and of productive power; positions from which people make sense of their worlds and their place in them, and from which they construct their concepts of agency, the possible, and their own capacities to do. Power and knowledge are directly connected, as Foucault discusses in *Discipline and Punish*: "There is no power relation without the correlative constitution of a field of knowledge, nor any knowledge that does not presuppose and constitute at the same time power relations" (Foucault, 1977, p. 27).

One of the basic premises of this thesis is that knowledge is an expression of cultural practice: information sanctioned as meaningful by the cultural context. Knowledge can be taken up as both individual and communal, but my emphasis on cultural practice foregrounds the communal aspect; stresses the relation of the individual to the community. Knowledge, in these terms, is a subjective commodity. It can be experiential, informational, or abstract in terms of its construction and purpose, but it can only exist within the ideological and discursive frameworks of culture, of community. And it can only be expressed and shared with the community through sign systems and technologies, which are also constructions of community. These communications and constructions are, in a sense, what makes community: the production of shared knowledge, of "togetherness." When that production gets taken up in practice, it is the common practices in the use of technologies or sign systems that make communication possible and thus make communities specific: they can be said to possess knowledge.

Such knowledge, while shared, is not necessarily agreed upon or invested in by all members of the community: it is the *investment* in specific knowledges that differentiates variant ideologies. The overt practice of party politics, in which knowledge positions compete for dominance within a community, is evidence of the distinction between possession of shared knowledge and investment in specific constructions.

Within communities, specific knowledges are produced as meanings are attributed and shared and invested in, whether these meanings happen to be communicated through visual, linguistic, or alternative sign systems. In each of these media, the specific technosocial practices used to convey knowledge are conventions. Convention is about literacy, in the broadest sense of the latter term: convention makes use possible by enabling literate usage. It is thus grounded in the cultural: "Convention is necessary to the understanding of any sign, however iconic or indexical it is...convention is the social dimension of signs: it is the agreement amongst the users about the appropriate uses of and responses to a sign" (Fiske, 1990, p. 56). Convention, like the knowledge conveyed through it, is a social practice and is therefore fluid: conventions are created in the practice of techknowledge, and as that intersection shifts, so do they.

Conventions inundate daily lives, but so thoroughly that they are often unrecognized. The type of knowing that gets termed "common knowledge" is actually conventional knowledge: how to behave in certain circumstances,

how to operate unobtrusively or successfully within a specific community, how to gain favour, or to lose it. Such knowledge is seldom actually common except to people within the community, or with access to the communal discourse, to the literate practices of that community. "Common knowledge" — no matter how widely shared it may appear to be — is thus located in specific discourses and subjectivities and ideological positions, and attached to particular practices, privileges, and disprivileges.

As sign systems change or are used differently, associated conventions and literacies also change, and social practices within communities are altered as this occurs. The literate practices and conventions which develop out of one technology, however, are often carried through into others: hence the traditional heroic cycle of oral Celtic mythology can be found in later literature, fundamentally unaltered, and in Hollywood film "classics" like the Star Wars trilogies, while the "Oyez! Oyez! Oyez!" cry which calls courtrooms to order is one of many conventions of formal oral communication carried over into contemporary legal proceedings and contract laws (Tyner, 1998, p. 39). When conventions of literate practice and communication from one community gain dominance across multiple cultural boundaries, the increasingly hegemonic globalism of our era becomes possible and even likely, since community boundaries around practice and knowledge are blurred. In the process, specific knowledges, cultural practices, and ways of knowing are lost, leaving many communities with little to base their sense of "togetherness" on. This is, undoubtably, one of the impacts of humans'

increasing capacity to communicate across distances both of time and space: in opening up the possibility for new communities to develop across disparate geographic and temporal boundaries, new techknowledge threatens communities whose existence and ways of life have been premised upon such boundaries.

Carrying literate practices from one context to another can also threaten the sensibilities and tastes of established communities, cultures, or classes. Walter Ong's theory of secondary orality posits that technologies such as television, radio, and the telephone not only re-introduced orality into mass culture but in doing so brought conventions of private discourse into the public realm (Tyner, 1998, p. 56), making topics that were once given oral expression only in intimate settings the loud, proud objects of public consumption. As Kathleen Tyner points out in her discussion of Ong's work in *Literacy in a Digital World*, "Ong's theory of secondary orality does much to explain the sense of 'tastelessness' that critics of media find so difficult to define with any precision" (ibid). In other words, the purported crassness of television, in particular, may be more directly related to the dislocation of conventions from their original contexts than it has to do with TV itself: certainly offense is taken most frequently by persons whose literate practices are predicated on value/knowledge structures that have foundational roots in the pre-television era, and who thus have a vested interest in maintaining the power represented by those practices.

However, while cultural globalization is a recent phenomenon made possible by the extent to which technologies can now transcend boundaries of time and space, and by the epistemological residue of capitalism and imperialism which informs many tech-based transactions today, the spectre of dominance in communications technologies and practices do not appear to be new at all. Particular literacies, and the technologies which represent them, generally dominate the social practices of a given community at a given time. One of my premises in this work is that a community's discourses about and understandings of knowledge in that context are intricately connected to the practices and the technologies that dominate the context. In other words, that how we know what we know will make it difficult for us — us being the aggregate of members in any community, or society — to learn to know differently, because it will entail a change not only in knowledge, but in practice. As Roger Simon points out, "Any discussion of social forms must take into account that some forms have come to constitute the legitimate, the 'usual,' the standard, the normal — marginalizing other forms in and through their difference" (Simon, 1992, p. 21).

This type of hegemonic legitimation, and subsequent marginalization of alternate practices, is evident in the popular use of the term "literacy" itself: despite extensive academic and educational work over the past two decades on literacy theory and multi-literacies, in contemporary culture literacy is repeatedly reinforced as the measurable, quantifiable usage of the print

alphabet. In this construction of literacy are many implications for social practice, including the privileging of knowledge gained from the products of print, a privileging of skills based in the conventions of print, and the consequent de-legitimation of knowledge and knowers constituted from other technosocial practices. Other communications technologies have proliferated over the past century, including the telephone and broadcast media such as radio and television, but none of these has seriously challenged the hegemony of print or the dominance of alphabetic literacy in the domain of what Western culture counts as knowledge. Print is so deeply institutionalized in our practices of making meaning and determining knowledge that it has become, arguably, how we know what we know: our discourses around knowledge have until recently foregrounded the practices and conventions of alphabetic literacy with vehemence.

Until recently, that is: the qualifier in that statement is a significant one. It seems fairly apparent that print's hegemony in the domain of knowledge-production has begun to experience serious disruption, as information technology's cultural star has risen and its practices have become lauded as legitimate and viable, if not necessarily parallel, to the uses and practices of alphabetic literacy. I consider this a techknowledge shift rather than simply a technological one: not only are new digital technologies encroaching on contemporary life in dramatic ways, but they are infiltrating the discourses and practices by which we know what we know, and becoming necessary to the way society knows itself. It is a cultural shift that is occurring.

Concurrent with this shift, cultural tension and debate has exploded about what this might mean for lives and jobs and societal practices. Along with the utopian dreams and dystopian projections, there are questions: whether alphabetic literacy's traditional artifacts — books, particularly — will be entirely replaced by digital technologies, whether the techknowledge shift will make us unrecognizable to ourselves, culturally, and what all of us — and especially any of us with a stake in education — are to make of all this shifting of how we know what we know. This thesis touches on these questions, but under the assumption that the disruption they address is not something new, but rather something that has happened frequently before in the varied histories of humanity. Chapter four, in particular, will take up some of the changes experienced by other societies which underwent shifts in techknowledge due to innovation in communications technology: how the process of dominance-building affected what they knew and what they understood themselves to be.

The changes — and potential dominance shift — that our culture seems to be experiencing are not necessarily about the death of print or alphabetic literacy, however, but rather about the death of its hegemony. Change in the dominant communications technology of a culture does promise change in that culture's techknowledge and in the culture itself, but it does not necessarily forebode the loss, entirely, of the old technology and its attendant literate practices. The adoption of writing and print in the Western world is a case in point: though alphabetic literacy has come to

hold a position of dominance in reference to cultural conceptions of knowledge, it has not replaced spoken language in all contexts, nor the practices of the oral tradition. It has, certainly, decimated the power that orality once held in many cultures, and in some cases contributed to the decimation of oral cultures themselves, destroying — through dominant cultural discourses of moral right and through dominant cultural practices of force — the literacies that made oral cultures communities. But, as mentioned before, some of the conventions of orality survive, subsumed in print culture's contemporary narrative forms, carrying with them ways of knowing that predate the techknowledge of print by centuries. My expectations for the 21st century and digital technology are rather similar. At this point in time, the old techknowledge of print and the emerging technologies of cyberspace are converging, to an extent: users and creators of both are crossing boundaries, drawing conventions and practices from the two and blending them to create new capacities and products. Digital technology, especially in the form of the computer and the Internet, makes extensive and visible use of print conventions, allowing desktop publishers to manipulate the familiar print variables of font, spacing, and layout, and to produce documents that two decades ago would have been unattainable without a professional printing press. Likewise, email — ostensibly a hybrid of letters and telephone and face-to-face conversational conventions — draws on practices and capacities made familiar in a variety of older technologies to allow for fast, informal communication over distance. In the other direction, the encroachment of hypertext-style writing into postmodern

published novels and other print texts makes convergence a veritable two-way street. These convergences reflect, in very real ways, the loss of familiar practices and techknowledge, but they do suggest that print will not disappear — only that it is likely to become something different in its digital incarnation. Some cherished aspects of print communications and knowledge will survive the shift to an information era, but they will not be unaltered, in form or in meaning. Since meaning is made possible only in the cultural context, in the intersection between technology and knowledge, and since the cultural context is changed by changes in technology and knowledge, it could not be otherwise.

I would venture, though, that this period of dominance shift itself is fertile with possibility for shaping the convergence and direction of techknowledges, since, in the postmodern epistemology upon which techknowledge is premised, the world is not determinate. The techknowledge and the culture of the future are created by the literate practices and conventions that our culture selects and reinforces and stabilizes. When mass-produced print replaced the culture of the manuscript, a specific focus of chapter five, the shift took place over centuries. But the capacity of digital technologies to communicate and operate with such speed seems to be encouraging what Kathleen Tyner calls an accelerated convergence.

> One form of communication does not automatically displace another... forms coexist as they borrow and swap genre, style, codes, and

> conventions — with mixed aesthetic success, of course. The ability of digital tools to collapse sight, sound, and motion with relative ease accelerates experimentation with the convergence of aesthetic form and structure from different media. (Tyner, 1998, p. 39)

This acceleration, with its multiplicity of possibilities, nonetheless demands a great deal from the individuals who live in the cultural sphere of such rapid change. Not only is cultural techknowledge being continually reshaped at a pace that is difficult to apprehend, but the tangible literate practices needed to be able to function effectively in the burgeoning information society change with a frequency and a complexity that even people privileged enough to have access to digital technologies find intimidating. As Paul Levinson points out, this acceleration of learning and shift in attitude towards life-long learning represents a dramatic cultural adaptation:

> Indeed, other than ideographic systems in Asia, alphabetic reading (and writing) remained the most difficult medium to learn well into the 20th century — looking at a photograph, talking on the phone, listening to a phonograph recording, watching a movie, listening to the radio, watching TV require no learning on the basic perceptual or performance level at all. The personal computer of course changed that, reversing the trajectory of ever easier-to-use media ...this has been no easy task for adults, many of whom looked at learning how to drive an automobile as the last significant skill they needed to master for full citizenship in the technological society. (Levinson, 1997, p. 31)

Some of the cultural resistance to digital technologies and the changes they are purported to represent needs to be considered in terms of the climate of fear and anxiety such a reconfiguration of learning creates.

In addition to issues of acceleration and convergence, it is important to note that the literate practices required for effective participation in the techknowledge arena of a particular era may not necessarily be — or perhaps seldom are — the literate practices of the majority. In the case of communication technologies, particularly, which I argue have a particularly significant impact on the process of meaning-making within societies, practices of gatekeeping have historically been used to define the communities to which literacies were available, and not available. In some cases, this definition of "community" may simply have revolved around a geographic entity of kinship, but in many instances the gatekeeping was enforced through matrices of status, class, and gender, as in the medieval stranglehold on alphabetic literacy and textual production held by the Catholic church, or the late industrial positioning of technologies as the domain of male workers. While the former situation is now, effectively, history in the Western world, the latter still has powerful significance in terms of women's relationships with the concept of technology and, as a result, with the forecast of a dawning information age. In a world where the term "technology" has been coded male, despite women's expert and in some areas almost exclusive use of technologies, the recent cultural foregrounding of technologies has raised this issue of gatekeeping and the "technophallic"

stereotype: "Women live, paradoxically, in a state of intimate connection with the technologies of re/production and yet are represented as perennially inadequate: groping towards and never reaching competence, technophobic and Luddite" (Bryson and DeCastell, 1996, p. 2).

Gatekeeping, in both the instances alluded to, not only limits access to the literate practices of a particular technology, and thus to participation in the cultural arenas in which those practices are necessary, but also regulates the production of subjectivities in relation to the technologies in question. Such regulation, enacted by positioning the technologies as the "natural'" jurisdiction of the groups who possess the knowledge — and therefore the power — of their practice, thus societally minimizes the desire of other groups to gain access, and restricts the ability even of determined but disenfranchised individuals to learn the literate practices in question. Formal routes are effectively closed off, and social sanction regarding appropriateness shuts alternate doors. The closed communities retain their status and power, and those shut out have little opportunity to contribute to the techknowledge intersections tied to the technology/ies in question.

Gatekeeping of this sort has been an element of the cultural practice of digital technologies since their inception. Not only does a minimal proportion of the world's — or even the West's — population currently have access to technologies and literacies which would allow them to participate in the information revolution or in a digitally-based society, but beyond this

material restriction of access, more subtle forms of regulation effectively restrict the participation even of persons who have the opportunity to touch and use digital technologies. The historical coding of technologies as male, and the discourses of cyberculture which position digital technologies as predominantly white, middle-class domains, all work to reinforce the existing structure of production in digital technologies. The majority of persons shaping information technologies, influencing the ways these technologies can be used and the knowledge possibilities they contribute to, are people whose subjectivities reflect the status quo of Eurocentric, masculinist, capitalist narratives. These subjectivities, and their attending values, tend to be reinforced by the technological capacities such creators write into their programs. Thus the techknowledge shifts that digital technologies precipitate in contemporary culture are likely to uphold the literate practices and discourses that privilege the segment of society which produced the technology itself.

Nonetheless, individuals who identify or are identified as "other" within the dominant white male discourse of technology can — and have — subverted the uses of various technologies, including digital technologies, to purposes which do not reinforce the traditional narratives of belonging which locate technologies discursively. Just as women read and wrote quite profusely (among particular classes) during eras when formal education was usually restricted to males and when women in authorial roles were belittled for indecorous behavior (Spender, 1995, p. 79), so today, despite the

gatekeeping which exists around digital technologies, multiple voices get through. Riot grrrls do populate the web in active resistance to patriarchal and pornographic dominance, as well as to discourses of woman as victim. And Donna Haraway's construction of the cyborg works to expose as hollow many of the premises on which gatekeeping is based: her cyborg is an object and a site of feminist resistance to the construction of the technological as a male domain. Rather than positioning the cyborg as a feminine alternative to the traditional masculinist narrative of technological prowess, Haraway breaks down the dualisms reified by the traditional construction: her cyborg is "[R]esolutely committed to partiality, irony, intimacy, and perversity. It is oppositional, utopian, and completely without innocence" (Haraway, 1991, p. 151). Through the cyborg, Haraway deflates the validity claims and literate practices of gatekeeping, providing an alternative techknowledge basis for a digital future.

Gatekeeping is not, and has likely never been, a wholly successful process of circumscribing community and literate practice to the exclusion of all who do not meet whatever criterion is used for inclusion. Processes of exclusion and participation, particularly on a societal basis, are — from the perspective of the postmodern and contructivist epistemologies I draw on — never monolithic, always contextual and complex. But issues of access and gatekeeping in reference to digital technologies are especially complex, because they draw attention beyond the ideal of access to technologies as tools, and towards a conception of access as techknowledge production.

While formal channels for the production and shaping of techknowledge products — the creative commodities that bear witness to the intersections of possibility and subjectivity in a given moment — still exist, digital tools make it possible to create and to publish, record, film, and promote outside the boundaries of established publishing houses, recording companies, and film studios. As Carmen Luke explains digital production: "Boundaries that used to divide authoritative speakers/writers and voiceless consumers/participants, have become permeable or eroded altogether" (Luke, 1996, p. 4). This erosion diminishes the power of traditional networks of gatekeeping and exclusion, and highlights the contradiction between the way the term "access" is popularly taken up and the way it has worked since the industrial era. Gatekeeping, during the 19th and 20th centuries, has not been solely — or perhaps even primarily — a process of denying individuals access to the use or *consumption* of technologies, but of denying them the opportunity to contribute to the discourses and practices made marketable by those technologies. As democratic ideals gained cultural capital throughout Europe and North America in the 1800s, so grew the belief that "[A] modern society needed its members to be literate if it was to function effectively" (Spender, 1995, p. 49). Concurrent with this development, though, came the manufacturing capacity to mass-produce books for consumers: in an economic sense, once the industrial era and the ethics of capitalism and consumerism gained power, the rigid gatekeeping of earlier eras with regard to literacy made no sense. But the industrial world was indubitably still a hierarchical world, and practices of exclusion and

limitation of power were not abandoned, only adapted. While persons whose identities were "othered" were granted some access to the powerful technology of alphabetic literacy, the institutional systems which protected publication still served to reinforce cultural predilections for the valuing of particular styles of writing, from particular sorts of writers. Until recently, the power granted the "dead white males" canon of English literature meant that a limited number of female and/or non-white authors had the opportunity to publish, or at least to have their writing taking up as literature. This system effectively served to reinforce the principles of exclusion that have dogged techknowledge production throughout history.

In a world where individuals have the capacity to produce — without systemic infrastructure — their own texts and creations, though, "access" necessarily implies more than just opportunity to touch and to develop literate practice: it becomes unarguably an issue of agency, and opportunity to contribute and critique. As Kathleen Tyner frames it, it is an issue of whether "[C]itizens have ample opportunity to become skilled information providers as well as information receivers (Tyner, 1998, p. 89). In this increasingly technologically saturated society, it is not unusual even for politically and economically disenfranchised persons to possess some technological artifacts: CD players, cell phones, pagers, Nintendo machines, and even computers are relatively inexpensive in the current market, and are becoming seemingly ubiquitous accoutrements of societal participation in diverse circles. I do not intend to negate the experiences of those

significant segments of the population for whom these digital technologies are nonetheless entirely out of reach and out of reality, but I believe the issue of access needs to be framed from a more complex perspective than the "haves" and "have nots" designation makes available. The focus on access as proximity to and possession of technologies obscures the issue of whether such access and possession actually reflects the primary practice of gatekeeping and exclusion any longer. The boundaries that Carmen Luke refers to as permeable and eroding are only eroding for those whose literate practices and subjectivities make it possible for them to conceive of being information creators as well as consumers. Those who can use and consume technologies but do not have the opportunity to contribute, reflect, and thus shape the techknowledge of their era are in many ways as disenfranchised as those who never see a computer.

3. Technologies in Culture

My dictionary defines technology as "[T]he application of practical, mechanical sciences to industry, commerce" (Drysdale, 1996, p. 418). The definition both intrigues and disappoints me; brings more into focus than I had anticipated, yet excludes much, too. It is intriguing because it highlights an aspect of the technological in this era that is so taken for granted it seems almost invisible: its relationship to commerce, to capital, to the economy of capitalism. Technology, and individual technologies, are currently both enablers of economic exchange and commodities within the systems of that exchange. And as commodities, these technologies are ascribed value not solely because of what they can do but because of their very status as technologies. This status, this representation of value and power in the cultural context of the late 20th and early 21st centuries, appears to grow daily. Baudrillard called ours a culture produced and organized by signs; one completely described by the dynamics of consumption (Horrocks and Jevtic, 1996, p. 50). Technologies are important signs and signifiers of consumption today: cell phones and laptops and new Beetles conflate notions of efficiency and nostalgia with status, and schools advertise their connectivity and computer-student ratios in order to appear competitive in the emerging market of education. Allucquere Rosanne Stone points to the complexity of this immersion in the technological:

> Great day for riding a tiger! We who jump the beasts — who use innovations of technology in the study of technological

> innovation — discover, sometimes to our surprise, that we aren't simple observers. Rather, we are immersed, complexly interwoven into the epistemes which are the objects of our work ...We live within the event horizon of late capitalism, a place where values are skewed by the immense force fields of economics. From that vantage point, the geometry of ethics and values is non-euclidean indeed. (Stone, 1995, p. 1)

I am mindful of this complexity, and my complicity and participation in the sphere of technoprestige and consumerism. I am a subject of the culture I want to explore — technologies, and technology, are interwoven into my life and my conceptions of the world. And thus my disappointment in the dictionary definition I found for technology: the "practical, mechanical sciences" emphasis focuses attention less on the technologies of my location in the 21st century than on industrial technologies, located in a different nexus of commerce and capitalism, and a differently organized cultural context. The technologies called to mind by the dictionary definition are not the technologies jockeying for status and attention on the contemporary stage, but rather dinosaurs, predecessors, museum pieces from an industrial world supposedly passed away. While important to my analysis, they are, at the same time, insufficient representatives for it.

Indubitably, though, contemporary concepts of "technology" owe their origins to the industrial model, and I would argue that the term still does reference steam engines and cotton gins accurately, though not in such an encompassing way as it might have been thought to three generations ago.

However, in the era of steam engines or cotton gins, the term "technology" was not yet widely used to describe those practical, mechanical applications of scientific principle. The contemporary meaning granted the term is fairly recent, and embedded in the history of "what it means to know" in Western culture. Its etymology lies in the ancient Greek "techne," meaning art, skill, craft, method, or system (Barnhart, 1995, p.798), and in English usage the term initially referenced systematic written treatises on art, craft, or technique (ibid). By the nineteenth century, however, usage focused specifically on the systematic element, and technology gradually became a term for mechanic processes and principles.

As Leo Marx explains in *High Technology and Low Income Communities*, "[I]t is important, if we are to develop a critical understanding of the way we think about technological innovation, to recognize that 'technology' is a concept of relatively recent origin... only in the first decades of this century did the word 'technology' — in today's wider sense, referring to the mechanic arts themselves (collectively) — gain currency" (Marx, 1999, p. 137). The term only began to be used extensively around the time of World War I: today we are inundated with it.

According to Leo Marx's account, the contemporary significance of "technology" stems out of what Donna Haraway calls the "polluted inheritance" (Haraway, 1997, p. 127) of the Enlightenment and the Industrial Revolution; out of those eras' pivotal faith in and focus on

progress, and in their shifting social norms and their construction of "man as machine." Progress was a foundation of knowledge in the Europe and North America of the 18th and 19th centuries: it represented the triumph and liberation of reason, the "[S]teady, continuous, cumulative expansion of human knowledge of — and power over — nature" (Marx, 1999, p. 139). Innovation in the mechanic arts, based as they were in principles of science and rationalism, was construed as physical evidence of progress. And this concept of progress encompassed both material inventions and sociocultural shifts; thus, as technologies like the railroad and the telegraph became widespread, specialized knowledge of their developing systems of operations became necessary.

Concurrent with the Enlightenment construction of progress was a *re*construction of knowledge itself: in much of earlier Western history, knowledge was understood to be a product of tradition, of the community literacies and conventions that had evolved over centuries. During the Enlightenment this emphasis on tradition was effectively dismantled and replaced by a focus on reason, to which end the principles of scientific method were developed and utilized. Knowledge became a quantity to be validated through systematic measurement, testability, observation, and experimentation (Scott and Usher, 1996, p. 11), and any knowledge claim which was not empirically valid became non-knowledge, relegated to the lesser status of superstition, opinion, or feminized "feeling." It was within

this empirical hegemony that the Industrial Revolution and the familiar use of 'technology" as systematic and mechanical were born.

Through the proliferation of technological innovation in the nineteenth century, growing bodies of categorized, classified, discipline-bound information, representing knowledge, were reified as examples of humanity's collective progress on the civilizing journey of conquest over nature. As Leo Marx explains it, these systems gradually became so complex and so wide-ranging that "[T]hey far outreached the conventional denotations of terms like 'the mechanic (or practical, or industrial) arts,' or 'the machine.' This increasing disparity between the language and its presumed referents — the entities to which it was supposed to refer — created the semantic void that 'technology' gradually filled" (Marx, 1999, p. 144). In other words, new structures in society demanded and made room for new knowledge, and for a conception of knowledge as an infinitely-increasing body. The emergence of the term "technology" allowed for systemic and abstract conceptions of industrial, mechanical inventions: for these knowledges to be categorized in a new way. It also allowed the social effects of machines to be referenced by the same signifier as the machines themselves.

This element of "technology effects" is important to my own conception of what technology and techknowledge are, and an additional reason for my interest in the dictionary's foregrounding of the *application* of technologies, rather than technologies as artifacts in and of themselves. The ways a

technology is used by a culture does a great deal to shape the eventual effects it has on that culture, and how it gets used depends on techknowledge, or the intersection between the technology and the knowledge and meaning structures of the culture. Still, this is not a deterministic process wherein the intersection and its effects can be predicted: "[T]echnological diffusion in the social sphere proceeds unevenly, and is mediated by a range of interlocking socio-demographic and cultural factors that variously enable and limit access and participation. The effects of media and other technologies are never intrinsic to a particular medium, but are always mediated by the uses to which technologies are put and the contexts in which they are used" (Luke, 1997, p. 5). And these technology effects, or the impacts of specific technologies being taken up in specific ways within culture, in turn shape the intersection of techknowledge and meaning just as they are shaped by it. The Industrial Revolution's emphasis on technological progress and the rationality of the Scientific Method, for example, intersected with the explosion of technological innovation and production to create a powerful cultural conception of human as machine; of the human body and human interactions as mechanistic processes as dissectable and comprehensible as those of mills and engines. This concept — this specific instance of techknowledge — made possible societal effects like Taylorism and the medical separation of biology and social context.

A central premise of my work in this thesis is expressed succinctly by Arturo Escobar in his *Welcome to Cyberia*, which he introduces by stating "The

point of departure of this inquiry is the belief that any technology represents a cultural invention, in the sense that technologies bring forth a world; they emerge out of particular cultural conditions and in turn help to create new social and cultural situations" (Escobar, 2000, p. 56). It is that "bringing forth a world," either on a broad scale or an individual one, which intrigues me in relation to my concept of techknowledge. Donna Haraway, in discussing the act of interpellation in discourse, "warps" Louis Althusser's theory of "[H]ow ideology constitutes its subjects out of concrete individuals by 'hailing' them" (Haraway, 1997, p. 49-50). To "hail," in this model, is to call out the subject, to create a moment of identification, to sound a "hey you!" that the subject interprets and positions self upon (ibid). I appropriate Haraway's warping stance, and adapt her claims about technoscience to my own focus, positing that discourses around technologies — part of the techknowledge intersection within culture — shape the meanings that are applied to technologies, and the ways the technologies are taken up. She says, "Subjects in a discourse can and do refigure its terms, contents, and reach" (Haraway, 1997, p. 50). In Althusserian terms, I want to argue that technology interpellates and hails individuals into taking on a variety of subjectivities, and those subjects then reconfigure the discourses which constituted them, and vice versa, in a complex and mutual cycle. For me this emphasizes the relational and contingent aspect of techknowledge; the way in which technology [b]reaches beyond the plastic or metal or ink or LCD display of its tangible boundaries once we begin to interact with it and re-represent it to ourselves. Technologies are embedded in matrices of

knowledge and cultural practice. As Carmen Luke puts it: "[T]echnologies emerge in specific historical contexts, and become part of the diverse social fabric of everyday life where they shape and are shaped by the social practices through which uses are mediated" (Luke, 1997, p. 7).

I do not believe that any technology is merely an artifact, a tool, a thing. I would venture, however, that the particular artifactual embodiment of different technologies influences the impact and effects they have in the cultural sphere: shapes the meanings granted to them and thus what they are able to *do*. As Bertram Bruce points out, "It is too easy, and wrong, to say that artifacts are *only* expressions of social relations, because, as artifacts manifest social relations, they appropriate the power they express" (Bruce, 1997, p. 294). The example he gives to illustrate his statement is a particularly compelling one for my own exploration: he cites the canon of Western literature, the so-called "dead white males" club that, despite deconstruction and calls for new boundaries based in less ethnocentric, patriarchal knowledge structures, still wields a great deal of control over what counts as literature. This is a case, however increasingly fractured, of artifacts representing knowledge, of technologies granted specific techknowledge status or meaning on the basis of their artifactual nature. How a technology is embodied matters. Thus I argue for a broader definition of technologies than the one my dictionary makes available — one that allows for the inclusion of the "practical, mechanical sciences" and the foregrounding of applications and the empirical, but that also emphasizes

the science and culture of the digital, of the Information Age, of today. Contemporary technologies are more abstract and systemic and wide-ranging than railroads ever intimated was possible, and are part of a cultural web of knowledge more contingent and divergently validated than the empirical roots of an industrial conception of "technology" could accommodate.

In the artifactual sense, then, I want to work from an umbrella definition of technology: one that encompasses the diverse range of embodiments that can be referenced by the term, however old or new. I even want to include and explore technologies that pre-date the Industrial Revolution by millenia — technologies that are not necessarily mechanical, or scientific in the 18th century sense of the term, but that impact and "hail" subjectivities, bring forth worlds, and influence what it means to know. By this definition, in accordance with Kathleen Tyner, I include reading and writing — the practices of alphabetic literacy — under my umbrella of technologies, since together they "[C]ommodify thought and speech into records" (Tyner, 1998, p. 17). And with this inclusion, I breach the limited boundaries of my dictionary's definition of technology, and posit my own hybrid instead: for the purposes of this project, I will use the term "technologies" to refer to cultural products with operational applications, which contribute to a reconstitution of culture, meaning, and knowledge, and which are tied into culture through specific discourses and capital relations.

How, though, do technologies bring forth worlds? And what sort of worlds will digital technologies — given their conventions and their cultural contexts — contribute to? Any response to these questions exposes a great many epistemological assumptions. In reference to the latter query, some theorists, artists, and writers have taken a dystopian stance towards technology, advocating resistance to it and positioning it as a force heralding the destruction of humane values; others have advocated embracing the technical, and coded new technologies in utopian and transformational terms. Many more cultural participants and commentators have taken a median perspective, characterizing technology as a neutral or utilitarian tool whose contribution to new worlds or ways of being is determined by the human hands and minds guiding it (Bruce, 1997, p. 290-291). In all cases, though, these variant perspectives all treat the technology being considered, however specifically or generically, as autonomous, as separate from the culture and the society assessing and using it. Bertram Bruce calls this habit of isolating technology from culture "the autonomy myth" (Bruce, 1997, p. 293). It represents, in all its forms, a deterministic response to the question of how technologies hail subjects and bring forth worlds: it presumes that technology has significance on its own, isolated from the discourses and practices which surround its use.

As Bruce outlines it, the autonomy myth operates by making sociotechnical interactions invisible, and privileging one or the other of the actors: "We see technology as pre-given and thus independently shaping social practices.

Or, we view societal relations as all encompassing, thereby finding it difficult to account for the specific effects of distinct technologies" (Bruce, 1997, p. 293). This is not technology as a hailing factor in the construction of identities and cultures, but technology as a thing unto itself, outside of society and the messiness of interpretation and intersection. It draws on the objective stance of the scientific method by separating the technological object from the arena in which it operates, and considering only those technological effects which are empirically visible. In doing so, it obstructs apprehension of the possibility of mutual constituency of culture and technology, and leaves the shaping of knowledge out of the picture entirely, as though meaning were either predetermined or a matter of choice. Such a construction can make any one partner in the intersection of culture, knowledge, subjectivities, and technologies all powerful, negating the processes of interpellation and the mutual meaning-making of techknowledge.

It is in that very mutuality, however, that I premise my own understanding of how technologies bring forth worlds. And one of the key factors in my interpretation of that mutuality is also foregrounded by Bruce's work: his focus on literacy technologies and on technology as part of all literacy practice. In his model, technologies are the ways literacy is *expressed*. As he puts it, "Technologies participate intimately in the construction of all literacy practices. They are not separate from texts and meaning making, but rather are part of how we enact texts and make meaning. We make

texts material through technologies of papyrus, paper, chalkboard, or electronic screen" (Bruce, 1997, p. 300). Bruce's conception of literacy appears to be limited to the confines of the conventional alphabetic literacy of reading and writing print text, but is premised on an understanding of literacy as the practice of meaning-making, thus allowing for multiple "literacies" realized through different technologies and types of texts. When I apply this concept to my own exploration of technology, knowledge, and culture, I take it to suggest that literate practices are connections between technologies and social relations; that these practices represent, at least in part, the *how* of technology's bringing forth worlds.

Any concept of knowledge implies knowledge of a community of some sort. As a result, knowledge can only be expressed through literacy in the communications technologies of given cultural contexts, and made sense of only through these literacies or literate practices. Technology is therefore always a part of the process of literate practice, though only in contemporary discourse do the two terms seem to have taken on a connected — if extremely limited — meaning. As Lankshear and Knobel posit, "Talk of *technological* literacies seems to arise from the fact that the technologies integral to conventional or 'normal' literacy practices have become 'invisible,' as a result of their always having 'been there' in our practice (Lankshear and Knobel, 1997, p. 139).

Literacy is sociotechnical, and literate practices are used to interact with technologies in order to shape and frame knowledge. Literacy is at the centre of my conceptual techknowledge intersection: the literate practices used to interact with communications technologies are part of the power/discourse matrices of subjectivity and communication, and they constitute, shape, and regulate knowledge as they are used, and by the ways they are used. It is through literacies and shifts in literate practices that new realities and new ways of knowing take hold in a culture. Literate practices allow people to make meaning out of technologies, within cultural or community contexts, while also changing those same contexts when technologies and practices change.

link — pedagogies

"Hierarchy is an illusion generated by a fixed observer" (Hazel Henderson in Bauer and McKinstry, 1991, p. 42).

If knowledge is cultural, expressed through the literate practices of technological convention, then techknowledge — the place where these factors come together to make meaning — is a pedagogical concept. Jennifer Gore asserts that all human sciences are inherently pedagogical (Gore, 1993, p. 124), and this thesis exploration of knowledge, technologies, and culture is in many ways the illegitimate offspring of a variety of human science disciplines: philosophy, sociology, linguistics, and education among them. Pedagogy, in this context, is a process of knowledge production and the production of subjectivities, and these productive processes are both the aim and the focus of my exploration of the techknowledge construct.

Pedagogy, like knowledge, is made tangible through discourse and practice, and is located in particular ontological and epistemological positions. It represents engagement with particular forms of meaning, as Roger Simon explains: "As a mode of organizing and regulating symbolic production practices, pedagogy attempts to influence the way meanings are absorbed, recognized, understood, accepted, confirmed, and connected, as well as challenged, distorted, taken further, or dismissed" (Simon, 1992, p. 59). Thus any conception of knowledge and meaning-making has pedagogical

implications: a place from which the knower speaks and attempts to influence others' knowledges and subjectivities.

This whole thesis, then, exists within a pedagogical framework, concerned with issues of human learning and understanding and cultural transformation. My most overt pedagogical intention in the project is to take up truth claims — particularly those concerned with singular, decontextualized concepts of truth — and to explore them in terms of techknowledge locatedness. This will allow me, I hope, to construct a picture of possibility for the emerging techknowledge of the digital era, and to position those possibilities in terms of their relationships — both of connection and divergence — to more traditional ways of knowing.

I do not, as stated elsewhere in the text, approach this project from a position of neutrality: I chose Henderson's quote on hierarchy to head this link section because her assertion outlines my own pedagogical position with clarity. From my constructivist and postmodern perspectives, locatedness permeates all perceptions, and the "fixed observer" Henderson refers to — the subjectivity of permanent stability and objectivity — is an untenable location. Yet only from the subjective and privileged viewpoint of a fixed observer can hierarchy appear as the natural and actual entity is has been reified into in modernist (and much of pre-modernist) discourse. It is subjectivities, and the discourses and literate practices out of which subjective meanings are constructed, through which historical hierarchies

have been enacted and discursively stabilized; through which knowledge of hierarchies has come to be known and lived.

The injury and damage I associate with hierarchies lies in the power they have been granted through the techknowledge intersection, wherein particular constructions are taken up as knowledge and fact. This is the productive power referenced to Simon in the opening chapter: power that regulates possibility. Gussied up in factual clothing, hierarchies of human subjectivity have regulated and constrained the opportunities, identities, and practices available to people over many centuries, and effectively erased the voices of various groups in particular contexts. As bell hooks asserts, this erasure has fostered racism, stereotyping, rebellion, and longing: "Specifically in relation to the postmodernist deconstruction of 'master' narratives, the yearning that wells in the hearts and minds of those whom such narratives have silenced is the longing for critical voice" (hooks, 1994, p. 3). I am interested in exploring the possibilities for new forms of productive power in that longing for critical voice. I am interested in whether society can take advantage of the ruptures threatened by postmodernity and digital culture, and can use these spaces of upheaval for intentional change, for the breaking down of the rigid categorizations and fixed depictions of subjectivity that have made hierarchy so powerful.

This thesis is a pedagogical project, then, aimed not only at postulating broad possibilities for sociotechnical shift in the 21st century, but at

deconstructing societal notions of hierarchy and exploring alternative constructions of subjectivity and practice within the context suggested by digital conventions. In the Bauer and McKinistry article which Henderson's quote is drawn from, the authors go on to define an alternate conception of positioning and locatedness: that of heterarchy, or "[S]ubset plurality within a system without dominant/subordinate ranking" (Bauer and McKinstry, 1991, p. 42). While heterarchy admittedly seems almost inconceivable given the dualisms and knowledges that still dominate discourse in popular culture, a new techknowledge is looming, and thus new knowledge production, and new discourse, is — at least from a pedagogical point of view — possible. One of the goals of this thesis is to envision how it might operate, and what it might look like, in a digital age.

4. Technological Change and Knowledge Shifts

Broad cultural shifts in the meanings and uses and availabilities of technologies and concepts do make new things conceivable for societies. Through windmills and through nuclear fission, humans have created new ways of generating energy, and new ways of relating to energy and to the earth and its potential. Through clocks and the industrial factorization of Western culture, we constructed new concepts of time, labour, and work ethic, and new subjectivities based in the veneration of those concepts. Through the automobile, we made suburbs possible and thus altered the shape and space of lives in the 20th and 21st centuries. Through writing and alphabetic literacy, we gave rise to new ways of relating to each other across time, and new ways of representing our subjectivities and our ideas.

In this chapter, I want to explore and analyze ways in which these last techknowledge shifts in communication and representation helped shape and change the societies in which they occurred, as well as the inheritances contemporary culture has drawn from those eras. The current popular wisdom asserts that Western culture — and thus, arguably, the globe — is undergoing an information revolution. While I'll examine the digital revolution and postmodernity in more detail in section six of the text, I will venture at this point that historical shifts in dominant communications technologies have also constituted information revolutions, though they have seldom been called by that name. Writing superceded oral traditions and technologies, and the printing press superceded manuscript writing.

Knowledge conceptions and culture impacted and were likewise impacted upon by these changes.

My intention here is not to try to establish universals of technological and cultural change, but rather to examine how and why people in different societies knew specifically different things, and how particular techknowledges of the past still have resonance in the intersection of meaning-making today. In choosing this path of focus, I will be imposing elements of closure on the exploration and creating a more linear and teleological version of events than is in any way natural. I have some discomfort with the way in which this may appear to position my work in a more positivist vein; to contradict my articulated intentions to position the thesis within the constructivist and postmodern traditions. After all, it is in reference to positivist research that Usher points out that "[K]nowledge in the form of predictive generalizations requires a closure which itself presupposes a determinate orderly real" (Scott and Usher, 1996, p. 28-29). But it is precisely because of the absence — within my epistemologies of choice — of an orderly real, or a transparently accessible history, that I pick and choose circumstances for exploration and initiate the closure process to which Usher refers. Predictive generalizations are not my goal. My goal, instead, is to illustrate moments of techknowledge shift and the processes by which they are understood to have occurred. I select two Western "seminal moments" to enact this illustration not because they are necessarily the best or most "natural" choices, but because their status in

Western history means that information is readily available about them. And in order to fulfill my illustrative and explorative intention, I engage in the imposition of closure: I believe that even canonized, stabilized constructions of history can be edifying as snapshots of culture and context, as long as the events they present are understood to be ever a partial presentation.

In carrying out my exploration of writing and print's incursion into the popular construct of Western civilization, I rely heavily on the constructivist methodology of partial and positioned interpretation. I recognize that I cannot claim to see historical events through the same lenses of perspective as they were seen and understood in their own time, but I can — with careful scholarship and an emphasis on recorded cultural practices of the context — attempt to ground my analysis in an appreciation of the ontologies and frames available during the eras of techknowledge shift being explored. I cannot, however, claim verifiable knowledge of what the worldview of an era was, because my perspective on it is so laden with centuries of expectations and historicization, especially in the case of events considered as foundational as the "advent" of writing and print. My aim is to work with the historical accounts of techknowledge shift, however partial I accept them to be, and through interpretation, to posit some sense of how knowledge, techknowledge, and literate practice were constituted in the era being explored, how they changed as communication changed, and how contemporary culture might draw from their experience.

However, an appreciation of the realities of the past is not always easy to achieve, as a clever little TV program called "History Bites" pointed out to me recently. The program, in constructing a mock-historical examination of Europe and its technologies during the mid-fifteenth century, used contemporary media conventions to outline the worldview of the era. In a short sequence set up as a radio call-in program, a "peasant" called in to discuss her purchase of that bewildering new time-measuring invention, the clock. Her question? Where exactly *was* the time she was supposed to be measuring with said clock? (History Channel, June 19, 2000). This example — facetious as it is — draws attention to the current ubiquity of what was once an abstract, foreign concept, and illustrates the dramatic shift in the constitution of reality that has occurred in the Western world over the last five centuries.

Not only has reality changed, but subjectivity, too: our cultural and individual discursive understandings of ourselves. I believe that technologies, through the literate practices needed to apprehend and make use of them, impact and shape subjectivities — we call ourselves readers, drivers, musicians, technogeeks, depending on our affiliations, and carry those badges of literacy as central components of identity and cultural practice. We define ourselves, at least in part, by technologies. And as technologies change and literate practices and discourses shift, so must subjectivities — we rewrite who we are and become capable of new things under different constructions of techknowledge. This is not necessarily a

simple or tidy process: Roger Simon calls the discursive construction of subjectivity an "[U]nending process taking place, in often contradictory ways, in a multiplicity of sites and relations" (Simon, 1992, p. 59). And not all of the technological literacies on which subjectivities get based are even evident to us: the example of time, on the History Bites program, points out that even things we now consider entirely natural were likely once strange, mystifying, and artificial. This naturalizing occurs through discourse, which is drawn from social context and the known, and as part of regulation and literate practice is therefore tied to technologies and is an integral factor in the construction of techknowledge.

According to the teleology that we call Western history, the first truly dominant communications technology, in the tradition posited by Simon in chapter 2, was orality, and the first significant shift of technological dominances was the conversion from the spoken word to alphabetic writing during the heyday of the Greek city states, around 300 BCE. I imagine there were shifts in the uses and structures of orality all through its long pre-history, and parallel transitions to writing, among the Sumerians or the Egyptians or the Chinese or innumerable other societies, but the Greeks are the ones who have been granted our attention, culturally speaking, over the past few hundred years, and thus the ones whose techknowledge shift, and reactions to it, are inscribed on the narratives of Western civilization and available for study.

It is Socrates, of the famous Greek trinity of himself, Plato, and Aristotle, who is usually placed at the centre of neo-classical exegeses of the incursion of writing into ancient Greece. It is odd, really, for an individual to figure so prominently in a discussion of cultural process, but such is the impact of Western culture's romance with cults of personality, on top of its almost three-hundred year-old habit of grounding itself in and justifying itself through the "classics." Since the actual volume of literature surviving from classical periods is slim, those figures that do populate the literature are granted exceptional power. In the case of Socrates and the technology of the alphabet, this prominence is both fitting and ironic.

Socrates was an avowed dialectician who considered the written word mute, inflexible, and unable to distinguish between suitable and unsuitable readers (O'Donnell, 1998, p. 21). For him, valuable knowledge was apparently that which was created in the techknowledge intersection of orality, specifically dialectic orality: the techknowledge he himself had influenced because of his authoritative position in the academic and philosophical circles of Athens. In ancient Greece — or the ancient Greece knowable today — Socrates, and, after him, Plato, were vehement and passionate defenders of the dialectic method of speech and argumentation, which was based in dialogue, logic, and rationalism, and believed to be *the* path to truth (Pirsig, 1974, p. 331). This systematic process of cross-examination in pursuit of truth represented both a technology, in the sense of a tool aimed at a specific end, and a techknowledge, a culturally specific

intersection through which meaning and status — in this case not only of truth but perhaps of Socrates himself — were created and supported. He railed passionately against "[M]aking truth the helpless object of men's ill-will by committing it to writing" (O'Donnell, 1998, p. 21); against abandoning the dialectic process of face-to-face communication and the resulting illumination of that rubbing together of minds. In defense of his own techknowledge, Socrates appears to have been a scathing critic of all other technologies of communication in his era: his primary focus of attack was actually not writing, but rather rhetoric, which he positioned in a dualistic relationship with dialectic and rent apart from there. Some of his most powerful critiques of rhetoric, though — that it constituted manipulation and a pandering appeal to emotion rather than truth (Pirsig, 1974, p. 333) — he likewise applied to writing, positioning both systems of communication as inferior to dialectic because of the "muteness" of their audiences (O'Donnell, 1998, p. 20).

Socrates' techknowledge would have involved literate practices of questioning and analysis, within a frame in which objective truth was a possibility, and the virtuous goal. His rejection of writing appears to have stemmed not only from his own dogmatic defense of his own position, but from his association of writing with rhetoric because of the non-dialogic structure of both. For Socrates, it appears, dialectic *was* truth, and truth as absolute, independent of interpretation. As Robert Pirsig explains in *Zen and the Art of Motorcycle Maintenance*, "Early Greek philosophy represented

the first conscious search for what was imperishable in the affairs of men (*sic*). Up to then that was within the domain of the Gods, the myths" (Pirsig, 1974, p. 336). And this notion of truth as *the* immortal principle, made tangible through dialectic, was still a fragile entity in Socrates' day, part of a tense political struggle for ideological dominance. Dialectic truth was set, in proper dialectic dualism, against rhetoric and the Sophists' prevailing concept of *arete*, or good: a more relativist position whose maxim ran along the lines of "humanity is the measure of all things." Although the politics of the struggle took Socrates' life, within generations his concept of objective truth as the ultimate goal had prevailed, subsuming "the good" as a mere fixed idea, and granting Socrates and his dialectic a semblance of immortality.

To my mind, there are two outstanding ironies in Socrates' critiques of writing. First, Plato and other contemporaries either wrote his dialogues and rants against writing down, or — as is more likely and even suggested by Aristotle (Pirsig, 1974, p. 335) — reconstructed them for the page. Through this act of writing an image of Socrates and his philosophies was preserved; one upon which subsequent cultures drew and modeled themselves. Thanks to fluke and neo-Classicism, two millenia later this iconic image of Socrates and truth still provides fodder for discussion — an eventuality Socrates likely never entertained. To him that span of time in human terms must have seemed inconceivable, since he would have had no way of crossing it in the sense that we do. It is written words, trapped in

translation over many centuries, that allow us to make partial connections to a world that is now ashes and archaelogy.

The second irony is the greater for me, and the more closely related to my focus on techknowledge. Socrates berated writing presumably for its divergence from the dialectic method, for its threat to the "truth" and dominance of that method, and for its surface connections to rhetoric. And yet, while the dialectic method — though influential in many branches of philosophy and science — is not known to have become a dominant communications technology in successive cultures, carrying the banner of objective truth, writing in many ways and in many places carried out the same end. Writing has been taken up, frequently throughout its history, as a technology capable of telling truth; of representing the world as it *is*, free from value judgements.

It is writing as techknowledge, predominantly, not writing in and of itself, outside of cultural contexts, to which this reinforcement of Socratic external truth can be attributed. Western culture's earliest philosophical texts and heroes are those of Greece, and Greece in an era shortly after Socrates, when truth had been accepted, rationalized, and reified into a place of dominance in the epistemology of that society. When later societies looked to this perceived Golden Age for wisdom, the wisdom they were able to access was bound up in the techknowledge intersection of authorial writing and absolute truth: in the conventional wisdom, literally, of a community

whose ideology was based in the "common knowledge" of truth as external and discoverable. Thus the literate practices that developed around writing led to it being taken up, powerfully, as a tool of truth, to texts being read as paths to truth, with meaning contained inherently in them, rather than in transaction between reader, author, and culture. This was reinforced in the Roman and early Christian cultures by the relative scarcity of texts, and by the religious nature or the high cultural status of many that did exist. As Purves points out, "[T]he position relating the text to the world was most vociferously held in those periods when there were relatively few texts as compared to the present time when the number of texts in the world probably matches the number of molecules of water in a good-sized lake" (Purves, 1990, p. 46). The sanctioned writings of the "peoples of the book" — Jews, and then Christians and Muslims — were taken up within those communities as the Word of God, and the surviving writings of the Greek ancients were seized upon by the Grecophilic Romans as equally singular truths, if not of Gods, then of honoured chosen ancestors, knowers of truth.

The concept of truth as something beyond humanity and human interpretation has been, Socrates would be pleased to learn, a continuing tenet of Western civilization, taking the guise of religious authority for many centuries, and underpinning the whole of science and reason, right from the moment of their Aristotlean origins. And the convention of writing that allows ideas to be fixed in print for future examination seems likely to have been a contributing factor in that origin: Pirsig illustrates how Aristotle took

Platonic and Socratic notions of truth, captured in writing, and subcategorized the world with the metaphoric knife of dialectic.

> Under Aristotle the 'Reader'...forms and substances dominate all. The Good is a relatively minor branch of knowledge called ethics; reason, logic, knowledge are his primary concerns. *Arete* is dead and science, logic and the University as we know it today have been given their founding charter: to find and invent an endless proliferation of forms about the substantive elements of the world and call these forms knowledge, and transmit these forms to future generations as 'the system.' (Pirsig, 1974, p. 344)

Arguably, the sorting and listing — and the reduction of much of philosophy to sorting and listing — for which Aristotle is known would have been considerably less feasible without some technology for holding ideas accurately and placidly in place. The intersection of writing and the knowledge and culture of his time allowed Aristotle to create processes and systems — specific techknowledges — that were not conceivable before. He then wrote down his catalogues of forms and substances with their overarching principle of external truth: centuries later they were revived by a world looking for an authority other than the church and tradition, and modern, empirical science, with its foundations in external objectivity, was born.

As mentioned, this concept of truth residing in the page is not inherent to the conventions of writing, though the distance between speaker and reader and the muteness Socrates criticized do contribute to the potential for

passive reading. I would argue, however, that such practices are learned, and that passive reading is more the product of practices based in the common knowledge of authorial truth than in any particular convention of writing itself. In other words, in the techknowledge intersections of writing and post-Socratian cultures, the belief in absolutes — be they godheads or the immortal principal of truth — tended to be so powerful that writing could not effectively undermine it. Writing is not innately a supporter of monologic truth, but it could, given its conventions, be used to that end. Most communications technologies have some flexibility of use built in: Plato's *Gorgias* dialogue makes it evident that dialectic, just as much as rhetoric or writing, can be used for the purposes of manipulation for which Socrates damns the other two (Pirsig, 1974, p. 333). It is the cultural context, and the mutual constitution of knowledge within that context, which shapes how technologies will be taken up and the literate practices that will develop around them. As the context changes, so do the practices. James O'Donnell points out that despite the tendency of cultures throughout history to respond to writing as something external, as contemporary culture moves further away from its longstanding veneration of universal truth concepts and objectivity, our literacy practices shift along with the shift in techknowledge:

> [T]he practice of the written word gradually shifts the locus of truth from the individual to the page. No longer is evaluation based on the reliability of the speaker, but on external manipulation of words on a page. Truth is independent of the speaker and in that way external to human beings. It becomes objective and powerful.

> We are more skeptical today than people were a hundred years ago about the ways human beings can manipulate textual truth to their advantage, and we must acknowledge that textual truth, on the other hand, has made possible much of what is distinctive about our society. The advance of science as a collaborative activity depends on that external truth being open to inspection and refinement. (O'Donnell, p. 140)

I am not advocating or celebrating the concepts of truth and objectivity, but grounding them, culturally, in the literate practices derived from specific techknowledge intersections. From my constructivist standpoint, Socrates' denunciation of writing in the name of truth — and the irony of the eventual outcome — would suggest that techknowledge is not a controllable entity, that it is powerful but complex, and that it does not always emerge as desired or expected.

How did the adoption of writing impact ancient Greece? In the artifactual sense, the alphabet presumably became a part of the landscape of life, or at least of privileged lives, within the city-states of ancient Greece and the succeeding empire of Alexander: inscriptions on edifices from those eras remain visible today. Literacy became a way of organizing knowledge and cataloguing new knowledge, until — over centuries — it became what it meant to *know*, and to educate. But in all, it was the knowledge forms — the *practices* — that changed most significantly. People began to use writing not just for lists but for communication. The boundaries of time and even death became more permeable, and a new, more prosaic model of

immortality became conceivable: not the immortality of the gods, but of the author. Face-to-face conversation and dialectic did not disappear, but rather shifted into different contexts, as new practices robbed them of their social prominence.

With the new technology, memory became a different, more exacting, entity. The tradition of oral recitation which preserved narrative but was always fluid in content, deleting or embellishing according to audience and to individual speaker, gave way both to the textual, canonical versions of the *Iliad* and the *Odyssey* and to the documented detailing of Aristotle. This alteration of the acts of remembering would have been a particularly significant redesignation within techknowledge: it implies a dramatic shift in the whole concept of what memory is and what it can be asked to do. Memory carries a culture's concept of what *it* is, its sense of continuity (O'Donnell, 1998, p. 91), so the transition to reliance on text for remembering would have changed not only the literate practices of the ancients, but their understandings of such practices and of their culture itself. The iconic library at Alexandria represents, two-fold, this shift in memory and in cultural subjectivity: knowledge had come to be housed in text, and culture had come to be something broad, beyond individual communities.

Socrates still holds an almost totemic place in Western culture, thanks to the aforementioned mythologizing and the writing his students left behind,

but he lost his fight against the technology of the alphabet, probably even in his own lifetime. As O'Donnell points out, Socrates' idealization of dialogue — as we have access to it — uses metaphors which suggest that writing was already hegemonic in the discourse of his time:

> Twice in the *Phaedrus* (276a and 278a) the authentic language of dialogueis spoken of by metaphor as 'written on the soul of the hearer.' Thus for Plato's Socrates, the written word is already so much a constitutive part of language that he cannot speak of or imagine the unwritten word except as not written...The advantages Socrates imputes to dialogue emerge only when the comparison with writing is made. (O'Donnell, 1998, p. 23)

This inability to frame one's position against a particular technology — or the techknowledge one understands it to represent — outside of the construct of the technology itself points to how insidiously technologies enter the discourses of cultures, and their ways of knowing. The story of Socrates reminds me of many writers and culture-makers today, positing dystopian visions of an information society based in, frequently, an idealization of past or current societal conditions that become ideal only when confronted with the spectre of cyberculture. While I in no way discount the value and legitimacy of caution in embracing and utilizing information technologies, I think it is important to acknowledge the fact that cyberspace and biotechnology and their digital kin, with their multiplicity of potentials, are *already* a part of the cultural context, and will not disappear from the horizon. They are part of our discourses, part of how we understand ourselves, and the impact they will have on techknowledge has

long begun. And the world before their existence — with its familiar racism, sexism, elitism, etc. — was hardly a Golden Age for many citizens. I want to remember that Socrates had an agenda in his diatribe against writing: an ideology he wanted to see survive, at any cost. In any techknowledge shift, particularly one in which a hegemonic communications technology is challenged by another, agendas will always be present, attempting in some cases to preserve privilege and in others to embrace revolution, always defining and interpreting social effects in terms of specific values structures. As cultural beings, we invest in our particular literate practices and knowledges and conventions, and engage in pedagogical attempts to influence the experiences and ideologies of others.

But I want to be wary of accepting tirades against digital technologies at face value, particularly when said criticism is centred around the divergence of projected digital societies from the natural order and unquestioned values of the past and/or present. As Donna Haraway outlines in *A Cyborg Manifesto*, dichotomies of the "natural" and the "simulated" can be broken down and shown to be empty, by the very techknowledge digital technologies make available. She explains: "High tech culture challenges these dualisms in intriguing ways. It is not clear who makes and who is made in the relation between humans and machines. It is not clear what is mind and what is body in machines that resolve into coding practices" (Haraway, 1991, p. 313). While the familiar, dualistic world of one Socratian external truth may be considerably more comfortable to the majority of contemporary people

than the mosaical, oppositional, blasphemic world of Haraway's cyborg, it may be worthwhile to examine the agendas of those who rail against the latter beyond the boundaries that discomfort and anxiety would suggest. Digital technology, like writing in Socrates' time, has already become a part of discourse, a part of the possible, and as Haraway suggests, may offer contemporary society opportunities to reconfigure techknowledge according to alternate principles and practices, practices that have been demonized perhaps largely because of the threat they represent.

It is also important to keep in mind that what may seem threatening and "foreign" to one generation or one era is frequently a matter of perspective. Certainly, a world limited to face-to-face forms of communication would be rather inadequate in terms of supporting the literate practices and discourses which mark contemporary culture, and I expect that few of us would trade the mobility and relatively equality of our era for life in a Greek city-state, however idealized they have been by neo-classicism. James O'Donnell points out that many contemporary and valued practices would be inconceivable if Socrates' diatribes against writing had been more successful: "The Socratic idealization of one form of communication is unrealistic in many ways. If we depend on face-to-face communication, then we condemn the larger social organizations on which we rely for sustenance. Communication beyond limitations of space time — the great benefit of the written word — is denied us" (O'Donnell, 1998, p. 22).

Over the seventeen hundred years following Socrates' dialectic speechifying, writing did not take a direct path to dominance in the Western world: its popularity and importance within culture rose and fell, though the idea of truth external to perspective, whether bound up in concepts of gods or objectivity, retained its prominence. When writing *was* used, its purpose was frequently the glorification of that truth, so the techknowledge possibilities that writing contributed to society over the centuries remained largely grounded in acceptance of absolutism and the dialectic dualism of the world. By the eighth century C.E., the concept of external truth had become ensconced in the form of deity, and though I do not subscribe to the myth of the dark ages, much of what would later be rediscovered and celebrated as "the classics" fell into cultural disuse. As an increasingly powerful Catholic church gained control over large segments of the feudal economy and its governance structures, writing — which had likewise become a medium of the church — came to represent knowledge itself, in the form of Roman Catholic doctrine and ritual. A monoculture of power based on the Word of God held sway across Western Europe. And then came Gutenberg's printing press, and the initiation of dramatic changes in how society operated and how it thought about knowledge.

The printing press was arguably the first in the series of mechanical communications technologies which have effectively made the world "smaller" over the last five centuries, and its power inhered in its capacity to reconstitute channels of communication and knowledge-sharing. The press

also introduced speed into text creation, to which Levinson alludes: "The impact of the printing press — midwife to the modern age — can be attributed to its being the first medium in history to extend more or less equally and powerfully across both space and time" (Levinson, 1997, p. 49). In *Nattering on the Net: Women, Power, and Cyberspace*, Dale Spender details a Europe of 1450 wherein the church essentially controlled knowledge: theirs was the key to what was known, both literally, because most documents were housed in the scriptoria of monasteries, and figuratively, because the church represented God. This independent, absolute God actually fit easily with the classical conception of truth as Immortal Principle, though there would have been little consultation of the classics during that era. But what was written, and in a monastic world, sanctioned by church process and protocol, was taken up as truth, independent of human bias or interference. And in the long tradition of gatekeeping alluded to in section two, the church kept a tight rein on this truth and people's access to it:

> [P]rior to the advent of the printing press, the Church was able to keep control of information in the hands of a very few. It achieved this partly by conducting the business of the Church in Latin — a language which no one spoke as their native tongue, and which most people could not understand. Latin became a sort of code to which the Church held the key...In order to read the religious manuscripts, you had to know Latin: and in order to learn Latin, you had to enter the Church's education system...By such means you were initiated into the values and viability of the Church. (Spender, 1995, p. 2)

This was a system under which any challenge to the authority of the church would have been difficult to effect, since the techknowledge of the church was near monolithic, particularly in the realms of formal communications and learning. It had power over both the spiritual and secular affairs of life, in the majority of places: there were no alternative institutions except that of the monarchy — and that, by nature, was closed to the vast majority of citizens. The techknowledge intersection of this Europe of the middle ages would been constituted by the labourious technology of manuscript printing, by a knowledge structure wherein all that was knowable was believed to be known (Spender, 1995, p. 2), and by a culture wherein life was highly stratified. Within this intersection, God was granted absolute knowledge and near-absolute power, and any available subjectivity would have emphasized the individual's primary place as that of a subject of God.

In approximately 1453 C.E., a German named Johannes Gutenberg transformed a wine press into a functional printing press equipped with movable type, and the print era was effectively brought into being (www.inventorsmuseum.com/Printing.htm, July 8, 2000). The concept of print had not been inconceivable before Gutenberg, and in fact his use of movable type was an adaptation on a much older Chinese system (ibid), but his press is thought to have been the first in Europe to function effectively and make printing a reasonable enterprise. It was certainly a successful enterprise, and within a very short period of time, printers and presses were springing up all over Europe (Spender, 1995, p. 4). These printers were, for

the most part, entrepreneurial folk who would have had more in common with mechanics and businesspeople than with clerics, and though the content of almost all known early print texts was religious, it was not all as pious in its nature as the church might have hoped. While Gutenberg's press was used to publish his famous edition of the Bible, it was also used from its earliest days to print indulgences, or tickets intended to absolve the purchaser from punishment or penance for sins committed (www.inventorsmuseum.com/Printing.htm, July 8, 2000). The existence of printing presses and printing businesses whose goal was economic rather than spiritual soon had an impact on the types of texts in circulation: for the first time in centuries, secular tracts, pamphlets, and books came into being and into the hands of citizens. The church's monopoly on information dissemination — on knowledge — was broken: other ways of "[E]xplaining the world, apart from the religious version which represented the church as all-knowing and all-powerful" (Spender, 1995, p. 3) had begun to take hold.

The church's monopoly on education was undermined by the secular information and institutions made possible by the printing press, and as a result, its power over the literate practices used to create knowledge also began to slip. Texts began to be published in the "vulgar" spoken languages of Europe rather than in Latin, thereby undermining the doctrine-based education system of the church and enabling people who wanted to challenge the status quo to spread their ideas. A German monk named Martin Luther harnessed the capacity of the printing press to spread

information quickly and in common language so effectively that his "Ninety-five Theses" fractured the church itself, commencing the Reformation movement and even drawing the church into use of the printing press to defend itself. As Spender succinctly explains: "The Church was caught in a bind. It could ignore at its peril the leaflets and posters which were circulating so widely and which were so critical of its practices. Or it could descend to the same vulgar level...so began the first poster war in history. The Church's critics leafleted the masses; and the Church tried to defend itself in a medium that it despised and condemned. The winner was the printing press" (Spender, 1995, p. 4).

The printing press also changed what it meant to create text, taking it out of the monastic confines of individual scholarship and placing it within a new structure of power grounded in economic principles. This redesignation of text impacted the societal image of knowledge, since the two had been so thoroughly intertwined, and made it something it had never overtly been before: a commodity, a product with exchange value. Removed from the hallowed domain of God, words and ideas and various wisdoms became articles of trade. As Paul Levinson puts it: "Knowledge has always been power, as witness the role that monopolies of knowledge among priests and others have played throughout the millennia. But knowledge first became a commodity in mass culture, to be bought, sold, traded, and otherwise exchanged, in the aftermath of the printing press. Today, computers have quickened, expanded, and otherwise amplified this process into the

'information society' that we now inhabit" (Levinson, 1997, p. 34). Such commodification laid the foundation for many of the principles that inform societal operations today, with our memoirs and our educational packages and our digital information systems all for sale. The techknowledge re-constitution that the printing press initiated in the middle ages reconfigured not only the content of knowledge, making it more secular and polyphonous than it had been under the church, but also the *domain* of knowing, making knowledge property and the knower its possessor. This departure from the medieval conception of the knower as the instrument of God opened the door for the eventual development of familiar concepts such as intellectual property, patents, and copyright.

This alternate constitution of knowledge also impacted concepts of authorship, as the monastic tradition of copying the known was superceded by the more contemporary role of writer as creator of text. Spender notes in her discussion of this transition:

> It is interesting to note how what is real in society changes over time. One day everything is known: a writer is a copyist, and there's nothing wrong with copying the accumulated wisdom of the community. But not so long afterwards, this is not how the world works. The reality becomes one where everything is *not* known, where there are new things to be discovered, invented, and dreamt of. And a writer/copyist becomes an author, who creates these new possibilities. Once work is valued for its originality, copying must be discouraged. (Spender, 1995, p. 70)

This shift in the way intellectual work and knowledge were valued meant that the hegemonic reign of the church over the literate practices of the written word — and the regulation of subjectivities — had ended. Organized religion survived, and in the case of the burgeoning Protestant denominations, even flowered, gaining great influence over particular communities and regions of Europe. But the very splintering of the monolith of Christianity was representative of the diversity of discourse made possible by the printing press: with the secularization of mass communication, and the initiation of secular education programs to afford literacy in that medium, specific knowledge forms, or ideologies, could no longer demand the absolute fidelity of entire societies.

All these changes were not taken lightly by those who had something to lose. The church attempted to maintain its power by positioning print, and especially the secular book, as immoral and dangerous, outside the sanction of the church and, by proxy, God. The book symbolized an end to church hegemony over techknowledge, but it was not the political danger to the dominance of the church that was addressed in discourses of resistance to this change. Rather the church emphasized the purported dangers of embracing the new and unholy technology, positioning their opposition in moral terms:

> Like the modern critics, the Church did not state its grievances in terms of self-interest. Religious dignitaries did not go about complaining that the book was challenging their power, reducing their influence, and marginalising their professional skills. Rather

> the objections were all about the damage that was being done to the individual and the community...discipline would disappear, brains would go soft, honour and uprightness would be sapped by all this salacious, violent, permissive literature. (Spender, 1995, p. 48)

As Spender herself points out, these criticisms ring familiar to any contemporary ear acquainted with 21st century diatribes against digital media, which reify the practices being superceded by positioning new practices as morally inferior. New practices also tend to be positioned as suspiciously enjoyable and therefore presumably unhealthy and distracting, as Spender adds: "In another fascinating parallel with some of today's criticisms of the new media, the Church condemned the way information was being transformed into entertainment" (ibid). Even within the new secular forms of print media that developed in the sixteenth and seventeenth centuries, the idea of books having dangerous power was reinforced. In the early novel *Don Quixote*, written 150 years after the invention of print (Murray, 1997, p. 97), the protagonist casts aside the norms of behavior of his particular culture to go tilting at the windmills he finds in narratives, and his folly has remained as familiar a touchstone in contemporary discourse as the novel itself.

> In short, he so buried himself in his books that he spent nights reading from twilight till daybreak and the days from dawn till dark; and so from little sleep and much reading, his brain dried up and he lost his wits...so deeply did he steep his imagination in the belief that all the fanciful stuff he read was true, that...[h]e decided...to

> turn knight errant and travel through the world with horse and armour in search of adventures. (Cervantes in Murray, 1997, p. 97)

Thus, this new version of the real did not easily or automatically translate into societal acceptance of new ways of knowing, or into widespread embrasure of reading and of diversity in knowledge claims. Though the printing press did make the creation of text and the dissemination of information into more grassroots-type enterprises than they had been under the monastic system, printing nonetheless became entrenched as the province of elites: elites not of God, but of economics and the new class structures that came into being during the social upheaval instituted by print. The gatekeeping of knowledge practiced by the church became gatekeeping practiced by publishers, based in the class values and practices of — or desired by — those who owned the technology. Schooling in alphabetic literacy remained the province of relatively privileged social elites — or the males of those elites — in most European countries until the nineteenth century (Spender, 1995, p. 52), and thus the majority of people who lived in the Europe so dramatically affected by the printing press likely never had the opportunity to read a book, let alone write one. Thus writing, despite its brief democratic upsurge, retrenched in a new status quo, and change came slowly. The techknowledge shifts initiated by mechanical print were neither uniform or swift: they were actualized over centuries, as alphabetic literacy slowly spread, and reading and literate practice, by the nineteenth century, became considered societal goals (Spender, 1995, p. 46).

The authority that had been widely invested in God became invested, instead, in writing itself — and the writing of Western culture came to be understood as representative of that culture and its truths.

Dale Spender posits: "The world changed when the primary information medium changed from manuscript to print. The story of creation, the meaning of life, the notions of good and evil — in other words, *the nature of knowledge* — were transformed, as print swamped the population with new ideas, and challenged old forms and explanations" (Spender, 1995, p. 6). Certainly the rise in alphabetic literacy and the parallel shifts in discourse and subjectivities that occurred after the introduction of the printing press *did* represent a shift in knowledge and techknowledge, but I do make one important distinction about the transformation of knowledge that Spender attributes to print. I argue that this transformation of the nature of knowledge, while broad, failed to impact that one central element of traditional Western knowledge's cultural constitution: the reliance on universal, objective truth. The concept of absolute truth did shift in its embodiment from God to science, eventually, in relation to the techknowledge changes initiated by the printing press, but there was no transformation of the absolutism itself, only its qualities. Thus the technology which so impacted the conventions of writing, the conditions of its production, and the issue of access *to* it, still had little effect — in the techknowledge intersections it reconfigured — on the cultural attachment to an overriding concept of external, Socratian truth. Literate practices of the

manuscript era and the print era shared the common bond of faith in a universal principle, however differently they conceived of it, and the familiar concept of authorship is still grounded in, and etymologically linked to, a notion of truth beyond human interpretation.

There were moments — in hindsight these are always readily available — when things might have gone another way. As Janet Murray explains in *Hamlet on the Holodeck*, early novels, including the sequel to *Don Quixote*, played with the conventions of linear narrative and monologic voice, emphasizing borders and constructions rather than the seamless representations, apparently whole and received, which came to dominate the forms and conventions of print. Murray points out that "[I]n the eighteenth century, Laurence Sterne wrote a self-deconstructing memoir called *Tristram Shandy* in which the narrator inserts black pages, numbers chapters as if they had been rearranged, claims to have torn out certain pages, and sends us back to reread certain chapters. In short, he does everything he can to remind us of the physical form of the book we are reading" (Murray, 1997, p. 104). There were opportunities, then, for a techknowledge which allowed for borders and multiple perspectives to emerge, but the intersection did not take shape in that way. Print, in the maturity of its high modernist form, was predominantly a technology of linear narrative and hidden construction: a technology whose usage tended to reinforce the culture's dearly held beliefs in order, classification, and the immortal principle of truth. As with the emergence of writing in classical times and under the early Christian

church, the conventions of print developed in a cultural context in which knowledge *was* truth, in one form or another. Thus the technology was taken up in such a way as to reinforce the common knowledge which dominated the era, and which made monologic voice a more comfortable convention. But culture is a continually fluid entity, and the intersections of capacity and knowing shift, as do the conventions reflecting and reinforcing different eras. James O'Donnell suggests that the forms of authorship and narrative that constituted the hegemony of the printing press era are now being subsumed in the gestalt of a new techknowledge and a new age:

> The author is already an endangered species, and rightly so. The notion that authoritative discourse comes with a single monologic voice thrives on the written artifact. Both oral discourse (before and beyond the written word) and the networked conversations that already surround us suggest that in the dialogue of conflicting voices, a fuller representation of the world may be found. The notion that reality itself can be reduced to a single model universally shared is at best a useful fiction, at worst a hallucination that will turn out to have been dependent on the written word for its ubiquity and power. (O'Donnell, 1998, p. 41)

5. Techknowledge and Discourse: Embeddedness

Techknowledge, constituted in the cultural intersection of knowledge forms, technologies, and subjectivities, is mobilized through discourse and literate practice, and changed when the contributing factors shift enough to result in changes in discourse and practice. Techknowledge shifts have occurred throughout history when dominant communications technologies have been ousted or infringed upon by new operations, and the introduction of digital technologies certainly appears to represent such a dominance shift. But in what ways is the new techknowledge of the digital era really different, or new? If the literate practices that develop around ascendant technologies tend to find ways of incorporating older practices, how are the emerging practices defining digital technologies based in previous traditions?

This thesis, with its focus on the processes of meaning-making, is centred around terms like "knowledge," "literacy," and "technology." They are words that carry baggage in our culture; words with roots in the Enlightenment project, and with modernist implications, even in this age of "information technology" and "technology literacy." The very use of adjectives as qualifiers to distinguish emerging uses of technology and literacy actually points out the divergence of the newer terms from their powerful root referents, and the resistance of the root referents to semantic shifts. At the same time, the adjectives reinforce the dominance of the root terms' residual ontologies: technology retains its mechanical and scientific and empirical connotations, and literacy its popular emphasis on print media and the

history of technicism in education. This hegemonic visibility of modernist significations in contemporary discourse means that a host of long-standing assumptions about nature and society and education — whether accepted, rejected, or unnoticed — are brought into play when words like "technology," "literacy," and "knowledge" are used: the histories of the terms follow them, and thus inform the way digital technologies are incorporated in those discourses.

Concurrently, these interconnected histories sometimes obscure one another: "Understanding about the essence of literacy, that is, its social and cultural uses in specific contexts, is easily sidetracked in discussions about technologies. Literacy artifacts — the alphabet, the pen, the book, the computer — become metaphors for the diverse uses of literacy and its vague promise of 'enlightened progress'" (Tyner, 1998, p. 17). Ironic how alphabetic literacy is seldom popularly recognized as a technology, even though its technological artifacts are often taken up as simple symbols for the complex practices of literacy itself.

I am aware of the paradox of grounding my analysis in concepts so laden with the very "polluted inheritance" I am trying to disrupt, and yet I would venture that the use of terms that reference modernism to discuss digital and postmodern circumstances appropriately captures the multiple positioning of digital technologies in contemporary consciousness. As Arturo Escobar puts it, "[C]yberculture originates in a well-known social and

cultural matrix, that of modernity, even if it orients itself towards the constitution of a new order — which we cannot fully conceptualize but must try to understand — through the transformation of the space of possibilities for communicating, working and being" (Escobar, 2000, p. 57).

My argument is centred on the premise that technologies *can* — and do — transform possibilities for communicating, working, and being, by creating the opportunity and the need for new literate practices, new literacies, which are constituted within — and in turn help reconstitute — sociocultural settings. But awareness of how specific technologies are embedded into the sociocultural matrix is important: their locatedness in discourse shapes the transformational effects they are capable of having. I do not believe that the technologies that make possible the "cyberculture" that Escobar refers to are necessarily more transformational, or more powerful in their bringing forth of worlds, than technologies of previous eras, though I would venture that discourses and literate practices are changing more rapidly today. But I do believe that it is important to explore the connections between these cyber-technologies of the information revolution and the philosophies and discourses of previous eras. If I am to try to evaluate the potential of cyberspace technologies for transformation and for bringing forth worlds, I need to first distinguish what they bring to the techknowledge table: what makes them unique and specific, and what embeds them in discourses already familiar.

Donna Haraway draws attention to the significance of this exploring of locatedness: "Technologies and scientific discourses can be partially understood as formalizations, ie. as frozen moments, of the fluid social interactions constituting them, but they should also be viewed as instruments for enforcing meanings" (Haraway, 1991, p. 164). Roger Simon expands on this point by emphasizing the particularity of locatedness and what he calls "discursive regimes":

> As a generic concept, 'technology' implies the specification of a mode of production; a way of organizing and regulating the bringing forth into presence of something previously without presence. This means that 'technology' must always be understood in its plurality, as variegated fields of different forms of power/knowledge. In reference to any specific technology we must ask: how is this technology consituted within particular discursive regimes? How do these regimes order the world into its components and relationships and establish particular knowledges and truths so as to make specifiable particular operations for constituting that which is to be revealed? (Simon, 1992, p. 42)

In some ways, digital technologies are genuinely a "brave new world," in the Shakespearean rather than Huxleyan sense of the term: a world for which existing discursive regimes may be inadequate. For instance, in the digital environment, texts and capacities and representations are all recreated each time the specific technology — what we still tend to refer to as "the machine," however post-mechanical its operations may be — housing these possibilities is turned on. This perpetual recreation, as Sadie Plant points out, "[E]rodes orthodox conceptions of originals and originality" (Plant, 2000,

p. 332), re-ordering the discursive regimes and knowledges on which familiar cultural truths are founded, and even challenging societal concepts, like that of the origin story, which have been traditionally taken up as foundational to the culture's sense of itself. Donna Haraway takes the concept one step further, pointing out that without originals, copies can no longer be denigrated for their lack of authenticity: she posits, "Microelectronics is the technical basis of simulacra; that is, of copies without originals" (Haraway, 1991, p.165). This erosion of traditional ways of understanding origins locates digital technologies — at least partially — in uncharted territory, constitutes them as distinctly "new" and different from familiar mechanical technologies whose form remains reassuringly constant and identifiable, no matter what their engagement. It also increases, dramatically, human capabilities for recording and representing information, and for manipulating such representations.

This increase, however, can be considered on a continuum, perceived as an extension of the human capacity for recording and representing that began, ostensibly, with cave paintings and other early communications technologies and literate practices. What cybertechnologies do, like the alphabet and the telegraph and the photograph before them, is make possible and increasingly efficient the transport of information over space and time. In a digital world, this transport is almost instantaneous, and can convey images, print, and sound simultaneously. This allows for the potential, and much-touted, conflating of a whole host of household entertainment and

information technologies into one artifactual, consumable "machine," which promises to arrive on the market within a relatively short number of years, and to eventually make obsolete the division of labour which has existed among 20th century household technologies. This promise of tangible shift — even convergence — in the artifactual use of technologies, combined with the distinction between the ways that digital and mechanical technologies operate, lends credence to assertions that an information revolution is underway: that society is on the cusp of a massive and significant shift. Paul Levinson takes up this banner, all the while tracing an awfully firm line between pre-digital and digital technologies, when he writes:

> [S]wings in media systems — midpoints in the pendulum when balances between older and newer forms obtain, before the new comes to unduly dominate the older — make for propitious intellectual times. With vantage points between two media, we have unique opportunities to chart the effect of one upon the other, to better trace their underlying structure, to more fully understand their effect upon us. We stand at such a crossroads of digital and analog/print information now, much as Socrates and Plato conversed and wrote at a crucial intersection of oral and written modes. (Levinson, 1997, p. 18)

My own focus on literate practices suggests to me that digital technologies *do* make possible new ways of knowing and being in a culture, in terms of their artifactual operations and their technology effects, and that Western — and perhaps global — culture is likely to undergo dramatic shifts in discourses and practices as a result of the ways we take up these new

technologies. But I do not subscribe to Levinson's clear divide or crossroads metaphor, however intellectually propitious it may be. Beyond O'Donnell's warning, quoted in the first chapter, against creating too clear a line delineating before and after, I also want to keep in mind that digital technology is a product of capitalism and of the problematic construct of Western society, both in terms of its origins and its economic role. The location of its particular techknowledge intersection may be, in many ways, entirely different from those which have come before, but it is also just as equally grounded in familiar territory, and it is misleading to cast it as a brand-new player on the scene. I do believe that technologically-embedded literacies and literate practices change as technologies and the cultural and ideological matrices of a context change, but I want to explore what sort of ideological and literacy shifts digital technology actually represents. If this project is to examine ways in which digital technologies enforce meanings and discourses, I need to take up the contexts and discourses from which they have developed: the ways in which they bridge the familiar and the potentially new.

I want to remember that digital technologies, and the computer and the Internet specifically, were in their first incarnations military inventions, creations of the Cold War and its politics of dualism, nationalism, and consumption. As Herbert Schiller outlines in his *Media, Technology, and the Market: the Interacting Dynamic*, American postwar budgets allocated astronomical amounts of money to the science and technology sectors both

of the corporate world and academia, creating a sense of national power and advantage, and such innovations as lasers, satellites, precision missiles, and computer chips (Schiller, 1994, p. 34). Schiller posits: "Out of this proliferation of scientific and technological projects of military and corporate parentage has also come what is reassuringly called the 'information society' in which we are now living. Yet the main beneficiaries of the new capabilities in information production, transmission, and dissemination are, not unexpectedly, those who were the main initiating agents of the Cold war era — the transnational corporations, the intelligence, military, and policing agencies" (Schiller, 1994, p. 34-35). I do not want to suggest that digital technology is merely an arm of manipulation and control for cultural institutions of power, but I do think it is important to keep in mind the fact that the origins of the technology are deeply entwined in the cultural paranoia and suspicion of the Cold War context, and in military and scientific circles with specific ideological positions. The vast amounts of information that digital technologies can store and process, the ubiquity of digitally-encoded identification, and the surveillance capabilities of satellites and micro-machinery all make dystopian fantasies like Orwell's Big Brother technologically possible, if still unlikely. Thus, when tempted to wax eloquent about the democratizing possibilities of digital technologies like the Internet — possibilities that depend upon how the techknowledge re-intersection of this information revolution plays out — I temper my enthusiasm with the recognition that these technologies are thus far still

particularly advantageous to those for whom they were created, and that their grassroots potential is only ever likely to be part of a broader picture.

Digital technology's embeddedness in corporate culture and the realm of economics also points clearly to its ties to its technological precursors of the industrial and Enlightenment eras. Whether capitalism is viewed still in terms of the primacy of industrial production and Marxist class struggle, or from a more post-modern perspective of Baudrillardian consumption (Horrocks and Jevtic, 1996, p. 9), multi-national capital exchange still figures powerfully in the contemporary cultural sphere and informs technological innovation, usage, and discourse.

As Langdon Winner discusses in *Three Paradoxes of the Information Age*, our cultural ideologies of technology are likewise still very much based in notions of progress: "[T]he belief that living conditions for the world's population improve through scientific and technological advance as applied in economic development" (Winner, 1994, p. 191). Winner points out the ubiquity of what he calls "the old creed" in the almost universal political commitment to economic growth, despite evidence of environmental devastation, the loss of jobs to automation, and the frenetic pace of technology-saturated, late-capitalist lives (Winner, 1994, p. 191-194). Technologies, in our contemporary context, are commodities even before they are invented, from the moment they enter the cultural imagination as possibilities. And we as consumers are encouraged to desire, to

accumulate: to keep the system functioning and growing. This pattern, and the emphasis on growth as progress, harks back to the industrial era and to the Enlightenment, which is inescapably part of the cultural matrix in which new technology exists and on which it is even premised. In this time of tangible cultural changes and literacy shifts centred around accommodating new technologies, particularly within the progress-saturated discourses of education, it can be challenging to keep the occurrence of change separate from the construct of progress. Allucquere Rosanne Stone, in *Memories of Oneness, or The Machine Age Arrived and All I Got was this Lousy Tshirt*, suggests that this may be one of the foremost challenges of re-envisioning society, in terms of techknowledge and literate practices: "[I]mmersed in our age, it is our task to clearly separate progress — that great foundational myth of the mechanical age which is still an excuse for fouling our own nest — from the dynamic, adaptive interplay of change which is at the heart of life" (Stone, 1995, p. 3). Digital technologies make speed of operations and communications relatively easy, in the context of a culture whose historical habit has been to code increasing speed as a sign of progress. The separation Stone speaks of is necessary if we are to avoid recreating the pattern of environmental and human damage that our enchantment with progress has thus far produced.

Digital technology's web of heritage and significance becomes increasingly complex when one looks beyond its systemic and ideological associations to its actual mode of operations. In its most pared-down representation,

"digital" refers to binary technology, based in a system of zeroes and ones, and thus to an extent in the enclosed "this or that" model so deeply inscribed on Western culture by Enlightenment philosophy. However, Enlightenment binaries, in the form of pairs of abstractable opposites like black or white, male or female, man or nature, always implied a cultural privileging of one of the partners over the other; a hierarchy within the binary pair. This hierarchy has bulwarked racist, patriarchal, imperialist practices in the past and into the present by providing them with ideological justification, and thus "binary" as a referent is a rather loaded term, particularly in academic and activist circles. This is one area, though, where I would posit that there is potential for new technologies to offer us new ways of thinking about familiar concepts. In digital binaries there is no hierarchy: the zeros and the ones are equivalent partners. In this sense, then, digital technology represents a significant departure from — even a rupturing of — the modernist ontology which is so deeply inscribed on culture and its products. Whether, and how, this ruptured conception of the binary is taken up within society will determine what potential digital technologies can be said to hold for hailing new, less hierarchical subjectivities and worlds. But as Sadie Plant outlines it, the possibility for a new conception of the binary, heterarchical and freed from dialectic dualism, is evident within the very structure of digital technologies: "Digitization sets zero free to stand for nothing and make everything work. The ones and zeros of machine code are not patriarchal binaries or

counterparts to each other: zero is not the other, but the very possibility of all the ones" (Plant, 2000, p. 333).

We do nonetheless still use the binary code of digital technologies to reinforce some of the ideological hierarchies of Enlightenment thought, at this point in time. Simon Penny, in *Virtual Reality as the Completion of the Enlightenment Project*, outlines the locatedness of virtual reality (VR) technology and rhetoric in Cartesian notions of space, rationality, and mechanism, and in the mind-body dualism that Descartes promoted and helped entrench in Western culture. Penny takes the position that while "VR is technically advanced, like most computer graphics practices it is philosophically retrogressive" (Penny, 1994, p. 231), since it emphasizes and "[B]lithely reifies a mind/body split that is essentially patriarchal and a paradigm of viewing that is phallic, colonializing, and panoptic" (Penny, 1994, p. 238). Within VR, the subject becomes, essentially, an eye, for the body is left behind, represented only visually. This foregrounding of the eye, of the visual, is common in Western patriarchal history, and has implications: it often operates using a binary split of light and dark, with light coded as masculine, white, and positive, and the "natural" opposites coded accordingly. This binary in turn is arguably the product of a cultural philosophy even older than the Enlightenment: Christianity. Penny points out: "The abhorrence of the body is inherent in Christian doctrine, and Christianity has served as the basis for Western philosophy until the last century. Philosophical ideas such as the duality of Rene Descartes are

based in Christian doctrine. William Gibson's cyberpunks proclaimed that 'the body is meat,' but neglected to notice just how similar their position was to that of Saint Augustine" (Penny, 1994, p. 235).

Julian Dibbell likewise suggests that the operations of digital technology — post-mechanical and invisible to the eye — resonate culturally with pre-mechanical associations of alchemy and the esoteric arts of Renaissance Europe:

> Anyone the least bit familiar with the workings of the new era's definitive technology, the computer, knows that it operates on a principle impracticably difficult to distinguish from the pre-Enlightenment principle of the magic word: the commands you type into a computer are a kind of speech that doesn't so much communicate as make things happen, the same way pulling a trigger does. They are incantations...and anyone at all attuned to the technosocial megatrends...knows that the logic of incantations is permeating lives. (Dibbell in Dery, 1994, p. 256)

The instant operations made possible by electronics (and near mandatory by consumerism) do frequently position technological artifacts as objects of incantation, ready to do duty at the click of a mouse, the typing of a code, or the sound of a beep, but the claim itself points to a broader observation. The discourses and literate practices of digital technologies often draw upon practices and concepts — such as that of the genie, whose mechanisms are invisible and cannot be empirically observed, available for service — which have not possessed cultural capital in the West for centuries, while at the

same time taking seemingly contradictory practices out of more recent eras and bringing them all together under the umbrella of a brand-new artifact.

Militarism, commodification, progress, alchemy, dualism, patriarchy: I take the position that recognizing the cultural inheritances evidenced in the usages of digital technologies is focal in attempting to apprehend the roles they are being granted by society, and thus what they bring to the contemporary techknowledge intersection. And, for me, each of the above examples highlights an aspect of the muddied, hybrid, and historically embedded cultural ontology attached to digital technology, and thus some of the implications it holds for those who look to it to bring forth worlds. What is digital is in many ways new, and may allow society to do things it has never done before, to develop literate practices and subjectivities it has never known before. But to embrace this mere potential for change as inevitable progress, or to ignore the transformational limitations of technology grounded in Enlightenment hierarchies is to approach technology from a naïve and deterministic position. If technology is culturally embedded, and within the techknowledge construct it cannot help but be, then that embeddedness cannot be discounted, or — to use a visual reference — overlooked. Whatever it is that contemporary society makes of digital technologies will be influenced by the residue of their embeddedness, and the practices and discourses that such a residue carries.

I do not draw attention to the "polluted inheritance" of digital technologies in order to discount them, however, or even to discount the inheritance itself. Despite my pedagogical investment in the postmodern deconstruction of origin stories, I would venture that in the cultural sphere, every phenomenon is made sense of discursively by way of inheritances, or cultural frames of experience and practice. And thus, every inheritance is in some way polluted, connected to human discourses of sense-making and practice and power. To attempt to negate the concept of inheritances entirely, or to dogmatically reject them as contaminated, would suggest the possibility of an objective ground zero: a re-origin, an unpolluted whole. I reject the ideal of that construction, following Judith Squires' admonition that it is "[B]etter to opt for the contradictions of everyday material life, than for the comforts of divine resolution" (Squires, 2000, p. 367). My practice instead is to trace inheritance in order to interpret locatedness: to examine the links between technologies and particular practices, and the meanings regulated and enforced by the existence of those links.

This approach is not about denying polluted inheritance, then, but about acknowledging and articulating it, bringing it into the forefront and making it a topic for discussion, a basis for re-visioning of practice and discourse. The ways of knowing that come down to us through our inheritances are problematic: laden with assumptions and erasures and violence, and framed by an ontology that reinforces "isms" of race and gender and a host of other categories and practices that work in opposition to the heterarchy of

plurality I advocate. Yet, as Donna Haraway points out, even the polluted inheritance of Western history is not a monolithic entity, entirely without legacies to draw from, and even we who look to reshape it are still — at least in part — subjects of its power to regulate identity:

> Shaped as an insider and an outsider to the hegemonic powers and discourses of my European and North American legacies, I remember that anti-Semitism and misogyny intensified in the Renaissance and Scientific Revolution of early modern Europe, that racism and colonialism flourished in the traveling habits of the cosmopolitan Enlightenment, and that the intensified misery of billions of men and women seems organically rooted in the freedoms of transnational capitalism and technoscience. But I also remember the dreams and achievements of contingent freedoms, situated knowledges, and relief of suffering that are inextricable from this contaminated triple historical heritage...My modest witness cannot ever be simply oppositional. (Haraway, 1997, p. 2-3)

Haraway draws attention to some of the aspects of the polluted inheritance that may bear retention in contemporary culture: the germination of a broad societal concept of equity, the growth of a secular world more polyphonous than that of the medieval church. These ideas did not result in practices in any way resembling heterarchy, but an inheritance need only be recognized, not necessarily taken up as a guide for practice: inheritances can serve as reminders, in fact, that practice is complex and partial.

6. Digital Technologies and Postmodernity

One of the reasons — aside from my own epistemological and pedagogical positionings — that I draw widely on postmodern theory in the construction of this thesis is the very time-locatedness of the postmodern era: the development of digital technologies and cyberculture has occurred very much in parallel with postmodernity's rise to influence within the academy and the broader culture. I don't believe that these common circumstances necessarily imply a common origin, or that digital technologies and postmodern thought grew from any single shared stem. I do, however, believe that each is a product of and a contributor to an emerging, and common, techknowledge: a shift in ways of knowing that marks the gestalt of the late 20th and early 21st centuries. In that techknowledge intersection of ideas and artifacts, the digital and the postmodern have impacted each other and shaped each other, and this convergence and cross-pollination will have allowed each to contribute to the meanings ascribed to the other. Thus it seems relevant to explore the two in relation to each other: to examine evidences of their intersection, and the implications of this intersection for the interpellation of new subjectivities and worlds. My interest is not in determining a causal relationship between the two, but in tracing the paths by which each may have affected, and effected, the other, and thus impacted contemporary culture.

Within the techknowledge construct I have articulated, the conventions of a dominant technology will shape the literate practices of the society in which

the technology is used. Digital literacies are indeed an integral part of culture in the postmodern era. How are these literate practices of digital technology and postmodern ideology related? Sherry Turkle, discussing reluctant postmodern theorist Fredric Jameson, makes the suggestion that digital technologies, and the hypertext capacities they have made available through the emerging Internet, are actually an embodiment of postmodernity; representatives for the postmodern worldview. In this view, the literate practices effective for dealing with one would also be applicable to the other, on a conceptual level. Turkle says, speaking of Jameson's work in the early 1980s:

> The turbine, smokestack, pipes, and conveyor belts of the late nineteenth and early twentieth centuries had been powerful objects-to-think-with for imagining the nature of industrial modernity. They provided images of mechanical relationships between body and mind, time and space. The postmodern era had no such objects. Jameson suggested that what was needed was a new 'aesthetic of cognitive mapping,' a new way of spatial thinking that would permit us at least to register the complexities of our world. A decade after Jameson wrote his essay, post-modernism has found its objects. (Turkle, 1995, p. 44-45)

If digital technologies, particularly in their communications capacities and in the ephemeral form of the Internet, are appropriate models for postmodernism, what connections —besides coterminal existence in time — link the two? What literate practices are shared between them?

According to Peter McLaren, postmodernism — like digital technology — is not something entirely new, but rather something which makes possible the new: "I do not conceive of postmodernity as a 'total historical rupture' that constitutes the ideological representation of late capitalism, the commodification of our decentered subjectivities, the implosion of the difference between the image and the real, or the collapse of all metanarratives, but rather as a sensibility or logic by which we appropriate, in the contemporary context, cultural practices into our own lives...our 'mattering maps no longer correspond to any available maps of meaning'" (McLaren, 1994, p. 18).

I accept McLaren's assertion that postmodernism can be approached primarily as a sensibility, an outlook, rather than as an amalgam of specific events or occurrences, but I would venture that the concept of a "sensibility" implies a particular construction of knowledge, and that it is that new version of knowledge that is referenced in terms like "late capitalism" and "the collapse of metanarratives." Postmodernity, for me, is most accessible when defined in terms of what it is *not*: it is not an age of simplistic, hierarchical dualisms, clean subject/object divides, resolution of contradictions into unified wholes, or tidy separations of nature and culture (Haraway, 1997, p. 42-43). It is — or is supposed to be, according to Foucault — a departure from the ways of living, labouring, and languaging that were hegemonic in the eras of the "polluted inheritances" discussed in the previous chapter. Whether or not these purported departures have been

realized is a hotly contested issue — metanarratives still hold a great deal of popular power and traditional hierarchies appear to have broken down only minimally (Haraway, 1997, p. 42) — but I would argue that the very existence of the *idea* of postmodernity has a diminishing effect on the power of those universalizing principles: the postmodern provides alternative knowledges to those which have previously been coded as natural and unassailable.

As Haraway suggests, it is the instability foregrounded by postmodernity that makes it evident as a state of being: "If belief in the stable separation of subjects and objects in the experimental way of life was one of the defining stigmata of modernity, the implosion of subjects and objects in the entities populating the world at the end of the second Millennium — and the broad recognition of this implosion in both technical and popular cultures — are stigmata of another historical configuration" (Haraway, 1997, p. 42). I think the instability of this configuration may be at least in part the root of cultural anxiety about postmodernism, evidenced in McLaren's statement about mattering maps no longer corresponding to maps of meaning. Certainly, new maps are being constructed, but if they are to be postmodern maps they will never be grounded in the solidity — or illusion of solidity — that metanarratives and established hierarchies provide. As yet, too, these new "maps of meaning" have not achieved great status or articulation in popular discourse: they have not been taken up as dominant, accepted techknowledge. Given postmodernism's emphasis on hybridity and lack of

emphasis on completion and unification, the familiar ideological construct of hegemony may not even be conceivable within a postmodern way of knowing.

The majority of Western citizens may not be able to articulate a great deal about postmodern theory, but I would venture that many of us are nonetheless impacted by it, or by practices that reflect its tenets, particularly as we make use of digital technologies. Using hypertext technologies and absorbing the capacities of instantaneous communication and non-linear narrative that they operate upon draws individuals into a realm of postmodern-like possibility, wherein norms of identity, hierarchy, and narrative are disrupted. Donna Haraway calls cyberspace "[T]he spatio-temporal figure of postmodernity and its regimes of flexible accumulation" (Haraway, 1997, p. 100). Within the fluid, astructural domain that is cyberspace, individuals are able to experiment with identities and subjectivities in ways that are unavailable to most of the embodied world, although — as many researchers have documented — such freedom to play does not mean that the hierarchies the embodied world has established around race, gender, sexual orientation, age, abledness and a host of other identity manifestations do not carry over into virtual communications (Nakamura, Stratton). Nonetheless, cyberspace does open doors to a realm of increasingly fluid and multiple identity, and as Luke asserts, these "[M]etaphors of fluidity and permeability conceptually match the multi-dimensionality of postmodern subjectivity" (Luke, 1996, p. 6).

The discourses currently used to conceptualize both cyberspace and postmodernism have commonalities that position them both as alternative in reference to the modernist ideal of the singular, sovereign, active, male subject. In Latin, the word for womb is "matrix" (Plant, 2000, p. 333), and the "non-space" of the matrix represents a departure from the rigidly defined Cartesian conceptions of space, presence, and absence. The poststructuralist stressing of intertextuality (Haraway, 1997, p. 128) and postmodernism's foregrounding of multiplicity of locatedness — as opposed to singularity of identity — can both be understood as extensions of this same reconfiguration of space and subjectivity, and also as emergent representatives of a new techknowledge emphasis on process and relatedness. This emphasis is paralleled by patterns of navigation and learning in cyberspace: "In the digital environment, an understanding of the *relations* among ideas is as if not more important than mastery of the ideas themselves" (Luke, 1996, p. 10). Within the contradictions of postmodernism or the uncharted connectivity of the cyberspace interface, the advantage goes to the individual who can make meaning out of multiple links and associations, and out of complex, fractured processes. The subjectivities that both digital technologies and postmodernity hail, or interpellate, then, are not subjectivities of unification, linear paths, or single, driving goals, but subjectivities of negotiation, of rhizomatic and intuitive divergences, and of flexibility: subjectivities of the matrix. Whether this new techknowledge privileging of what have traditionally been feminized — and within the dualistic hierachy of modernist thought, devalued —

characteristics will actually deflate the old male/female binary and translate into less patriarchal and phallocentric societal practices remains to be seen.

Some of the literate practices that have shaped the development of digital technologies could be argued to be responses to postmodernity itself: the postmodern's emphasis on fragmentation, and the real degeneration of traditional societal connecting factors, appear to have left many citizens of the digital age searching for a sense of community. In an era in which serial monogamy, geographic transience, STDs, job instability, and isolation from neighbours are part of the discourses of normal life, many individuals have turned to the virtual world in order to make meaningful connections with other people. This phenomenon, and the variant forms of communities that have developed on the Internet — discussion groups, gaming MUDs and MOOs, romance and sex sites, political action groups, and fan sites dedicated to pop culture icons and programs — have been definitive in shaping the discourse that has developed on and around the Internet over the past decade, and in shaping some of the capacities the Internet has developed or supported. Rosanne Allucquere Stone suggests that the virtual community is in a sense an adaptive response to the circumstances of postmodern life:

> Electronic virtual communities represent flexible, lively, and practical adaptations to the real circumstances that confront persons seeking community...they are part of a range of innovative solutions to the drive for sociality, a drive that can be frequently thwarted by the geographical and cultural realities of cities

> increasingly structured according to the needs of powerful economic interests rather than in ways that encourage and facilitate habitation and social interaction in the urban context. (Stone, 2000, p. 523)

Certainly the virtual community is, in its disembodied nature, with its fluctuating and hybrid possibilities for identity and its fragmenting of the space in which lives are lived and literacies practiced, a rather postmodern sort of construct.

Another area where the coterminal development of digital technologies and postmodern theory seems to have allowed for a shared societal influence is in the realms of time and speed: the temporal rate at which life is practiced. What is perhaps unique to our contemporary situation is the speed with which the current shift in literate practice is influencing our technosocial environment: we are not only intensely aware of the changes happening, but can observe significant degrees of change over short periods of time. The concept of cyberspace is predicated on the possibility of essentially instantaneous communication, to the extent that Jon Stratton argues that it is not the computer as we know it but the much older telegraph, the first Western technology to collapse distance with speed, that is the conceptual precursor to the matrix. "It is...not the introduction of computers that marks the beginning of the production of cyberspace, but the increase in the speed of communication over distance to a point where the time taken for a

message to traverse that distance reduces to a period experienced by the receiver, and sender, as negligible" (Stratton, 2000, p. 722).

Postmodernism, too, is concerned with the collapsing of linear and "natural" notions of time, and one of the hallmark experiences of living in postmodernity seems to be that of a shifting, condensing sense of time, where, as Donna Haraway points out, human futures are pre-written by debt schedules:

> Time is highly condensed and fused and implosion is all around us. It is the average person's experience in late capitalism... For instance the way debt-schedules write the future. If you are subjected a certain kind of debt-repayment schedule with a mortgage, or as a developing nation, the debt-schedule locks you into various kinds of food production systems, tourist industries, military repression, marriage practices, etc...It's an already-written future, with a bounded notion of temporality built into it. (Haraway, 2000, p. 99)

The digital capacity to allow instantaneous communications and operations appears to have translated into a discourse commodifying time, wherein the old capitalist doctrine of "time is money" has leaked from its original location in labour and profit schemata and taken on a consumerist character. In the globalizing economic arena of late capitalism and the "knowledge economy," the phrase "time is money" extends not just to those involved in production of commodities but to all members of the economic society. Additionally, as Donna Haraway explored in the paragraph quoted above, "time is money"

has been transposed, in the context of ever-increasing debt, to a logic of "money is time:" a logic wherein futures and possibilities are condensed into debt repayment schedules, and economic terms. Economic concerns saturate postmodern culture, with the hyper-commodification of digital technologies as a case in point, leading Fredric Jameson to posit that "[E]very position on postmodernism in culture — whether apologia or stigmatisation — is also and at the same time, and necessarily, an implicitly or explicitly political stance on the nature of multinational capitalism today" (Jameson, 1991, p. 2).

Dale Spender attributes the neophilia, or love of the new, that runs rampant through much contemporary Western discourse and succors the multinational capitalism that Jameson references to a shift in the societal valuing of time and objects' place in time: "[W]hereas during the Middle Ages the most revered and reliable information was the *oldest*, these days it is the *newest* information which is considered to be the most accurate and desirable. This of course means that the pressure to update, to give credibility to only the latest information, makes us a community built on continuous change, rather than conservation" (Spender, 1995, p. 127, emphasis original). Digital technologies support the postmodern ethics of "easy reproductability" (McLaren, 1991, p. 148) and disintegration: life in the information age is marked by frequent and almost ritual obsolescence, and the term "learning curve" has become a ubiquitous catchword signifying the

sorcerer's apprentice role that characterizes participation in the new "knowledge economy."

One of the more intriguing sites (in the cultural, rather than the digital, sense) in which to explore the mutual constitution of new techknowledge by digital technologies and postmodern theory is the concept of the information revolution itself: as a society, we are naming and marking — and thus constructing — this transition even as it happens, writing history in the present. The condensation of time through digital technologies allows us to live in awareness and expectation of revolution in our midst, and the postmodern emphasis on performance and spectacle encourages us to create and live narratives of an information age, which, as practices develop around them, result in self-fulfilling prophecy. Baudrillardian analysis would suggest that this entire practice is a simulation: that the "mass as object" is faithful to that which tries to represent it, yet ends up annulling it, destroying any meaning, and presumably any meaningful future, that could be made out of the information age construction (Horrocks and Jevtic, 1996, p. 139). My own techknowledge analysis does not go so far as to preclude meaning, in practices stemming from performance and even simulation: the techknowledge intersection is premised in the concept of mutual constitution of meaning, allotting power to all intersectors but also, therefore, obviating the possibility of predetermined outcomes. Within the techknowledge construction, as well, any shift in the significance or meaning attributed to the intersectors concurrently shifts the location, in

discourse, of the intersection itself, and new techknowledge constitutes a new — or at least significantly shifted — way of knowing; new meaning.

Within the contemporary junction of postmodernity and digital technologies, most societal markers appear to be undergoing shifts in discursive significations. Familiar discourses and categories are fragmented into often-wayward threads, and the literate practices required by an individual in society are increasingly multiple and increasingly fast-changing. Donna Haraway discusses the redesignation of societal discourses in terms of digital influence: "Microelectronics mediates the translations of labour into robotics and word processing, sex into genetic engineering and reproductive technologies, and mind into artificial intelligence and decision procedures" (Haraway, 1991, p. 313). In the context of the techknowledge construct, this redesignation means significant changes in literate practices, and dramatic shifts in the understanding of knowledge and meaning, in the 21st century. Whether the literate practices that get taken up in reproduction and accomodation of our increasingly digitized and postmodern culture are taken up as ironic performances, as simulations, or as survival strategies, they will in turn reflect back into the cultural context and keep the fluid construction of discourse and knowledge in motion.

Which brings me back to the concept of truth — the universalizing, externally-located concept of truth that developed from Socrates and has held sway, in various forms, over Western culture for more than two

millenia. Postmodernism is a highly contested, and broadly scattered, body of theory, with contradictory and often disturbing tenets attached and ascribed to it. And it is a body that can be taken up, or criticized, as a truth of its own, whether understood in terms of Aronowitz's homogenization of culture (McLaren, 1991, p. 145) or as a position of complete moral relativism. My approach to postmodernism does not position it as truth — or attempts not to — but is centred around the concept of truth and my own incredulity towards it, my inability to believe in the construct of a single "immortal principle" that supersedes human understanding and interpretation of it. Lyotard's "incredulity toward metanarratives" is perhaps the best summation of the spirit in which I apprehend and appropriate postmodernism, and the site of my (admittedly qualified) pedagogical hope in the emerging techknowledge of the digital age. I am unable to believe in a concept of truth without positioning, truth without agenda, truth that doesn't favour someone. And while I am also frankly incredulous about any possibility of utopian universal equity — itself a version of metanarrative — I am nonetheless hopeful about the changes that a societal revaluing of diversity and, especially, a diminishing of dualistic hierarchy might make available.

I am aware that postmodernism itself could and can be used to reinforce hierarchies: one of the criticisms commonly made against it is that it strips away socially emancipatory claims and supports hegemonic capitalism and white, male privilege by reducing everything to signs (McLaren, 1991, p.

148). These are not outcomes or practices I endorse. But neither does this characterization seem to me to represent the postmodernism of incredulity and multiplicity from which I have drawn my analysis: postmodern epistemology is hardly a cohesive body, and I hesitate to dismiss the potential of its fractured whole when it hasn't been determined what necessary connections might exist between one aspect of what is deemed "postmodern" and every other. Given the damage that cultural metanarratives have wrought over history, on women, on people of various non-dominant ethnicities and subjectivities, on the poor, and on anyone positioned as "other" by the truths in favour in a given period, I argue that the spectre McLaren denounces has actually been realized — in the capitalist, industrialist veneration of Socratian truth — for centuries. Postmodernism — especially in the techknowledge construction lent to it through its intersection with digital technologies — may or may not help bring discourses and literate practices into being that will challenge metanarratives of hierarchy and privilege. Within my techknowledge construct, whether that happens and how it happens will depend upon how meaning gets ascribed to the intersectors involved, and how they get taken up within culture.

I do not believe that either digital technologies or postmodernism are inherently emancipatory, and I am mindful of bell hooks' comment on the elitism of audience and language in the practice of postmodernism: "It is sadly ironic that the contemporary discourse which talks the most about

heterogeneity, the decentered subject, declaring breakthroughs that allow recognition of otherness, still directs its critical voice primarily to a specialized audience, one that shares a common language rooted in the vary master narratives it claims to challenge" (hooks, 1994, p. 2). Hooks' assertion does expose an attachment to the idea of a possible "language of clarity," which postmodern analysis would deny, due to the way the construct of clarity makes disparity invisible while ensuring its maintenance. And yet, while I do not subscribe to the theory of clarity, I do think there is validity to hooks' criticism of postmodern discourse: it *is*, in practice, a discourse of very select and privileged circles, and tends not to be available — in terms of vocabulary *or* opportunity to engage with it — to people outside the academic arena.

Both digital technologies and postmodern theory are still, in their respective ways, tied up in discourses and practices of domination and gatekeeping. Yet I believe that in their shared emphasis on diversity, fluidity, and more complex matrices of space and time, there are implications for techknowledge shift — and thus cultural change — that suggest a future in which Socratian dualism and the attachment to external and universal notions of truth *can* be put to rest, and more heterarchical literacies developed.

> The electronic processes that make almost endless human variety accessible in visual and textual forms instantaneously convey overtly the 'message' that social practices come and go: they emerge and evolve in particular contexts, under given

conditions, for certain purposes and in association with specific values, beliefs and theories; they give way to other practices under different constellations of purposes, beliefs, values, and conditions. While this awareness is in principle available in similar ways via engagement with more conventional text forms, it is nonetheless much more readily apparent and, indeed, is practically unavoidable, where electronic hardware and relevant software is employed. (Lankshear and Knobel, p. 159)

link — elegies

"[W]ith the new medium, the knowledge of the monks no longer counted. Memorizing was no longer an appropriate activity once the comparatively few manuscripts gave way to the thousands (millions) of secular books. Reciting out loud to fellow scholars was no longer a valid test of understanding and learning, once everyone could go off and do their own thing" (Spender, 1995, p. 105).

When the print revolution began in the fifteenth century, societal concepts of knowledge — what it was, where it could be held, how it could be practiced and demonstrated — began to change. And though I have spent a sizable proportion of this thesis pedagogically affirming these changes in knowledge production, and advocating continued change in the face of yet another information revolution, the process of techknowledge shift is neither an easy nor a painless one, as Spender's example of the monks points out. On both individual and cultural levels, shift implies irrevocable losses of particular ways of knowing, and devaluing of skills and practices that community members have premised subjectivity in. And in thinking about the myriad possibilities that the information revolution makes possible, I find myself wondering what will be lost, too, as we move from a print world into a digital one. How will new techknowledge, however it emerges, affect what we know ourselves to be?

Paul Levinson, in discussing public outcry against the incursion of digital technologies into schools, asserts: "There is probably a deeper fear afoot in most attacks on new media. It is a fear at once well-founded, unavoidable, and yet superfluous in the sense that by the time it is felt, not much can be done about it. It is a fear that the new mode of communication will undermine an older way of life — a way of life not necessarily better by any means, but certainly more comfortable than what is to come, because the older way is known" (Levinson, 1997, p. 56). For all my excitement and cautious hope in the possibilities represented by digital technologies and postmodernity, I need to acknowledge that I, too, have a little of that fear. In a world dominated by print techknowledge, I am a knower, and as techknowledge shifts, I risk becoming, metaphorically, a monk: a knower in a construct no longer invested with power.

Thus, while I support the breaking of print literacy's iron grip on legitimate knowledge, I do have anxieties about the contemporary techknowledge shift, and what it may mean for my place — and my *understanding* of my place — in society. Print is, in many ways, what I do best: I am a fast, avid reader, able writer, near-perfect speller, for whatever that's worth, and print is what I have studied and where I have worked. I am adept at the practices of alphabetic literacy and at making sense of its conventions: print is a first language for me, in a sense, almost invisible yet always at my fingertips. I am at home in print, and a part of me hates to see its familiar incarnation shift and change. I do not want to be left behind by the changing practices

of the world, deemed obsolete, and I do not want to see the ways of knowing on which I have come to premise much of my own subjectivity and worldview dismissed, either.

The first anxiety doesn't really keep me awake at night. As I mentioned in an earlier hyperlink, digital technologies no longer have the power to intimidate me in the way that they once did, and, in truth, the ones that I use most frequently, for word processing and research, give me pleasure: certainly I'm grateful to be writing this thesis on a computer rather than the typewriter I acquired fifteen years ago. So, to avoid obsolescence, I simply work towards increasing my facility with various programs and with the Internet, and I write my thesis on digital technologies in hopes that people will mistake me for an information age kind of woman. And as I become more fluent in the new technologies, I am able to build on my print skills and do whole new things with text. Occasionally I do stay up late wishing I'd been good at Nintendo instead of spelling, but, overall, I'm shifting with the times, and without great pain or trepidation.

While I can take action to minimize the chances of my own personal obsolesence occurring, however — and my print facility and concomitant education privileges me in this regard, making the opportunity to learn digital literacies relatively available — the issue of disappearing ways of knowing is rather more complex. In the last chapter I explored the ways in which the techknowledge intersection of digital technologies and

postmodernity is impacting concepts of time, community, identity, truth: foundational locations of modernist subjectivity, both on the individual and cultural level. None of these concepts, however, in its pre-digital form, is particularly sacred or inviolable for me personally, and I relish the irony that a postmodern stance encourages towards the sacrosanct. As a result, I am able to approach the present shifts in sensibility and practice with alert, muted cheer, since my cynicism about the practices of ages past leads to me conclude that perhaps a change is, as the saying goes, as good as a rest: surely society could use a rest from the hierarchies and hatred that dualizing truth concepts seem to enforce in practice. I'm pessimistic about the likelihood of any future techknowledge being taken up in such a way as to make the world a happy heterarchy, but the conventions shaping the intersection of digital techknowledge at least leave a little room for hope.

But I do have my sacred cows, particularly in the area of literature, and during the course of this thesis I've had to look many of those hallowed bovines in the eyes and then deconstruct them. One of these is a valuing of text, or particular texts, for the sake of text: a valuing that results from intersections of status and familiarity and delight in language that I am not entirely able to discard, but which makes me a definite "Coles Notes" snob, no matter how engaging the Coles Notes — or the comic book, or the film version — of a beloved text might be for others. And yet I *don't* believe that all texts are appropriate for all contexts, that all texts should be interesting to all readers, or that *any* texts have an inherent truth or meaning — except

of course if I'm the one doing the interpretation. But these familiar discourses of truth and canon and quality, and my own stubborn, if ideologically deflated, adherence to the mythology of the original, are going to be difficult for many lovers of print literature to let go of. In his book *The Gutenberg Elegies*, Sven Birkerts suggests that while many cultural and literary touchstones may retain a place of privilege in the digital age, the meanings that cybersociety takes out of them may be quite different than those contemporary culture has invested *in* them:

> The student may, through a program on Shakespeare, learn an immense amount about Elizabethan politics, the construction of the Globe theater, the origins of certain plays in the writing of Plutarch, the etymology of key terms, and so on, but will this dazzled student find the concentration, the will, to live with the often blurred and prickly language of the plays themselves? The play's the thing — but will it be? Wouldn't the sustained exposure to a souped-up cognitive collage not begin to affect the attention span, the ability if not willingness to sit with one text for extended periods, butting up against its cruxes, trying to excavate meaning from the original rhythms and syntax? (Birkerts, 1994, p. 138)

And it is the loss of those cherished notions — not so much the much hyped disappearance of the physical form of the book or the laments about the death of "standards," but the loss of familiar ways of understanding text and narrative and meaning — that seems likely to be the biggest cultural hurdle in embracing the possibilities of the information age. This is particularly so for people like myself who have so much of their knowledge invested in those familiar understandings — and I would venture that the majority of adults

in the West have specific and particular investments in modernist techknowledge, though not necessarily in the aspects of it to which I find myself beholden. Any discussion of loss in the techknowledge arena is at least partly a discussion about loss of privilege, since the cultural intersections that constitute knowledge always favour particular literacies and practices, which are then frequently enhanced in status and protected by those who have been sanctioned as knowers.

Practices and knowledges among the children of the digital age, though, are based in different understandings and literacies: literacies of hypertext and relational connections and character embodiment, literacies of video games and the Internet. Thus the interests and the discourses and the learning preferences and conclusions regarding meaning and value that are reached by this new digital generation are bound to be different from those that I imbibed even fifteen years ago, and, as they grow and become the knowers of the digital era, their practices and knowledges are likely to carry privilege that my own concepts do not, any longer. One of the almost certain losses of the information age, for those of us who grew up with print rather than electronics, will be the loss of the construct of aged wisdom; the right to position ourselves as authorities simply on the basis of our longer association with the technologies of knowledge. This loss will impact both individual subjectivities and society's understanding of itself, since — like the digital world's emphasis on relations b*etween* ideas, rather than mastery

of them — it reconfigures the very basis of what it means to know, and thus the practices and privileges that accompany knowing.

I would argue, however, that Birkert's question on the previous page of "the play's the thing — but will it be?" ought to have its tag line rephrased as "or is it?" The cultural and educational discourses of the canon and universals of quality have led to widespread investments in subjectivities — of reader, appreciator, knower — that fit those discourses but not the actual practices of reading and understanding that suit this heterogenous world, with its plethora of available texts in diverse media forms. I do not dismiss the loss of these discourses, for loss felt as loss is nonetheless painful, but we might, in true postmodern fashion, ask ourselves if we're really mourning a simulacra. Perhaps the play is not the thing, in the way we have taken it up. Perhaps it hasn't been for a generation or far longer: certainly many students encountering Shakespeare in the discourse of the canon have never wholeheartedly embraced the truth being fed to them. Or perhaps the play has *never* been the thing: certainly particular readings of the play, or of text in general, have been taken up as "the thing" in the pedagogies and discourses of modernism, but that reification of singular meaning does not make Birkert's elegy for Shakespearean integrity any less fatuous. The techknowledge changes he forecasts are not spectres of the future, but actualities of the present and, I would venture, even the past, but they have been smokescreened by cultural and educational practices of devotion to the discourse of the canon. Perhaps the most welcome loss that digital

techknowledge change could bring would be the de(con)struction of Birkertian attachments to a past that never existed, and the adoption, instead, of literate practices and discourses equipped to accept a fluid, rapidly-changing present. It is possible that digital techknowledge — with its technologically-necessitated emphasis on continual adaptation and keeping up with the "new" — is actually long overdue.

Concluding Notes

Knowledges, technologies, subjectivities, discourses: all are aspects of cultural practice, contingent upon each other for the meaning attributed to them in the social arena. Reconstruction of one implies reconstruction of all, within the techknowledge model of intersection of (multiple) mutual constitution. This construct of techknowledge, located as it is in postmodern and constructivist traditions of contingent meaning, allows for conceptualization and analysis of the processes of social change without asserting universal claims or fixed patterns. It is a contextual construct, a tool for exploring meaning.

The implications that digital technologies hold for the techknowledge of the 21st century are centred in meaning change. Base conventions of digital technologies are being taken up in practice and discourse in ways that suggest dramatic changes in the meanings of time and space, in terms both of communications and of lives lived in this increasingly instant, global, compressed world. Multiplicity and polyvocality are emerging powerfully from the techknowledge intersection of digital technologies and postmodernity, suggesting changes in the meanings taken up around identity, narrative, and possibly, truth(s). And the late-capitalist ethic of the global bottom line permeates all meanings attributed to digital technologies and to postmodernity.

How these changes will actually translate into practices remains uncertain. The techknowledge construct is a broad-based construct which enables exploration of concepts and relationships, but it is not grounded in the positivist tradition: it cannot be used generalize, or to tell the future. From my own locatedness in constructivism and postmodernism, in any case, I do not *believe* in a pre-written future. What techknowledge analysis allows for is the identification of trends and movements, shifts in the intersection of meaning: how those shifts then influence specific sociotechnical practices is, from my perspective, a fluid and indeterminate process. It is impossible, in the year 2000, to predict how people will live, or what culture will look like, one hundred years from now.

What *is* possible to assert, with the boundaries of my analysis, is that what Western culture has known as late 20th century techknowledge will necessarily change as digital technologies gain purchase and dominance in the practices and discourses of the digital age. What it means to know, in an era hallmarked by the vast availability of information, will certainly centre less in memory, as it did for the ancient Greeks and medieval monks, or in standardized truths, as it did in the printing era. The techknowledge shifts to multiplicity and locatedness mean that knowing seems likely to become a practice of discernment, of critical thinking and exploring assumptions. Issues of epistemology and ontology, of locating oneself within theory, may become foregrounded as the concept of one "natural" way of knowing or thinking is eroded. And knowers may become valued, not for

their cumulative knowledge *of* things, but for their knowledge of how to go *about* knowing: their facility with relations between ideas and with locating and evaluating knowledge claims. This *may* happen: my analysis suggests it. But then, within a techknowledge of postmodernity and multiplicity, there really can be no final word.

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