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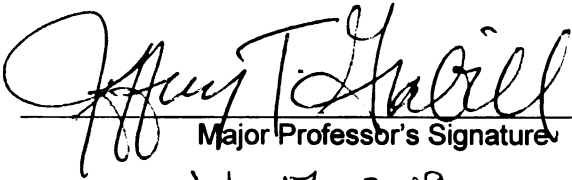
WRITING MEMORY: A STUDY OF MEMORY TOOLS
IN INVENTION

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WRITING MEMORY: A STUDY OF MEMORY TOOLS IN INVENTION

By

Stewart Neal Whittemore

A DISSERTATION

Submitted to
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ABSTRACT

WRITING MEMORY: A STUDY OF MEMORY TOOLS IN INVENTION

By

Stewart Neal Whittemore

There is a growing recognition that one of the key limitations for all writing-based knowledge work, whether in schools, workplaces, or communities, is how to productively handle information overload imposed by information technologies as research and writing tools. Rather than conceptualizing information load in terms of data storage – a move that severely curtails a focus on memory in contemporary study of rhetoric – this study builds on the idea that stored information or memories are only useful when they are employed in support of rhetorical practices—that is, when they can be retrieved and used in specific situations to solve problems and meet audience needs. Therefore, I reason that a productive way to research memory-in-use is by paying close attention to specific 'scenes' of memory work in which writers retrieve and use stored knowledges in rhetorical situations using all the affordances perceptible to them in their embodied contexts, much as ancient orators used spatial structure as a mnemonic to recall the points of a speech. To accomplish this, I studied the memory practices of a team of technical communicators in a medium-sized software firm over a six-month period. The data from this research, including recorded observations and interviews supplemented by collected artifacts and field journals, were analyzed to identify the role of embodied contexts in writers' memory work in five scenes of composing. The results of this analysis contribute a new theoretical and methodological foundation for studying memory work as rhetorical practice.

To

Patrick Joseph Canney

1940 - 2007

Bonae Memoriae

ACKNOWLEDGMENTS

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CHAPTER 1: INTRODUCTION AND REVIEW OF LITERATURE

Memory Work and Technical Communication

Arguably, the most important sector of labor in an information economy is work

that centers on the storage and maintenance of knowledge and its timely and effective

retrieval for new purposes. Inarguably, writing is the prototypical and most effective of

all technologies for preserving and retrieving information and knowledge: in other

words, for doing memory work. As Ong (1982) puts it: "by taking conservative

functions on itself, the text frees the mind of conservative tasks, that is, of its memory

work, and thus enables the mind to turn itself to new speculation" (p. 41).

Consequently, writers within contemporary organizations play a vital role in

maintaining and using the memories of those organizations. This is especially true of

technical communicators, who perform for their organizations the critical work of

finding, assessing, filtering, and translating information stored in texts in various modes

(e.g., technical specifications, user requirements, task analyses, workflows, fields in

databases, etc.) into useful, actionable knowledge for diverse audiences in contingent

and variable situations. In fact, earlier traditions of workplace writing saw this work of

retrieving and adapting existing knowledge to the exigencies of shifting rhetorical

situations as so important that it was given its own canon in rhetorical theory, the canon

of memory, and skill in memory work was considered absolutely essential to invention,

the creative process by which orators or writers determined what to say and how to say

it to meet the needs of their audiences.

Yet, despite the importance of such creative work to contemporary

organizations, the memory work that writers perform is often not recognized or

rewarded as critical to an organization's success. This is an unhealthy development for both writers and organizations. It is unhealthy for writers because the memory work that writers, particularly technical communicators, perform is at the core of what distinguishes writing as symbolic analytic work, the highest form of labor in the global information economy according to former Secretary of Labor Robert Reich. Reich (1991) draws a direct link between the activities of symbolic analysis and the memory work of writing by describing symbolic analysis as work that entails the timely, effective, and creative reuse of existing information for new purposes: "Discovering patterns and meanings [in stored information] is, of course, the very essence of symbolic analysis" (p. 229). Because symbolic analytic workers are the highest in status, pay, and prestige of the three broad strata of labor that Reich discerns in an information economy, performing (or being perceived as performing) this memory work is critical to the long-term status, pay, and prestige of technical communicators in their workplaces. Correspondingly, failure to recognize or understand the memory practices by which writers retrieve, assess, and repurpose information into timely and useful knowledge products is unproductive for organizations because it prevents those organizations from fully benefiting from the inventional expertise of one of the most important sectors of labor in an information economy. So, making the memory practices and tools of writers visible should be a critical task of any research focusing on technical communicators.

Such research can borrow from long and varied research traditions exploring writing, memory, and inventional practices in workplaces. First, there are workplace studies that combine ethnographic methods with various types of textual analysis to

study the ways in which people construct and preserve knowledge in organizations through writing and communication. Studies of this type include Zuboff's (1988) now classic study of the effects of automation and information technology on workplace knowledge practices and Sellen and Harper's (2002) exploration of the importance of the materiality of paper documentation to knowledge work. Similarly, Winsor (2000, 2003) and Spinuzzi (2003a, 2003b) explore the role of workplace genres in preserving organizational knowledge and power relations while Brown and Duguid (2002) examine the ways in which knowledge is created, preserved, and transmitted through networks of communities of practice.

Next, there are historical and archival studies that analyze texts from the distant and not-so-distant past in order to trace the development and evolution of memory practices in various types of workplaces from various epochs. Although I may be the first person to ever label her scholarship "workplace research," Mary Carruthers' (1990, 1998) exploration of the memory practices of Greek and Roman orators and medieval monks provides fascinating insight into the tools and practices of knowledge management in the ancient workplaces of forum, pulpit, and scriptorium. Carruthers' central finding is that the knowledge management issues of storage and retrieval, though often thought of primarily as a byproduct of the computer age, are in fact not new at all but have been concerns for effective workplace practice since the beginning. More conventional of archival-based workplace research is that of Joanne Yates' (1989) who studied the rise of managerial command and control during the late nineteenth and early twentieth centuries via such mundane yet crucial technologies as vertical filing cabinets and internal genres like the work order. More recently, Bowker (2005)

explores the memory practices of scientific researchers ranging from nineteenth century geologists to twenty-first century environmental scientists through analysis of the scientific report genre.

Finally, there is the strand of research that attempts, through close observation of writers at work, to model and describe the cognitive processes underlying the writing process, including the influence of a writer's pre-existing knowledge or memories on invention. Flower & Hayes (1981) inaugurated the golden age for this type of research by recording writers thinking aloud during composing sessions conducted in lab-like controlled situations. Hayes (1996) and Kellogg (1996) continue this tradition, attempting to further illuminate the role of constructs such as affect and short-term memory during composing. Other researchers have attempted similarly close observations of writers under more natural conditions: in situ in the writers' actual workplaces and by substituting methods other than unnatural think-aloud protocols. Of particular interest for a study of the role of memory in composing are the work of Haas (1996), who describes aspects of writers' embodied interactions with computer technologies of writing that are habitual, or involving bodily memory in some form, and the work of Prior and Shipka (2003) who study the ways in which composing and invention are distributed across space and time, an approach that has important implications for understanding the functioning of memory.

However, despite the richness of these research studies exploring the interrelationship of writing, invention, and memory there have been few attempts to bring the strands of research together in order to explore the tools and practices by which contemporary workplace writers, like technical communicators in knowledge-

intensive organizations, manage the complex "datacloud" of "shifting and only slightly contingently structured information space[s]" of the contemporary workplace in order to perform the creative work of symbolic analysis – to invent *new* things by writing with and about older things (Johnson-Eilola, 2005, p. 4). As a consequence of this, technical communicators' contributions to the memory work of organizations risks, at best, going unnoticed, or, at worst, being viewed as low-skill non-creative work rather than the dynamic and creative form of labor that Reich conceptualizes as symbolic analysis.

A Theory of Memory in Invention

Understanding workplace writing as memory work first entails articulating a theory of invention for composing in contemporary knowledge-intensive workplaces. Reich's (1991) delineation of the four characteristics of symbolic analytic work offers a good starting point for this endeavor. According to Reich, symbolic analytic work is first characterized by the twin moves of abstraction and system thinking, complementary processes by which raw information is first analyzed in order to find patterns and hidden meanings and then communicated and synthesized within larger, interconnected systems in order to discern potential areas for innovation. Symbolic analysis also entails experimentation, in which established bodies of knowledge are tested and played with "in order to better understand causes and consequences" (Reich, 1991, p. 232). Finally, symbolic analysis requires various forms of collaboration, in which information that would otherwise be overwhelming to a single person working unaided, is divided up and dispersed among other tools and actors before being reassembled into useful knowledge. Johndan Johnson-Eilola (1996) makes the connection between Reich's quadripartite formulation of symbolic analytic skills and

the invention processes of technical communicators explicit: "the ability to manipulate, abstract, revise, and rearrange information is itself one version of the classic task of the technical communicator: someone who takes pre-existing knowledge about technology and explains it to others" (p. 255).

Reich's emphasis in this theory of invention is *not* that stored information – here conceptualized as *memories* – has become less important to creativity in the information economy – indeed the ubiquity of access to stored information in contemporary workplaces actually makes it more important – but rather that stored information must be rendered usable and useful. And, according to Reich (1991), it is the job and the distinctive skill of the symbolic analyst to do this work of making memories usable: "The symbolic analyst wields equations, formulae, analogies, models, constructs, categories, and metaphors in order to create possibilities for reinterpreting and then rearranging, the chaos of data that are already swirling around us" (p. 229). What Reich's theory of invention does not give much sense of, however, are the specific practices by which symbolic analysts perform this work of rendering stored information usable in specific times, circumstances, and situations to meet the needs of audiences. In other words, what Reich's theory lacks is an understanding of such memory work as rhetorical practice. This is what turning to the rhetorical tradition can give us.

Rhetorical practices for making memory usable in invention are hardly new – each age develops its own set of practices to manage the information made available by new technologies of storage and retrieval in order to meet the needs of new audiences and new situations. Jocelyn Penny Small (1997) summarizes this phenomena succinctly: "each tool or technology makes it possible to deal more efficiently with the

current accumulation of words, but by virtue of its success propagates yet more words that need yet more techniques to control them" (p. 141). Reich's articulation of symbolic analytic work, therefore, is enriched and expanded when considered in relation to earlier rhetorical practices that make more explicit the connection between the retrieval and use of stored information for audiences as situated acts of invention. Of special relevance to this are the rhetorical theories and practices of the canon of memory, one of the five essential divisions of classical rhetoric, particularly as it was developed in Roman rhetorical theory in response to the specific exigencies of the occasions of Roman civic oratory. Catherine Steel (2006) describes the exigency of Roman oratorical situations in this way:

> A speech is prepared for a specific time and place, to be directed at a specific audience and [...] with the aim of securing a specific outcome. Moreover, this first performance is, logically, oral and does not imply the existence of a written text; indeed, there was a strong convention within ancient rhetoric that speeches were delivered from memory, and even though written texts might well feature in preparation, orators would often find themselves in situations where improvisation was necessary. (p. 25)

This ensured that Roman oratory developed around the idea that merely possessing a reserve of stored content, however vast, was not adequate in and of itself: that knowledge was only useful when it could be retrieved, adapted, and used at the precise moment in which it was needed in order to meet the needs of the particular scene of rhetorical activity. This moment was the moment of *kairos*, which, as Kinneavy (1986, 2002) points out, was a central concept in Roman rhetoric. Kinneavy (1986) interprets

kairos as a two-part concept in Roman thought emphasizing both time and appropriateness: "the right or opportune time to do something, or right measure in doing something" (p. 80). Time and appropriateness together, Kinneavy (1986) points out, delineate the boundaries of a rhetorical situation: "the appropriateness of the discourse to the particular circumstances of the time, place, speaker, and audience involved." (p. 84).

While at first glance, *kairos* as a concept would seem to be more significant to the canon of delivery than those of memory or invention, recent rhetorical scholarship has located Roman thinking about the creative processes of invention much closer to contemporary social constructivist theories than to post-Enlightenment notions of the isolated creative and unified individual mind. That is, similar to social constructivist thought, which holds that invention is a process "initiated by inventors and brought to completion by an audience," implicit in the Roman view of invention was the notion that speaker and audience together create new things (LeFevre, 1987, p. 63). First, classical theories of invention started with the notion that writers and orators "began their investigations with what other people thought, rather than with an introspective review of their own thought processes" (Crowley, 1990, p. 16). The purpose of the speech, therefore, would be to "jog the memories of both rhetor and audience, since it would mirror the way ideas had been stored there in the first place. Memory was especially well served when the rhetor employed the orders of place or time" (Crowley, 1990, p. 44). Similarly, Carruthers (1990) describes the process of invention during composing as a joint process rather than as a soliloquy occurring in the orator's head: "for composition is not an act of writing, it is rumination, cogitation, dictation, a

listening and a dialogue, a 'gathering' (*collectio*) of voices from their several places in memory" (p. 198).   In a sense, then, mnemonics of the *ars memoria,* such as the place/image or *walking* mnemonic, were tools for invention as much as they were tools for storage, as speakers and audiences together walked their memory places creating shared meanings and understandings.

So, despite recent misinterpretations of the rhetorical tradition, such as Yates (1974) or Corbett & Connors (1999), who characterize the techniques of the *ars memoria* as technologically outdated and overly complex methods of *storing* large quantities of information, in its classical origins the rhetorical canon of memory was in fact primarily concerned with *retrieving* stored information for *kairotic* purposes in order to facilitate invention during rhetorical situations. As Carruthers (1990) puts it, in classical and medieval rhetorical theory "the proof of good memory lies not in the simple retention even of large amounts of material; rather, it is the ability to move it about instantly, directly, and securely that is admired" (p. 19). Similarly, Crowley and Hawhee (2004) note that classical rhetoric emphasized a "memory-ready" condition, not unlike the ready stance [of] *kairos*" (p. 317). In this interpretation, therefore, it is *kairos* that is most important in the memory work of invention processes because, to be useful in invention, information must be retrieved and transformed in the situational and contextual moment.

Similar to contemporary activity theory, the classical rhetorical tradition also emphasized that memory work was shared and distributed: not just between speakers and audiences but also between writers and their work spaces and tools, and between writers and their bodies. Cicero, for instance, emphasizes the somatic and spatial nature

of human memory – the way in which information is best understood when it is connected to the world of the senses, of artifacts and spaces. Cicero (1942) states "the most complete pictures are formed in our minds of the things that have been conveyed to them [...] by the senses , [...] But these forms and bodies, like all the things that come under our view require an abode, inasmuch as a material object without a locality is inconceivable" (p. 469). The entire basis of the walking mnemonic was the ancients' theory that "the whole sensing process, from initial reception by a sense-organ to awareness of, response to, and memory of it, is somatic or bodily in nature" (Carruthers, 1990, p. 48). Small (1997) adds nuance to this: "Once the places take on a physical form, they become subject to the physical limits of human perception, for the [author of the *Rhetorica ad Herennium*] believes that the external and the internal eye match in their abilities" (p. 100).

Finally, classical rhetoric emphasized that information had to be personalized in some way in order for it to be useful to anyone, speaker or audience. Carruthers (1990) makes this point best when she illustrates that, for the ancients, "*memoria* refers not to how something is communicated, but to what happens once one has received it, to the interactive process of familiarizing – or textualizing – which occurs between oneself and others' words in memory" (p. 13). This textualizing process is similar to the process of abstraction in symbolic analytic work in that information "out there" must be internalized in order to become susceptible to manipulation, to use. Reich (1991) puts it this way: "The real world is nothing but a vast jumble of noises, shapes, colors, smells, and textures—essentially meaningless until the human mind imposes some order upon

them. […] Reality must be simplified so that it can be understood and manipulated in new ways" (p. 229).

Together, then, these theories of invention, ancient and contemporary, suggest a conceptual framework for evaluating memory work as a rhetorical practice of invention. This framework consists of three basic insights. First, it suggests that, in memory work, the responsiveness of stored information to retrieval and manipulation in actual situations of use is more important to invention than raw storage. Phrased more succinctly, the interface is more important than the database for performing memory tasks. Second, it suggests that memory is most useful when we can offload it in some way to our surrounding material and social environment. We offload memory to our material environment through our use of our tools and workspaces; we offload to our social environment by sharing and communicating memory with the audience of our peers in order to share the labor of walking our memory places. And finally, it suggests that memory is inherently psychosomatic, involving both the mind and the body, and, therefore, that information must be susceptible to personalization in some form, that there must be a way to "touch" and to "feel" data in the world of the senses. Any tool, workspace, infrastructure, or job description that does not conform to these three insights will not be entirely successful in supporting memory work.

Literature Review of the Problem of Information Overload and Invention

The principal challenge facing the symbolic analyst is a problem of memory: how to manage the information load of a global business environment characterized by the "explosion of networked information and affordable computational and storage resources" without becoming overloaded (Larsen & Wactlar, 2003, p. 8). In such an

environment, so-called "information overload" is an ever-present threat – as well as an opportunity for the symbolic analyst to display her most valuable skill. All three conditions for memorial invention are affected by information overload: if we are overloaded with information, we cannot respond to rhetorical situations in a timely fashion; if we are overloaded with information, offloading for purpose of "filtering and assessing" this information becomes difficult if not impossible; and finally if we are overloaded with information, we can no longer grasp data in the world of the senses in order to see the big picture (Gee, Hull, and Lankshear, 1996, p. 38).

Computer technology provides, of course, both the font of access to information as well as the geyser that leads to information overload in contemporary workplaces. The literature on contemporary digital interfaces for memory work sheds light on the phenomena of information overload and reveals several disciplines trying to formulate better digital workspaces for performing memory work. In particular, two fields have contributed substantial insights into the design of interfaces for managing memories digitally: library and archival science and the somewhat nebulously defined field of "office automation," centered on the various special interest groups (SIGs) of the Association for Computing Machinery (ACM), including especially Information Retrieval (SIGIR), Computer-Human Interaction (SIGCHI), and those contributing to the Conference on Computer-Supported Cooperative Work (CSCW).

The field of library and archival science has, it goes without saying, witnessed a sea change over the past fifteen years with the rise of the Internet as the overwhelmingly dominant method for gaining access to and utilizing the resources of archives. In the last few years, studies have begun to appear in the archival science

journals that examine archival interfaces from a variety of perspectives, including studies analyzing political aspects of interface design, as collections which were formerly heavily-curated and closely-managed are made available to anyone with an Internet connection (Delmas, 2001; Besser, 2002; Hedstrom, 2002; Bizjak, 2000), critiques or refinements of specific interface elements for finding information, such as augmentations or replacements for the ubiquitous search and browse paradigm (Coleman & Oxnam, 2002; De Chiara & Scarano, 2004; Fast & Sedig, 2005; Lansdale, 2005; Matusiak, 2006); and direct user-research studies such as focus groups and usability tests of archival interfaces (Kani-Zabihi, Ghinea, & Chen, 2006; Glosiene & Manzhukh, 2005; Beaudouin-Lafon, 2004; Hong, Thong, Wong, & Tam, 2002).

Each of these studies identifies significant problems with the design of current interfaces for finding and managing information, but perhaps the most complete summarization of the interface-related problems facing information and archival science appear in Larsen and Wactlar's (2003) report of the NSF Workshop on Research Directions for Digital Libraries, "Knowledge Lost in Information," which summarizes the difficulties facing users by the "explosion of networked information and affordable computational and storage resources" and articulates a research agenda to guide the development of the next generation of archival interfaces (p. 8). Larsen and Wactlar note that simply dumping data into Internet-accessible digital archives is not adequate; that users need to be provided with tools for finding the appropriate data at the appropriate time and for evaluating and using that data to support meaningful activities. They add, "data of many types will be increasingly abundant and 'technologically' available. But these data will continue to seem chaotic, lacking sufficient organization,

stability, and quality control. Moreover, individuals and communities may lose the ability to control access to and manage their own data" (p. 8). In response to these challenges, Larsen and Wactlar (2003) articulate a five point research agenda, including exploring methods of "employing 'context' in information retrieval at the technical, individual, and societal levels, [...] integrating information spaces into everyday life, [and] reducing data to 'actionable' information" (p. 9).

Larsen and Wactlar's (2003) recommendations reveal a new recognition among archivists that the most important issues facing contemporary archival science lie not with raw storage but at the interface where users interact with the "information ether" (p. 1). Significantly, Larsen and Wactlar (2003) conclude by arguing:

> The volume, complexity, and heterogeneity of new information outpaces even the most advanced of current approaches. Part of the solution may lie in better tools for envisioning information spaces. Research in this area posits that search can be improved by exploring new ways (or old ways in new data environments) to visualize media-rich information. [...] replacing information overload with an intuitively understandable visualization that captures the essence of a situation. (p. 9)

This need to capture the essence of a situation leads Larsen and Wactlar (2003) to make an interface suggestion of their own, one that, as will be shown, seems to have interesting parallels with the techniques of the *ars memoria*:

> We know that information visualization (in the full multimedia sense) can be effectively employed to summarize content and provide the means to display it

in new and novel ways. Imagine an information room in which users can specify an initial domain [...] and 'walk through' the information space. [...] and, perhaps, discover additional information that bears on their interests as seen through the prism of the visualized or sensed world. (p. 15)

The ACM's work on digital office automation also reveals parallels with the rhetorical tradition. In particular, one of the foundational dialogs in the ACM about the function of digital memory interfaces stems from Malone's (1983) study "How Do People Organize their Desks? Implications for the Design of Office Information Systems." Malone notes that one of the most insightful and surprising findings of his study was the degree to which the spatial arrangements of workspaces proved vital to participants' abilities to effectively manage the information load associated with their particular types of work. He found that this spatial structuring served a *reminding* function for his participants so that they did not have to retain conscious awareness of discrete pieces of information but instead would structure their environments so that they encountered the information naturally as needed during their work routines. This reminding function, he notes, contrasts with the *finding* function in which documents or other artifacts are carefully classified and organized into discrete information structures, such as in file cabinets, so that they can found during deliberate searches. Malone (1983) concludes by noting that "in general, the notion of accessing information on the basis of its spatial location, instead of its logical classification, is an important feature of the way people organize their desktops that might profitably be incorporated into computer-based information systems" (p. 108).

Malone's study initiated a conversation that has continued to inform the design of user interfaces and to inspire researchers seeking new graphical interfaces for doing memory work to this day. Barreau and Nardi (1995), for instance, refine Malone's conclusions by identifying three basic categories of information on users' computer desktops based on temporal and situational needs: ephemeral, working, or archived. They note that ephemeral and working information is used far more often than archived information. Consequently, they note that too much attention in interface development is paid to accessing infrequently-needed archived information at the expense of the ephemera and working files that users really need in their day-to-day activities. They conclude by noting that, for ephemera and working files at least, users prefer "a 'physical' system in which a specific location is associated with the file, making it more useful than a purely logical system" (Barreau & Nardi, 1995, p. 41). Thus, they hypothesize that "users prefer location-based filing because it more actively engages the mind and body and imparts a greater sense of control" (Barreau & Nardi, 1995, p. 40).

Fertig, Freeman, and Gelernter (1996) counter by arguing that Barreau and Nardi confuse cause and effect in their assertion that ephemera are more important to daily work than older information. Fertig, Freeman, and Gelernter (1996) point out that users would be more likely to regularly use older archived information if their interfaces gave them readier access to it. Further, they suggest that new, non-spatial metaphors are needed to help users find and manage larger and larger quantities of stored information. So, they propose a time-based interface based on the metaphor of a stream as a better method of managing information over the lifecycle of a project. However,

their solution reinforces rather than refutes Barreau and Nardi's findings regarding users' desire for physical rather than purely logical methods for managing memories.

More recently, interface researchers have continued to investigate possible improvements or alternatives to the search and browse paradigm for both individual and cooperative work. For example, pervasive computing research like Thayer and Steenkiste's (2003) proposes interfaces that integrate physical and digital spaces via speech and gesture recognition and eye tracking in order to "automate [...] much of the drudgery associated with computers" (p. 82). Zhang and Marchionini (2005) propose a visualization model that couples the browse and search functions, while Krishnan and Jones (2005) propose a model of "temporal visualizations" similar to that of Fertig et al. (1996) to help users manage their information space over time. Krishnan and Jones (2005) take particular care to emphasize that visualization models for memory work must be highly customizable by users. They argue that "personal information spaces are individual. Current systems [...] make limited use of features that would personalize the view so that users' information space representation is uniquely their own and lends itself to interpretation," a finding which again parallels insights from both the rhetorical tradition and Malone's research (Krishnan & Jones, 2005, p. 52).

For their part, researchers in computer supported cooperative work have attempted to demonstrate how creating shared visual and "'virtual' physical co-presence" via digital interfaces can facilitate the sharing of knowledge in teams (Fussell, Kraut, & Siegel, 2000) as well as to show the inherent difficulties in coordinating distributed work without the affordances offered by shared information spaces (Spinelli, Perry, & O'Hara, 2005). This research also demonstrated how "hazy

human memory" (Ackerman & Halverson, 1998, p. 46) or "powerful social mechanisms" (Perry, Fruchter, & Rosenberg, 1999, p. 131) often must suffice when archives or other memory interfaces break down (Czerwinksi & Horvitz, 2002). However, as with research on individual desktop interfaces, no consensus has yet been reached on how to move beyond the limitations imposed on memory work by contemporary computer interfaces.

Over the past quarter century, computer technology has become the primary repository of our individual and collective memories, and, as the ecology of computer-mediated memory technologies grows more sophisticated and powerful – more graphical, scalable, portable, and embeddable – it increasingly offers the potential to mediate human memory in ways that transcend the wildest dreams of the formulators of the techniques of the *ars memoria*. Yet, until our preoccupation with storage capacity becomes tempered by a similar level of attention to retrieval and use, the *ars memoria* will continue to have things to teach us about doing memory.

The Need for a Better Understanding of Memory Work as Rhetorical Practice

These commentaries on the current state of digital interfaces for memory work reveal the pervasive influence of a particular "memory regime" – a regime that privileges storage over retrieval (Bowker, 2005, p. 9). According to Bowker (2005), memory regimes "articulate technologies and practices into relatively historically constant sets of memory practices that permit both the creation of a continuous, useful past and the transmission *sub rosa* of information, stories, and practices from our wild, discontinuous, ever-changing past" (p. 9). Bowker (2005) further notes:

If we completely know a system in the present, and we know its rules of change (how a given input leads to a given output), then we don't need to bring to mind anything about the past [...] it remains true that there are modes of remembering that have very little to do with consciousness. These modes tend to abstract away individuality [...] by substituting rules and constraints on the behavior of types of people for active recall. (p. 8)

This aspect of a memory regime is mirrored closely in the functioning of a computer interface, which, when working normally, is intended by its designers to be invisible and to seem entirely natural to the user. For those interfaces designed for memory work, this means that the methods of "conventional information retrieval," like searching and browsing, become de facto the only methods for doing memory work with computers (Fast & Sedig, 2005).

While research from archival science and office automation have made important strides in suggesting new or augmented methods for doing memory work, the failure to arrive at a viable alternative suggests that new perspectives coming from different critical traditions is needed as a corrective to the memory regime prevailing in current symbolic analytic workplaces that relegates retrieval to secondary status in comparison with storage. For computer interfaces are also, as Selfe and Selfe (1994) put it, "cultural maps" conveying "the values of our culture—ideological, political, economic, and educational [...] such maps are never ideologically innocent or inert" (p. 485). In its function and effects, the concept of a memory regime as Bowker articulates it, therefore, equates in many ways to the function and effects of culture. Or, similar to what Slack and Wise (2005) note about culture, a memory regime performs "the work

of selection: the selecting, challenging, arranging, and living of [the] received artifacts of everyday life" (p. 4). That is, like culture, the memory regime determines what can and cannot be said, what counts as knowledge, and what evidence can be used as warrants in arguments. And, also like culture, a memory regime is most readily discernable at the level of practice, which "denotes a set of socially defined ways of doing things in a specific domain: a set of common approaches and shared standards that create a basis for action, communication, problem solving, performance, and accountability" (Wegner, McDermott, and Snyder, 2002, p. 39). To analyze and critique a memory regime, then, is in some sense to attempt to bring about cultural change, and to bring about cultural change, it is first necessary to understand the practices that arise from this culture with an eye towards changing those practices.

A necessary first step toward a memory regime change, then, entails that we identify the memory practices of actual writers as they work – the articulations by which these symbolic analysts overcome information overload via cunning (and fleeting) assemblages of both high- and low-technology tools offered by their work contexts. This dissertation is an attempt to closely observe and understand the complex scenes of memory work in which writers in contemporary workplaces attempt to retrieve and adapt stored information to meet the exigencies of rhetorical situations. In other words, it conceives of memory work as rhetorical practice and investigates the role in composing and writing of "high" technologies like computer interfaces and databases *in tandem* with "low" technological mediations offered by human embodied interactions in space and time for the purposes of changing memory regimes and informing the design of more effective technologies in the future.

CHAPTER 2: THEORETICAL FOUNDATIONS

Dimensions of a Rhetorical Practice of Memory

The goals of this chapter are to articulate a working description of a rhetorical memory practice and to ground this description in rhetorical theory and contemporary psychology in order to arrive at an approach to studying such practices as components of rhetorical invention. As I noted in the previous chapter, Bowker (2005) coins the term "memory regime" as a way of describing the *collective* (or the complete collection of) memory practices of a given culture. As cultures have subcultures, which both partake of the features of the larger culture and adapt those features for local circumstances, memory regimes also have specific instantiations, such as in organizations, that both adopt and adapt the memory tools and practices of the larger culture to meet specific organizational needs. Finally, *individual* memory practices are the activities and tools by which members of a given memory regime attempt to deal with information from the past, including a large variety of activities ranging from note-taking to data-basing. These activities and tools are substantially influenced by the memory regimes in which they reside but they are also often employed in idiosyncratic ways in actual work processes based on the experience and cunning intelligence of individuals as they respond to situations. For example, as the present research study reveals, some participants handwrite notes in notebooks during meetings so that they can later refer back to the notes while composing while others do so purely as a method of imprinting the material more firmly into their own long-term memories – findings similar to those of Ann Blair (2004) in her study of note-taking practices throughout history.

However, as Bowker (2005) makes clear, the most important thing about memory practices is that they exist primarily to enable action in the present rather than to preserve a perfect record of the past: "one of our chief ways of dealing with the world is to remember things [...] it is one of our chief ways of being in the world as effective creatures: it is a way of framing the present; a mode of acting" (p. 25). Consequently, Bowker notes, memory practices are about forgetting as much as they are about remembering. Building on Derrida's (1998) theoretical work on archives, Bowker adds that memory practices tend to be both *sequential* and *jussive*. That is, memory practices are sequential because they partake of standardizing and classifying information so that it can be found when needed, and they are jussive because they often participate in the process by which information judged to be of no use is purged from memory – all in order to enable practical action in the present and future.

Further, according to Bowker, memory practices become incorporated into the built environments that surround us – our buildings, our workspaces, and our digital spaces – in other words, in our infrastructures and tools. Alluding to his earlier work with Susan Leigh Star (Bowker & Star, 1999), Bowker (2005) notes that standards and classifications, embodied in infrastructures, contain affordances by which we can offload part of the burden of memory: "we classify in order to be able to forget" (p. 21). Collectively, these affordances, when they are working properly, enable something rather like a "standing wave" of memory whereby we are able to manage the information load necessary to accomplish our daily tasks without becoming overwhelmed by the work of recall – that is, without becoming overloaded with information. We are able to do this because infrastructures offer affordances that allow

us to offload memory so that precisely the right amount of information required to perform a given task presents itself at any one moment:

> We are not in general able to remember complete stories about the past [...]
> What we do well is to disaggregate a fact about the past into a number of
> standard elements, and then set in train a procedure for reassembling the specific
> out of the general. This sets in motion a system of memory recall that is able at
> any given moment to create a working version of the past. (Bowker, 2005, p. 18)

In other words, for Bowker, successful memory work depends a great deal on the ability to respond to *kairos*, and situational affordances play a large role in this ability: organizations, Bowker (2005) notes, "delegate memory tasks to the environment" (p. 15). Further, these infrastructures aid memory by organizing and in many cases limiting what we can and cannot perceive or interact with in a given situation, phenomena related to cognitive *cueing* and *constraining* as noted by psychologists studying user-centered design (Norman, 2002).

However, Bowker's (2005) methodology for studying memory is historical and textual rather than ethnographic or observational, so he focuses more on the larger systems of memory than on the actual practices by which individuals or groups "set in train" these procedures for recall during activities (p. 18). While it might, then, be said that Bowker's research gives a sense of the *where* of memory practices, Star's fieldwork methods enable her to get a detailed look at the *when* of memory practices in the real-time activities of her research participants. From her observations, Star (1999) formulates the concept of "articulation work" as a label for the "real-time adjustments"

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that people continually perform below the level of their visible work tasks in order to make those work tasks and processes flow smoothly (p. 385). Star (1999) elaborates by describing such articulation work as the invisible "process of assemblage, the delicate complex weaving together of desktop resources, organizational routines, running memory of complicated task queues" that goes on below the surface of visible production work, enabling and supporting it (p. 387). She further notes:

> This system is necessarily fragile (as it is in real time), depending on local and situated contingencies, and requires a great deal of street smarts to pull off. Small disruptions in the articulating processes may ramify throughout the workflow of the user, causing the seemingly small anomaly or extra gesture to have a far greater impact than a rational user-meets-terminal model would suggest. (Star, 1999, p. 387)

Star does not describe them as such, but many of these fragile and impromptu practices of articulation work are, in fact, memory practices, the fragile and fleeting assemblages by which we continuously attempt to preserve our standing wave of memory through space and time. Further, many of these memory practices do *rhetorical* work because they support and partake in the activities of invention in which we utilize contextual affordances to retrieve and manipulate stored information in timely and appropriate (i.e., *kairotic*) ways.

The Role of the Body in Writing and Memory

Bowker (2005) and Star (1999) provide a good framework for understanding memory practices as occurring at the confluence of spatial and temporal contexts – the

where and *when* of infrastructures, in other words). What they are less interested in doing is exploring the role of bodies in these articulating processes, which perhaps might be thought of as the *who*, *what*, and *how* of infrastructures. However, as I will show, the rhetorical tradition, at least as it was originally formulated under the Greeks and Romans, understood memory as fundamentally psycho-somatic, involving the actions of both the mind and the body. Therefore, if we want to better understand memory practices, particularly *rhetorical* memory practices, it is important that we pay attention to the embodied aspects of human interactions with infrastructures in space and time. That is, the rhetorical tradition points to the fact that only by accounting for the activities of memory performed by body and mind in tandem can we fully understand these activities as culturally determined practices, as manifestations of particular memory regimes. An obvious place to look for manifestations of these memory "street smarts" is with writers (Star, 1999, p. 387).

The purpose of this study, then, is to explore the ways in which writers rely on their embodied senses in order to perceive and use the infrastructural affordances of their workplaces to help them avoid information overload while inventing and composing. This is an innovative approach to understanding memory because studies of the role of the senses in mediating memory in complex "open-ended design process[es]" like writing have in the past tended to become preoccupied with only one of our embodied senses: our sense of sight (Sharples, 1996, p. 127).

This preoccupation with the role of sight in mediating composing tasks goes back at least to Cicero (1942), who calls sight "the keenest of all our senses," and so it is not really surprising that many writing process studies focus on visual aspects of

composing to the exclusion of other ways in which we perceive the world (p. 469). Sharples (1996), for instance, points out that "one way to overcome the difficulties of performing such complex knowledge manipulation in the head is to capture ideas on paper [...] in the form of external representations that stand for mental structures. So long as ideas, plans, and drafts are locked inside a writer's head, then modifying and developing them will overload the writer's short-term memory" (p. 135). In making this assertion, Sharples is, of course, reinforcing the findings of a long line of writing process researchers like Flower and Hayes (1981) who note that the ability to see one's own words on paper helps a writer compose: "the logic which moves composing forward grows out of the goals [that] can be both sustained and influenced by [...] the text itself" (p. 380). Similarly, Neuwirth and Kaufer (1989) note that, when composing, "external representations then can be useful for keeping track of goals" (p. 328).

Perhaps no one has endowed the sense of sight with so much importance in thinking and composing as Walter Ong. According to Ong (1982), writing "transformed human consciousness" (p. 78) because it moved articulated thoughts (i.e., speech) out of the "evanescent" (p. 32) realm of aural sensation and into "a new sensory world, that of vision" (p. 85). This new visual practice of communication enabled, Ong says, more abstract and complex forms of thought. Ong (1982) puts it this way, "by taking conservative functions on itself, the text frees the mind of conservative tasks, that is, of its memory work, and thus enables the mind to turn itself to new speculation" (p. 41). Sight can do this because "sight isolates" while "sound incorporates" which gives the thinker/composer perspective on his or her thoughts, enabling, it seems, more abstract and conceptual thought (Ong, 1982, p. 72).

Cicero and Ong are, of course, correct: sight is undeniably important to composing and is probably, as they claim, the sense we rely on most when writing. Yet still, as cognitive research shows, we miss something important if we become too preoccupied with the sense of sight to the exclusion of the other ways in which our bodies reason and remember. For example, as the following interview transcript taken from Linda Flowers' "Cognition, Context, and Theory Building" (1989) demonstrates, research into the supposedly 'situated' contexts of student writers tends to occlude the fully embodied nature of their composing practices:

Ron: I try to write [an assignment] as soon as I can and let them look at it. Even take it right to the teacher, and say, look at this. Am I going in the right direction or not?

Interviewer: That's a kind of expensive way to do it, isn't it?

Ron: You pick up things. You pick up good things. It's expensive in terms of that paper, but it's not expensive in terms of putting that away for future reference. [...] It's not really a conscious process that I go through. You just got to listen. I don't know if it sounds weird or what. But I sit there and I watch them during the lecture, I listen to key words that they use. They register. (p. 293)

Flower (1989) uses this section of transcript to highlight the "savvy [...] and highly intentional effort" that students such as her interviewee exert in order to understand and interpret a given writing context (p. 293). What she ignores in her discussion, however, is the physical and metaphoric language this savvy student writer uses to describe his

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learning and writing processes. The student himself probably does not consciously

realize it, but his words reveal that writing and the memory-work associated with

writing are physical as much as mental events, and that this physicality is derived not

just from what he sees ("I watch") but what he hears ("I listen") and feels ("I sit," "you

pick up," "going in the right direction"). Even when physically confined by a

classroom desk, the student seems to be thinking with his body, not just with his mind:

his sensations while sitting at his desk influence what he absorbs into memory, how

those memories are deployed in composing, and, of course, how his composing

practices are recalled and articulated in the interview situation itself. In his

retrospective account, the student seems to be using the space around him to help him

remember what he needs to remember to accomplish his task.

Lakoff and Johnson shed some light on why Flower's student seems to be

thinking with his body. They point out that "there is no such fully autonomous faculty

of reason separate from and independent of bodily capacities such as perception and

movement [...] reason uses and grows out of such bodily capacities" (Lakoff &

Johnson, 1999, p. 17). Metaphors like the ones the student uses to describe his

composing processes arise out of his bodily experience. In fact, according to Lakoff

and Johnson (1999), virtually all metaphors are based on bodily experience: they exist

so that the "inferential structures of concrete domains" can be "employed in abstract

domains." (p. 155). So, the student composes with his body and subsequently

articulates this composing process in bodily language because there is simply no other

way he could do it: "can we think about subjective experience and judgment without

metaphor? Hardly" (Lakoff & Johnson, 1999, p. 59). Further, according to Lakoff and

Johnson (1999), such use of metaphor is "the principal instrument of abstract reason," again, because they are the means by which concrete embodied knowledge can be employed in abstract reasoning (p. 155). Lakoff & Johnson's chain of logic, then, runs something like this: we think via metaphor, most metaphors ("primary metaphors") are derived from "sensiromotor domains," therefore we think with our bodies (1999, p. 45).

The claim for the centrality of metaphor in thinking is, of course, not at all new in rhetorical theory. Catherine Hobbs (2002), for example, points out that in the work of Aristotle and Vico, "metaphor is a cognitive instrument more than an ornament, productive of new knowledge for the individual and the culture" (p. 71). So, if we accept Lakoff and Johnson's assertion that metaphors almost always arise from the body, there should, in theory, be a very strong tradition in rhetoric and writing studies related to how we use the body to compose, yet this has not been the case. Kristie Fleckenstein (1999) notes this absence: "bodies as sites of and participants in meaning-making have been elided [...] we need an embodied discourse [that] locates an individual within concrete spatio-temporal contexts" (p. 281). Like Lakoff and Johnson, Fleckenstein (1999) also links the body to metaphor and memory in composing: "operating according to metaphoric [...] logic, corporeal texts are the means by which we carry our bodies in our minds [...] corporeal codes stabilize discursive codes and produce a language from pulse beats, memories, and images" (p. 290). Finally, Fleckenstein (1999) urges the field of rhetoric and writing to acknowledge the corporeality of texts as one method of "refiguring writing, teaching, and researching in composition studies" (p. 298).

In fact, several influential researchers have attempted to answer Fleckenstein's concerns over the past few years. Beverley Sauer (1998, 2003), for instance, explores miners' use of physical gestures derived from their procedural memories of embodied experience in the meaning-making process: "gesture is both an iconic image and an act of rhetorical meaning-making that assists and constructs an individual's knowledge of risk" (2003, p. 257). Similarly, Haas and Witte (2001) examine the role of embodied actions like movements and gestures as "pre-texts" that mediate the thought processes of blue-collar city workers during their interactions with white-collar engineers while revising a report (p. 444). Likewise, although he is not necessarily focusing on composing in the narrow sense of putting pen to paper, Mike Rose (2004) studies the role of embodied actions in shaping the thought processes that lie behind such mundane yet sophisticated activities as waiting tables or carpentry. Finally, Prior and Shipka (2003) speculate about how the buzzing timer on a clothes dryer and the subsequent activity of folding laundry affect the composing processes of a college professor as she writes a scholarly article while working at home. With the exception of Prior and Shipka, however, all of these studies operate on what could be labeled a "deficit model" of the role of the body in composing. That is, none of them really focuses on the embodied aspects of composing as hallmarks of expertise in writing, as I believe the rhetorical tradition calls for. Instead, they seem to conceptualize the employment of embodied senses, particularly senses not derived from sight, as crutches or as the remediation strategies used by less-skilled writers attempting to express their meanings in language.

It seems, then, that we have lost something somewhere along the way in the history of rhetoric: we have lost the idea that the expert writer is the writer who practices a physical as well as a mental art. What is needed then is a renewed theory of embodied rhetoric grounded in contemporary cognitive theoretical constructs that lend themselves to empirical study. Such an embodied rhetoric of memory will, by highlighting the expertise of writers in organization as the product of both a physical and mental discipline and by revealing the working environment in which this expertise is developed, contribute valuable insights that may influence how technical communication is studied and taught and the physical, digital, and social spaces in which it is practiced.

Aristotle's Embodied Epistemology

While Aristotle does not offer the sort of tidy summation of the link among the body, writing, and memory that Plato provides at the end of *Phaedrus*, his thought is indispensable for understanding memory and writing as embodied activities. Although his theories about the body, thinking, language, and memory are dispersed throughout his works, Aristotle principally articulates them in his treatise "On Memory and Reminiscence," which Murphy (2002) points out provides part of the "general theory of human action" that undergirds Aristotle's theory of rhetoric (p. 213). First, Aristotle and his medieval successors like Aquinas believed that the body and its sense perceptions played a far greater role in thinking than has post-Cartesian thought. Theirs was a fundamentally embodied epistemology. That is, Aristotelians like Aquinas held that "the activity of thinking and the activity of having a sense perception are fundamentally analogous, not fundamentally different" (Carruthers, 1990, p. 57). Or, as

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Lakoff & Johnson (1999) articulate it, Aristotle "locates reality ultimately in the world, and he thus sees our thought as dependent upon the nature of the world. [...] Thus, for both Plato and Aristotle, there is no separation between the mind and the world" (p. 374).

As for the role of memory in thinking, it too involves the whole body. In one of the most important but confusing parts of "On Memory and Reminiscence," Aristotle states:

> One might be puzzled how, when the affection is present but the thing is absent, what is not present is ever remembered. For it is clear that one must think of the affection, which is produced by means of perception in the soul and in that part of the body which contains the soul, as being like a sort of picture, the having of which we say is memory. For the change that occurs marks in a sort of imprint, as it were, of the sense-image, as people do who seal things with signet rings. (Sorabji, 1972, p. 50)

At first glance, Aristotle seems to be saying that we only remember in pictures, which, if true would, according to Virginia Allen (1993), be a faulty notion because, "hasty introspection reveals that our knowledge of such things as typing, playing the guitar, and driving a car are not mediated with images" (p. 51).

Yet, Allen is missing a key nuance here. Aristotle is not saying that these are exclusively or literally visual images but, rather they are *"like a sort of* picture" (Sorabji, 1972, p. 50, emphasis mine). Carruthers and Sorabji avoid Allen's mistake by labeling these "quasi-imprints" *phantasms* to distinguish them from literal visual images

(Carruthers, 1990, p.16; Sorabji, 1972, p. 14). Carruthers (1990) glosses the phantasm this way: the "phantasm is the final product of the entire process of sense perception, whether its origin be visual or auditory, tactile or olfactory. Every sort of sense perception ends up in the form of a phantasm in memory" (p. 17). In other words, rather than exclusively (or even mostly) a visual picture, a memory is more like a multimodal "snapshot" derived from all our embodied senses in a given moment in space and time: "all mnemonic advice stresses the benefits to be gained from forming memories as 'scenes' that include personal associations [...] the need to impress the circumstances during which something was memorized [...] how one feels, the gestures and appearances of one's teacher, the appearance of the manuscript page, and so on" (Carruthers, 1990, p. 60). This interpretation of the Aristotelian phantasm as a "scene" perceived from the embodied perspective of the rememberer is reinforced by Sorabji (1972), who says "Aristotle seems to imply [that] that the memory-image is a copy of one's view of that scene" (p. 7). Murphy (2002) concurs with Sorabji, adding that data from the other senses is "collated" in the phantasm (p. 218).

The process of deliberately recollecting memories (as opposed to simply random recalling), then, entails finding or locating these phantasms/scenes/snapshots either via repeating some aspect of the physical circumstances in which the original sense impression occurred (e.g., walking to the foyer and retracing your steps to try to figure out what you did with your keys when you walked into your house) or by using some sort of artificial heuristic technique like the place/image mnemonic. The recollection process also involves an act of reconstructing and interpreting the embodied sensations laid down during the original experience of the thing being recalled: "recollection was

understood to be a re-enactment of experience which involves cogitation and judgment, imagination and emotion" (Carruthers, 1990, p. 60). Since, in most cases we can't actually recreate the exact physical circumstances of the original experience (the memory work involved in composing tasks is rarely as simple as finding one's keys), artificial methods (that is, methods that are susceptible to training or the product of an art) and tools for recollection become vital.

Yet, recollection during open-ended design tasks like composing can be difficult and can resemble the cognitively demanding, labor-intensive process of dredging up declarative memories one-by-one that experts know how to avoid. To make the process of recollection easier, Aristotle offers a number of possible methods for tapping into and manipulating phantasms for purposes of deliberately recollecting memories during composing tasks: employing the *topoi* as "organizing modes of recollection" helps us to envision ourselves in relation to the points we are trying to make by "initiat[ing] memory in certain directions" (Murphy, 2002, p. 220); using metaphor, as I've already mentioned – and as the example dialog from Flower's study demonstrates – helps us connect "concrete domains" to abstract ones (Lakoff & Johnson, 1999, p. 155); "tagging memory emotionally" makes remembering easier by adding an internal sensations to the external physical sensations of the phantasm snapshot (Carruthers, 1990, p. 60); and, perhaps most importantly, repeating and practicing a particular composing activity habituates us to the memory demands of particular rhetorical situations (Murphy, 2001 & 2002, points out that the Romans made habit the foundation of their educational system).

The Aristotelian Phantasm and Social Theories of Cognition

Each of the methods for engaging memory during composing that Aristotle offers makes intuitive sense as means of performing memory work, but how does the phantasm fare as a construct in light of contemporary developments in cognitive psychology, and, more pertinently, how might we study similar methods in the actual practices of contemporary writers as they work? Answers to these questions can be found in recent theories of social cognition deriving from activity theory as formulated by the great Soviet psychologists Lev Vygotsky and Alexei Leontiev. In fact, activity theory, with its focus on external physical actions as keys to understanding internal mental states and its assertion that "perception is an integral part of human interaction with the world" have gone a long way towards refuting the legacy of post-Cartesian understandings of human thought as a product of an a-social, a-historical, a-material, and disembodied mind and, consequently, towards revalidating Aristotle and his successors' embodied epistemology (Kaptelinin & Nardi, 2006, p. 81).

Of particular importance in this endeavor are theories of situated cognition which posit that the activities and contexts in which learning occurs are inseparable from and co-productive of knowledge itself. First, consider the following passage in which Brown, Collins, and Duguid (1989) articulate the central construct "knowledge" lying behind their theories about how people learn in and through situated activities:

> Knowledge, we suggest, similarly indexes the situation in which it arises and is used. The embedding circumstances efficiently provide essential parts of its structure and meaning. So knowledge, which comes coded by and connected to the activity and environment in which it is developed, is spread across its

component parts, some of which are in the mind and some in the world much as

the final picture on a jigsaw is spread across its component pieces. (p. 36)

It is not too much of an overstatement to suggest that the construct that Brown, Collins,

and Duguid are describing here serves essentially the same purpose in remembering and

thinking as the Aristotelian phantasm. That is, their "final picture," like the phantasm,

is something similar to an embodied snapshot linking interior phenomena – knowledge

– inextricably to the external circumstances of place and time in which that knowledge

was learned – in which it entered memory (Brown, Collins, and Duguid, 1989, p. 36).

Subsequent theorizers of situated cognition add nuance to this construct. For

instance, Reynolds, Sinatra, and Jetton (1996) describe situated cognition in this way:

"situated cognition [...] attempts to account for how one learns in a conceptual

environment. The conceptual environment consists of the external world as perceived,

the internal representations of the perceptions, and the resulting interactions" (p. 100).

These "internal representations" seem quite similar in both origination and in function

to the phantasm. Cybernetic theorists like Clancey (1997), who have turned to situated

cognition as a means of formulating new approaches to artificial intelligence, add

further weight to this claim. Clancey (1997) says "conceptual knowledge, as a capacity

to coordinate and sequence behavior, is inherently formed as part of and through

physical performances. The formation of perceptual categorizations and their coupling

to concepts provides material for reasoning (inference), which then changes where we

look and what we are able to find" (p. 5). This "coupling" of perceptual information

with declarative conceptual knowledge that Clancey recognizes, again, seems to

function in much the same way that the phantasm does by collating diverse sensory inputs into usable and recollect-able scenes which drive human thinking.

Moreover, some of the methods of tapping into and manipulating these "final pictures" or "internal representations" that the situated cognitivists posit as critical to achieving expertise in a given task domain resemble the advice offered by Aristotle for tapping into the phantasm. Habit, in particular, plays a critical role for both Aristotle and the situated cognitivists. According to Aristotle (1952), "acts of recollection, as they occur in experience, are due to the fact that one movement has by nature another that succeeds it in regular order. If this order be necessary, whenever a subject experiences the former of two movements thus connected, it will [invariably], experience the latter" (p. 693). Murphy (2002) points out that what Aristotle is describing is habit, noting that "the tendency to act in a certain manner, derives from memory in that unrecollected choices create a potential motion of the soul in advance of recollection" (p. 218).

To deliberately trigger these "unrecollected choices" during some deliberate task like composing, then, one needs to practice so that the action becomes habitual during subsequent performances of the task: "accordingly, therefore, when one wishes to recollect, this is what he will do: he will try to obtain a beginning of movement whose sequel shall be the movement which he desire to reawaken" (Aristotle, 1952, p. 693). Or, as Carruthers (1990) glosses Aristotle's notion of habit articulated in the *Nichomachean Ethics*: "one's *hexis* or *habitus* is developed by the repetition of particular emotional responses or acts performed in the past and remembered, which then predispose it to the same response in the future. [...] Experience is made from

many repeated memories, which in turn are permanent vestiges of sense perceptions" (p. 68). Carruthers (1990) links the role of the phantasm to the laying down of habit: "it is the spatial, somatic nature of memory-images that allows for secure recollective associations to be formed [...] because it is also a physiological process, recollection is subject to training and habituation in the manner of all physical activity (p. 63). Finally, Sorabji (1972) corroborates Carruthers by stating, "it looks as if Aristotle's view is that, whenever images regularly follow each other, this is by way of habit. The habit may have become established either because the images were naturally fitted to occur in a certain order, or [...] as a result of artifice [i.e., training]" (p. 45). Habit, of whatever type, is for Aristotle a product of physical as well as mental and emotional training.

Quite similarly, Brown, Collins, and Duguid (1989) note that "understanding is developed through continued, situated use" (p. 33). From this idea, they formulate the notion of the "cognitive apprenticeship" as the ideal method of learning to be an expert in a given task domain. Again, like Aristotle, the process of habituation achieved through extended apprenticeship is as much physical and emotional as it is mental:

> Cognitive emphasizes that apprenticeship techniques actually reach well beyond the physical skills usually associated with apprenticeship to the kinds of cognitive skills more normally associated with conventional schooling. This extension is not as incompatible with traditional apprenticeship as it may at first seem. The physical skills usually associated with apprenticeship embody important cognitive skills, if our argument for the inseparability of knowing and doing is correct. (Brown, Collins, & Duguid, 1989, p. 39)

So, a cognitive apprenticeship is a means of achieving a *hexis*. The fundamental congruence of the Aristotelian conception of knowledge and that of the situated cognitivists leads them to articulate quite similar theories of learning.

Two other methods for manipulating the phantasm that Aristotle offers – the *topoi* and metaphor – suggest yet another activity theory-inspired cognitive theory: distributed or joint cognition. Building on insights from Edwin Hutchins' seminal study of ship navigators in *Cognition in the Wild* (1995a), Engeström and Middleton (1996) identify the central construct of knowledge lying behind theories of joint cognition in this way:

> [The] unit of analysis [is] a culturally constituted functional group rather than an individual mind. This theory reconceptualizes 'information' as the propagation of representational states of mediating structures that make up the dynamic and substance of any complex system. These structures include internal as well as external knowledge representations, (knowledge, skills, tools, etc.). (p. 6)

These information "structures" fill the same role in theories of joint cognition as phantasms do in Aristotle's theory of memory. Consequently, as this passage suggests, phantasms, like these information structures, exist not only inside the head of the individual but also in the collective, in the "functional group." That is, because of the shared spaces in which we live and work and the commonality of our embodied experiences in these spaces, the Aristotelian phantasm, as a snapshot of sensory experience, is inescapably both an internal and an external representation of knowledge. Viewed in light of joint cognition, Aristotle's phantasm is a theory of joint as well as

individual memory because it offers an explanatory framework for collective activity, as the internal representations which constitute the phantasm are propagated across individuals through language, through spaces, through tools, and through artifacts. Metaphors and topics, then, are methods not only for individual understanding and thinking but also for joint thinking because they are methods for sharing and communicating knowledge representations.

To take another example: Describing their case study of joint cognition in airport workers, Goodwin and Goodwin (1996) point out that "in these data we are able to catch a glimpse of the social and historical processes through which a community accumulates experience of the habitual scenes that constitute their working environment, and articulates for each other how these scenes should be properly interpreted" (p 83). These "habitual scenes," then, give rise to the metaphors and determine the common topics or "places" which a community uses to recollect and to reason. As I note above, Murphy (2002) points out that the *topoi* "initiate memory in certain directions" (p. 220) Metaphors and topics, then, depend on the "embeddness of knowledge" that is, they assume that "the ability to see something is always tied to a particular position encompassing a range of phenomena including placement within a larger organization, a local task, and access to relevant material and cognitive tools" (Goodwin & Goodwin, 1996, p. 61). The airport workers are able to work together successfully because of the shared contexts in which their memories were originally laid down. By virtue of their training and common experience, they share phantasms, or, as Fentress and Wickham (1992) put it, social memory is strongest "at the level of shared meanings and remembered images" (p. 59).

Finally, one particularly important aspect of activity theory – its focus on tool use – helps us understand how Aristotle's embodied epistemology may have been employed at the level of practice by the ancient rhetoricians. Activity theory posits that tools operate at both external (embodied) and internal (psychological) levels, bridging the body and the mind in everyday practice: "tools shape the way human beings interact with reality [and] the shaping of external activities eventually results in the shaping of internal ones" (Kaptelinin & Nardi, 2006, p. 70). Tools also function as enablers of joint cognition by bridging the knowledges of individuals: "tools usually reflect the experience of other people who tried to solve similar problems earlier and invented or modified the tool to make it more efficient and effective [...] the use of tools is an accumulation and transmission of social knowledge" (Kaptelinin & Nardi, 2006, p. 70).

Memory tools are, of course, no different from any other tool: they are socially acceptable aides to natural memory that often become internalized and are often employed in idiosyncratic ways by individuals during the course of actual practice. The function of a memory tool might then be thought of as an aide to maintaining the standing wave of memory that enables effective action in the present by providing just the right information about the past. The memory tool accomplishes this because it contributes to the sequential and jussive work of the memory practice. The walking mnemonic of the Roman rhetoricians was, of course, just such a tool – it enabled Roman rhetoricians to think on their feet in the Roman forum by helping preserve the order of their speeches and by ensuring that only the correct information would be "in sight" and therefore in mind at the correct time that it was needed. That is, by turning difficult declarative memory tasks like recalling the content of one's speech into easier

procedural or natural memory tasks like walking down the street, the walking

mnemonic might be thought of as functioning as a sort of embodied simulation or a

filmstrip version of Aristotle's phantasm, in which the orator imagines him or herself

interacting with places derived from habitual experience. As Luria's (1987) case study

in *The Mind of a Mnemonist* demonstrates, the walking mnemonic is an incredibly

effective tool for doing memory work, but, most importantly for the present discussion,

it was originally theorized from an embodied epistemology that fully enlisted the body

– its perceptions and sensations – in its memory practices. As a tool for memory, then,

the walking mnemonic will doubtless have a longer shelf-life than many of the digital

memory solutions detailed in the previous chapter's consideration of archival

technology and office automation.

This study, therefore, will attempt to better understand the memory "street smarts"

of writers by exploring the ways in which writers use and adapt the perceptual

affordances offered by existing tools and infrastructures to do the memory work of

composing (Star, 1999, p. 387). To accomplish this, the study asks these questions:

- Do writers use the affordances of their embodied contexts to support memory-
related demands of composing?

- Where/when in the composing process do embodied-contexts seem to be most
important?

- How, if at all, do embodied contexts aid composers' memory work during
invention?

CHAPTER 3: METHODOLOGY AND RESEARCH METHODS

Scenes of Memory Work

Studying memory is a complex undertaking. In one sense, memory is
ubiquitous because memory as stored information impacts virtually everything we do
and the various aides to memory are legion, from our email in-boxes to reminders
posted on our bulletin boards, to our Internet browser bookmarks, to the organization of
papers on our desks. In another sense, of course, memory is ephemeral, often taking
place inside our heads in fleeting moments of deliberate recall or unintentional
recollection. Approaches to studying the function and effects of memory in human
activities, such as writing, are similarly diverse, ranging from broad explorations of
memory as social narrative in Fentress and Wickham (1992) to narrowly-focused and
quasi-experimental attempts to describe the cognitive processes of memory at work
during various activities, such as the composing research of Flower and Hayes (1981)
and Kellogg (1996).

Bowker is critical of both extremes. As opposed to broad studies of narrative
and intertextuality, Bowker (2005) encourages a more situated focus by pointing out
that "stories are told in a context, under a description" (p. 7). Cognitive approaches are
even more misguided, he says:

> Memory is often, and wrongly, conceived of as an act of consciousness and
>
> associated with what can be called to mind. By this light, it is often seen as the
>
> act of deciphering traces from the past. We don't analyze the movement of
>
> icebergs by studying the bit that appears above the surface of the sea; nor should

we study memory in terms of that which fires a certain set of neurons at a determinate time. We as social and technical creatures engage in a vast span of memory practices, from the entirely non-conscious to the hyperaware. (Bowker, 2005, p. 8)

Bowker's study, with its extrapolation of work practices based on historical analysis, presents one possible middle approach between the two poles. However, rhetorical theory offers a refinement and additional level of specificity to such a middle approach because, as I argue in Chapter 1, a rhetorical theory foregrounds the notion of *kairos* over *chronos* in any study of memory-in-use or memory as practice – a move that Bowker's methodology does not allow him to make.

John E. Smith's (2002) distinction between *chronos* time and *kairos* time helps make clear the importance of rhetorical theory to memory study:

Chronos [...] means the uniform time of the cosmic system [...] In *chronos* we have the fundamental conception of time as measure, the quantity of duration, the length of periodicity, the age of an object or artifact, and the rate of acceleration of bodies. [...] The questions relevant to this aspect of time are: 'how fast?' 'how frequent?' 'how old?' and the answers to these questions can be given in cardinal numbers. By contrast, the term *kairos* points to a qualitative character of time, to the special position an event or action occupies in a series. [...] The question especially relevant to *kairos* is 'When?' 'At what time?' (p. 47)

That is, where both macro- and micro-level approaches to studying memory (as well as approaches to designing office automation and archival technology) tend to focus on memory as a matter of storage – of where and how to save information (i.e., the sequential aspect of the archive in Derrida's scheme) – rhetorical theory focuses on context and use. Consequently, the concerns of a *chronos*-centered view of memory lie primarily with the accumulation of information, with concerns such as how information is stored in databases, in file systems, in the structures of the organic brain.

A *kairos*-centered theory of memory, on the other hand, entails that we focus on both storage and recall in specific times, places, and, most importantly, in order to achieve specific purposes – in other words, on the rhetorical context of memory. Sheard (1993) makes this connection between *kairos* and context explicit:

> *Kairos* is the ancient term for the sum total of 'contexts,' both spatial (e.g., formal) and temporal (e.g., epistemic), that influence the translation of thought into language and meaning in any rhetorical situation. *Kairos* encompasses the occasion itself, the historical circumstances that brought it about, the generic conventions of the form (oral or written) required by that occasion, the manner of delivery the audience expects at that time and place, their attitudes toward the speaker (or writer) and the occasion, even their assumptions about the world around them, and so on. (p. 292)

Sheard's conceptual linking of *kairos* and context echoes the work of Kinneavy (1986, 2002). Kinneavy (1986) identifies *kairos* as a critical construct tying rhetorical theory to empirical research: "the concept of situational context, which is a modern term for

kairos, is in the forefront of research and thought in many areas" (p. 83). In particular, Kinneavy calls attention to the compatibility between theories of *kairos* and domains of inquiry, such as ethnomethodology, that focus on the ways in which context is "defined dynamically" in a given situation (Dourish, 2004, p. 22). Finally, Kinneavy (1986) notes the ongoing relevance of rhetorical theory to empirical research designs: "it may be that modern treatments of situational context can learn something from the handling of the same topic in antiquity. I would argue that they can" (p. 85).

So, then, how does one design a study of contextualized memory use that is informed by rhetorical theory? Rhetorical theory first provides the notion that rhetorical situations, encompassing definable speaker/writer, audience, and purpose, are the places and times to look for this contextualized memory use. Further, as Chapter 2 demonstrated, classical rhetorical theories of memory are built on an embodied epistemology largely validated by contemporary cognition research, so such research must also account for the role of the body in the thinking and remembering that occurs in rhetorical situations. Consequently, the central methodological aim of this study of memory in composing is to observe and account for the embodied contexts of composing situations and to relate these as closely as possible to the activities of memory in those situations.

Rhetorical theory itself provides a label for and approach to bounding such a contextualized inquiry in the notion of a "scene." Much like a scene in a drama, a scene of rhetorical memory work might provisionally be defined as the lamination of otherwise spatially and temporally discrete situations inhabited by particular actors, both human and non-human, in which the activities of storing information are linked to

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the activities in which that stored information is retrieved and used (see Figure 1).

These laminations are discernable chiefly through the rhetorical purposes of the actors

Figure 1: The scene of memory work
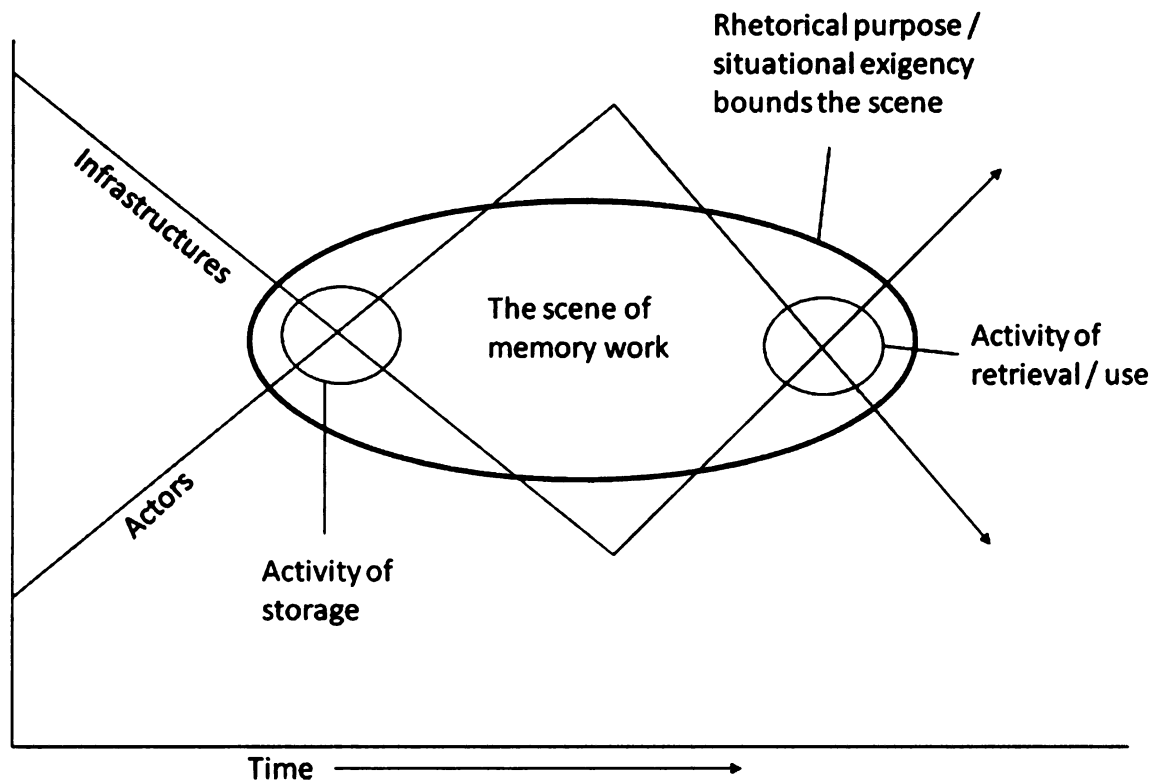
involved but they are also responsive to the situational exigencies arising from the times

and locations and spaces and places in which the memory activities occur. Thus the

notion of *kairos* as both context and occasion – rhetorical purpose and situation of use –

links the activities of storage and retrieval in the scene of memory work.

Studying *kairotic* memory as scenic has ample precedent. First, such an

approach is in keeping with Aristotelian embodied epistemology, as Carruthers (1990)

points out:

All mnemonic advice stresses the benefits to be gained from forming memories as 'scenes' that include personal associations [...] the need to impress the circumstances during which something was memorized [...] how one feels, the gestures and appearances of one's teacher, the appearance of the manuscript page, and so on. (p. 60)

A version of the classical understanding of scene recurs in modern rhetorical theory in Kenneth Burke's pentad, which posits the scenic nature of all human communication. According to Sheard (1993), "Burke describes a 'scene' as the container for acts and agents" (p. 305). Finally, as with the Aristotelian phantasm, contemporary cognitive theory points to the embedded-ness of human thought and activities in particular scenes. According to cognitive scientist David Kirsh (1995), "in having a body, we are spatially located creatures: we must be facing some direction, have only certain objects in view, be within reach of certain others. How we manage the space around us, then, is not an afterthought; it is an integral part of the way we think, plan, and behave" (p. 31). Kirsh (1995) cites our use of space as particularly important to memory in use: "space is a resource that must be managed, much like time, memory, and energy. When we use space well we can often bring the time and memory demands of our tasks down to workable levels" (p. 32). In short, the props and sets of the scenes in which memory work occurs play a key role in the *kairos* of the scenes. As the ancients recognized, the *kairos* of a scene arises at least in part from the physical infrastructure of the scene.

Labeling a situation of memory work a "scene," then, attempts to account for the spatial and temporal aspects of activity in Bowker's (2005) memory practices and Star's (1999) articulation work: the scene is the "where" and "when" of memory

infrastructures determined by their *use* in fulfilling rhetorical purposes. These time and place combinations encompass the spaces, tools, people, and situations in which rhetorical invention occurs. In short, they are where memory regimes, infrastructures, and bodies come together in memory activities that further the rhetorical purposes of the actors involved. The scene of memory work, then, represents perhaps the chief contribution of rhetorical theory to studying memory since it inextricably binds activities of storing memories to the activities of retrieval in which those stored memories are used to achieve rhetorical purposes in specific situations. Without such binding, inquiry into memory practices, as the review of research from archival science and office automation demonstrates, tends to become preoccupied with the tools and practices of storage at the expense of the tools and practices of use. Because it makes explicit the connection between storage and use, the scene, therefore, would seem to be a better focus of inquiry into memory practices.

As for how to go about studying the memory work in a scene, a couple possibilities present themselves. Burke's (1969) method of analyzing rhetorical situations according to pentadic ratios of act, scene, agent, agency, and purpose—dramatism—presents a method that lends itself well to the study of texts. More appropriate to the present study of practice, however, are constructs from the various branches of social cognition theory, detailed in Chapter 2, that confirm and validate earlier rhetorical theories of memory in practice. These provide a language for describing and methods for studying scenes as temporal and spatial laminations in which memories are recalled through embodied perceptions and enacted in observable activities and interactions. Activity theory suggests that we pay attention to tools and

artifacts; situated cognition theory suggests that we focus on place and space; and joint cognition theory requires that we look at the role of other actors, human and nonhuman.

To understand the relationship of these categories of visible objects (tools, artifacts, place, space, and bodies) to the operations of memory, a further category of data must be collected from a scene, that of the activities that take place in/during the scene. Ultimately, the central premise of this methodology is that observation of the visible aspects of the scene is the key to finding memory in the scene. As activity theory posits "Activity theory maintains that internal activities cannot be understood if they are analyzed in isolation from external activities, because there are mutual transformations between the two kinds of activities. Internalization is the transformation of external activities into internal activities" (Kaptelinin & Nardi, 2006, p. 69).

The Research Site

While the notion of a scene provides the methodological and theoretical bounds for data collection, the selection of a research site was equally important. Where the notion of the scene provides a framework for studying instances of memory regimes in the intersection of infrastructures and people in time, the research site provides a location and an opportunity for studying these intersections in shared space – physical, digital, and social. In other words, the research site is the stage on which the scenes of memory work are enacted, a site which is both constitutive of and constituted by the memory regimes at work in the larger society.

In keeping with the aim of this research project to understand the memory activities of writing as symbolic-analytic work, therefore, I selected a knowledge-

intensive workplace as the research site. This site was a privately-owned medium-sized (around 175 employees) commercial software firm in the US Midwest. The firm, which I will call "Software Unlimited" throughout this dissertation, creates and markets image manipulation and screen recording software to consumer, corporate, and university customers in the US and through resellers in 30 other countries. As part of its increasing focus on international expansion, the company's products, including software and documentation, are localized into five languages. At the time of the study, Software Unlimited was over twenty years old and, like other software firms of similar age, had experienced periods of growth and periods of downsizing; however, during the two years immediately prior to the study, the company had undergone tremendous growth, nearly tripling its number of employees.

The research described in this dissertation took place in Software Unlimited's headquarters offices. These headquarters offices, where most of the company's employees worked, occupy space in office suites in 4 buildings spread throughout a single suburban office park. This fragmentation of offices spaces was an unplanned byproduct of the company's rapid expansion, and the company had plans to build a new headquarters in order to consolidate its employees. As part of these plans, the company was, at the time this research was conducted, experimenting with new office configurations and types of furnishings in its headquarters offices, which played a role in the research described below. All of the research activities of this dissertation took place in a single one of these sets of office suites – that housing the technical communicators as well as the company executives, administrative staff, and a significant portion of the software developers.

I selected a software company as my research site because the software industry is prototypical of the type of knowledge-intensive, symbolic analytic workplaces described by Reich. Further, Software Unlimited's comparatively long (for the software industry) history combined with its rapid growth made it a good site in which to observe a range of issues, infrastructures, and situations in which writers would play an important role in the memory work of the organization.

In fact, Software Unlimited proved to be an ideal site in which to explore all three types of memory issues in inventional activities that were outlined in Chapter 1: responsiveness to *kairos*, the importance of offloading or distributing information, and the necessity of personalizing information. First, Software Unlimited's focus on the production of software for the consumer market, particularly its expansion into Internet-based products, creates a high-pressure work environment of code freezes, shipping deadlines, and attention to the importance of so-called "Internet time." These considerations make responsiveness to *kairos* a key element in the company's employees' success, thereby creating ideal conditions for the types of scenes of memory work required by this research design.

An additional impetus for situations of *kairos* at Software Unlimited is the company's adherence to an "Agile" software development methodology. According to Schwaber and Beedle's *Agile Software Development with Scrum* (2002), a volume which is recommended to all new employees of the company, the Agile methodology places a heavy emphasis on responsiveness to time. In this, Agile is like the sport of Rugby from which it draws its terminology: "Both are adaptive, quick, self-organizing, and have few rests" (Schwaber & Beedle, 2002, p. 1).

According to Schwaber and Beedle, the Agile methodology borrows from process control theory the notions that all aspects of the software development process should be transparent to management and continuously verifiable empirically. The principal mechanisms enabling this transparency are the Scrum Team and the Sprint. Scrum teams are small (ideally no more than seven to nine person), multidisciplinary, and, within limits, self-directed and self-organizing groups of workers who are tasked with "delivering new executable product functionality" during fixed thirty day design periods, termed Sprints (Schwaber and Beedle, 2002, p. 9). The goal of each team, then, is to create a product or piece of a product that could theoretically stand on its own as an upgrade or stand-alone product. Each Scrum team must contain all the expertise necessary to complete these deliverables: "Regardless of the team composition, it is responsible for doing all of the analysis, design, coding, testing, and user documentation" (Schwaber and Beedle, 2002, p. 37). At Software Unlimited, each Scrum team that I studied included one technical communicator (titled "information developer" at this organization), one or two quality assurance (QA) team members, a Scrum team leader, a user training specialist, and four to six software developers.

The thirty-day Sprints are bracketed by planning and review meetings in which team members, management, and users determine the functionality to be built by the team during the upcoming thirty-day period or review the results of the previous thirty-day period. The most important meetings and mechanisms for transparency prescribed by the methodology, however, are the Daily Scrums. The Daily Scrum is a short meeting lasting no more 15 minutes in which all team members meet face to face or via conference call and answer for each other three questions: "What have you done since

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last Scrum? [...] What will you do between now and the next Scrum? [...] What got in your way of doing work?" (Schwaber and Beedle, 2002, p. 43).

The rules, which the methodology urges be strictly followed, are that the location and time of the meeting be constant, that all team members arrive on time, that team members speak briefly and to the point when answering the three questions, and that any design issues or problem discussions be deferred until after the Scrum. The Daily Scrum, in other words, is meant to be a method for maintaining team and management awareness, not a working meeting. Although different teams that I observed adhered to the rules of Scrum to varying degrees, one factor that seemed common to all was the practice of holding short informal follow-up meetings immediately after the Daily Scrum in which impediments or design issues could be discussed by smaller subsets of team members. The information developers, in particular, made frequent use of the Daily Scrums as opportunities to arrange such short face-to-face meetings with developers and other team members.

Each of these elements of the Agile methodology – teams, Sprints, and Daily Scrums – contributed in varying degrees to the conditions for *kairotic* action in the research participants I observed at Software Unlimited. The Agile methodology also contributed to making Software Unlimited a good site for studying the other two aspects of memory in invention processes. First, the intensive, self-directed, and transparent nature of the Scrum teams created a work environment that encouraged distribution and sharing of information. As just one instance of this, during the Daily Scrum meetings team members met in spaces where they could view shared objects of attention: "The

team should arrange themselves in a circle, generally around a focus such as a table" (Schwaber and Beedle, 2002, p. 43).

Finally, the so-called "empirical" aspect of the Agile methodology, with its concern for observing people and processes and for listening to feedback foregrounded the role of embodied interactions in meaning making: "Daily Scrums provide a direct view into each team's progress [...] team spirit, each member's participation, team member interaction, work that is being completed, decisions that need to be made, and impediments that need to be removed" (Schwaber and Beedle, 2002, p. 69). Lastly, the type of software products that Software Unlimited produced (e.g., image manipulation and screen recording) themselves served to foreground issues of interfaces, interaction, and embodiment among participants.

The Research Participants

Software Unlimited management helped identify employees for participation based on their job responsibilities as technical communicators in the Information Development team. Although each information developer was assigned to a separate software product and served on that product's development team, attending Daily Scrums and other Sprint-related functions, management reporting and administrative functions were performed in the Information Development team by the Information Development manager, who also participated in the study.

The research participants consisted of four women and two men, each with varying degrees of experience as technical communicators and different lengths of tenure with the company, ranging from a few months to almost six years, thus giving each writer a different perspective on the memories of the organization. The writers

chose or were assigned the pseudonyms Angela, Peter, Lance, Monica, Lucy, and

Becky, the team manager.

Table 1: Research Participants

Participant	Background and role in the study
Angela	Most senior member of the Information Development team with a tenure of nearly six years with the company at the time of the initial interview. Participated in the initial interview and meeting observation session.
Becky	Information Development team manager for just over one year at the time of the initial interview. Worked as a member of the Information Development team for six months before becoming manager. Participated in the initial interview.
Lance	Newest member of the Information Development team with a tenure of only a few months at the time of the initial interview. Participated in the initial interview, composing and meeting observation sessions, and follow-up interviews.
Lucy	Employed by the company for two years at the time of the initial interview, though had only recently returned to full-time work after time off and part-time work during pregnancy and an illness. Participated in the initial interview, composing and meeting observation sessions, and follow-up interviews.
Monica	Three years with the company. Started as an intern while in college. Participated in the initial interview and meeting observation session.
Peter	Just over one year at the company at the time of the initial interview. Participated in the initial interview.

Physical and Digital Infrastructures

As mentioned above, the Information Development team was located in a single

suite of offices, which they shared with several other groups of employees (see Figure

2). Peter, Lance, and Lucy were assigned to cubicles in the center of a large room in

one wing of this suite, and Monica, Angela, and Becky occupied offices around the

perimeter of this room. Other company employees (i.e., employees who were not

information developers) occupied the remainder of the cubicles and offices in this room. One end of the large room was devoid of cubicles and left open in order to be used exclusively by the product team to which Angela belonged. This open area and the offices immediately surrounding it were nicknamed the "Petri Dish" because the area contained experimental furnishings and office configuration for the planned new corporate headquarters. The furnishings in the open area, including tables, chairs, white boards, and a video projection screen were all wheeled so that they could be reconfigured as needed. Likewise, the offices at this end of the room held two

Figure 2: Information development wing
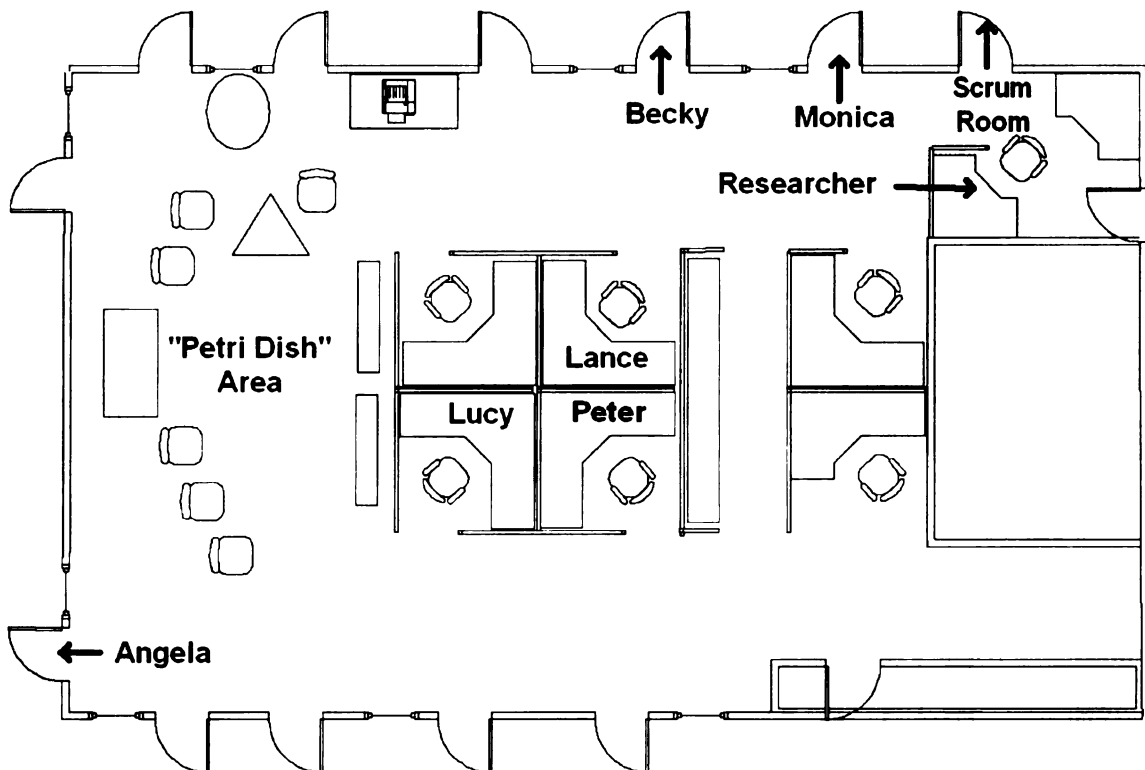
employees each. These employees' workstations within the offices were placed in several experimental configurations – some occupants' desks faced each other, others faced away from each other, and still others faced the same direction. The information

developer Angela occupied this last type of experimental configuration. Two other Information Development team members, Monica and Becky, the manager, occupied conventionally-arranged and furnished offices along the perimeter of the other end of the room. Lance, Peter, and Lucy occupied separate cubicles in the middle of the room. Their cubicle walls were five feet tall.

At one end of the large room, there were two meeting spaces: the "Library" and a small meeting room termed the "Scrum Room." The Library held a large conference table with seating room for ten, a projection screen, and bookshelves along the perimeter, filled with books and periodicals of importance to the software industry, as well as video games and movies which could be checked out by employees. The Scrum Room possessed about 10 plastic chairs and a single work table, which remained pushed to one side during the period of the study. Two walls contained white boards, one wall a large window, and the other a projection screen. The projector sat on the table. Although some differences in each writer's workspace existed and will be noted later where necessary, each workspace possessed at a minimum a desk, chair, small file cabinet, laptop or desktop computer, and at least one monitor.

Most of the data collecting reported in this dissertation took place in the spaces described above, including all of the composing observation sessions and several of the interviews. The interviews with Lance and Lucy, however, took place in a smaller conference room in another part of the building. Also, Lance's meetings with developers took place in the developer's offices or in the hallway where his Daily Scrums were held.

As would be expected at a software company such as Software Unlimited, the computer hardware and software infrastructures supporting the information developers were extensive and participants' configurations and use of these infrastructures varied, as will be noted in the analysis chapters. However, a few commonalities across participants can be given here. Every participant had at least one personal computer in his or her workspace, though several participants had more than one, including a mix of laptops and desktops and Macs and PCs. Every participant had at least one external monitor and keyboard, though, again, many had more than one. Every participant had the Microsoft *Office* suite installed on his or her computer, as well as Software Unlimited's own suite of graphic editing software. Every participant used Microsoft *Messenger* for instant messaging and Microsoft *Outlook* for email. Additionally, several participants used the *Outlook* calendar feature for work scheduling and reminders. Every participant had access to the Internet, a shared network drive, a shared company intranet, and a shared company Wiki.

Data Collection Methods and Rationale

Studying memory work as scenes occurring at the confluences of rhetorical purposes and bodies and tools in space and time required a mix of data collection methods. That is, in order to assemble a scene by indexing observable activities to the rhetorical purposes and situational exigencies for those activities, it was necessary to collect as much data from as many sources as possible. Only by employing a mix of ethnographic methods including observations, videotaping, and interviewing was it possible to render visible the operations of memory as enacted in embodied activities.

Using such a mix of data collection methods also helped triangulate findings (Lauer and Asher, 1988; Denzin & Lincoln, 2003; Kramp, 2004; Hays, 2004). My purpose in such triangulation was not in order to claim objective proof of the phenomena I observed, but instead to ensure that my accounts of the scenes of memory recounted in Chapters 4, 5, and six possessed verisimilitude. Kramp (2004) defines verisimilitude as "the appearance or likelihood that something is or could be true or real," which is possibly as close to proof of the fleeting and ephemeral functioning of memory in activity as we are likely to get (p. 108).

The methods described in this section enabled me to assemble the scenes of memory work by providing me with data about what counts as stored information or memory in this organization, where this information lives, how different types of memories are valued, and how these memories are stored and retrieved in practice. The methods also helped me to answer, at least tentatively, the research questions detailed at the end of Chapter 2 concerning how, when, and where writers use this information when composing. Table 2 maps each research method and the type of data the method generated to the element of the scene of memory work that the method helped explicate and to the research questions it helped to answer. Following the table, each research method is explained in more detail, including its rationale for inclusion in this study. Finally, the data collection schedule is summarized in a table at the end of this section.

Table 2: Data Collection Methods Mapped to Scenes and Research Questions

Data collection method and data source	Element of scene this data helped reveal	Research question it helped answer
Dwelling (field journals)	Rhetorical purposes and situational exigencies	Where/when are embodied contexts most important for memory work?
Initial interviews (video recordings)	Rhetorical purposes and situational exigencies	Do writers use the affordances of their embodied contexts to aid memory work?
Composing session observations (field journals and *Morae* recordings)	Memory activities	Where/when are embodied contexts most important for memory work? How do embodied contexts help?
Meeting observations (field journals and *Morae* recordings)	Memory activities	Where/when are embodied contexts most important for memory work? How do embodied contexts help?
Follow-up interviews (field journals and *Morae* recordings)	Rhetorical purposes and situational exigencies	Where/when are embodied contexts most important for memory work? How do embodied contexts help?
Artifact collection (soft and hard copies of documents)	Memory activities	Where/when are embodied contexts most important for memory work?

Dwelling

As part of a case study rationale seeking to provide "in-depth descriptions and interpretations," I spent around 120 hours over a six month period (September 2007 through March 2008) at the research site in activities that I label "dwelling" (Hays,

2004, p. 218). As part of these dwelling activities, beginning during my first week at the research site and continuing over the course of the entire six months of the study, I attended all but three of the weekly Information Development team meetings, sat in on a dozen meetings between the information developers and members of other teams, and spent ten entire days working, listening, and watching in a cubicle that Software Unlimited had provided for me adjacent to the information developers' workspaces (see Figure 2). My purposes in these activities were to help participants grow comfortable with my presence in their midst, to get a sense of the daily flow of activities, and to attempt to learn about job functions and team relations so that the subsequent interviews could be more focused. My own experience as a technical communicator, including four years at a similarly-sized software company, contributed positively to my comfort level and, I believe, positively influenced my ethos with my participants. On several occasions I was asked about my experiences and I was also asked to contribute to several team-building activities.

Initial Interviews

Beginning at the end of the first month of the study, I interviewed each participant to learn about his or her background (including educational background, history with the company, and experience as a technical communicator), and memory and writing tools and practices. In Yin's (2003) taxonomy of interview types, these interviews were focused but open-ended. That is, they were relatively short – lasting from 45 minutes to one hour – and consisted of the same core set of questions for each participant (see Appendix), but I conducted them in an open-ended manner by adopting a conversational tone, by asking unscripted follow-up questions where I thought more

information would be helpful, by omitting certain questions if I thought the answers would be redundant, and by interjecting anecdotes from my own experience where I felt they would be appropriate.

These interviews were audio and videotaped using a Webcam attached to my laptop. The Webcam was pointed at the participants throughout the duration of the interview in order to record participants' gestures and movement as they answered the interview questions. The purpose of videotaping the interviews was to provide additional data sources in order to create a richer understanding of the unfolding dialog. In this, I was guided by the work of Leander & Prior (2004) who argue for the importance of capturing data about embodied practices when studying composing by asserting, "speaking (and silence), gesturing and the text work together in [...] meaning-making; it is impossible to interpret meaning form any one of these modalities alone" (p. 231).

An even more important reason for videotaping was the recognition that the interviews themselves constituted scenes of memory work in which participants used embodied resources to facilitate recall and to help them compose answers to my questions. The insight that interviews themselves are key sites of memory work is offered by Yin (2003), who although he is making rather a different point, makes an important observation about the difficulty of doing memory during interviews, "interviews should always be considered verbal reports only. As such, they are subject to the common problems of bias, poor recall, and poor or inaccurate articulation." (p. 92). In short, I believed that the interviews would be a good place to look for some of the same embodied articulation work as any other composing activity.

Composing Session Observations

Two of the writers, Lance and Lucy, participated in work-session observations in order to closely observe the moment-by-moment composing activities that occur in a scene of memory work. These four sessions are the primary focus of my analysis in Chapters 4 and 5. I selected Lance and Lucy because of their high level of comfort with the research process, which, I reasoned, would lead to more natural and therefore more valid data. I employed two field-work methods to capture data during these observation sessions. First, in the two observation sessions with Lance, I sat behind him in his workspace and took handwritten field-notes as he composed and, afterwards, as he met with software developers. During these sessions, Lance would provide clarifying information about his work processes whenever I asked or, more frequently, when he felt additional information was necessary; however I tried to keep my questions to a minimum in order to not impact Lance's usual work processes.

The second field-work method, which I employed during two composing sessions with Lucy, utilized the user-testing software TechSmith *Morae* to record Lucy's on-screen activity, her interactions with her computer (mouse and keyboard interactions), and her physical gestures and movements (via Webcam placed on top of her computer monitor). *Morae* also enabled me to watch remotely from another office in real-time and to take field-notes as Lucy worked during these sessions. Lucy already had a Webcam and *Morae* installed on her computer and routinely used *Morae* to record herself working for the purposes of usability testing, so the recording process did not seem to present a major distraction.

Each of these work sessions attempted to capture a naturally-bounded segment of working time, lasting anywhere from 45 minutes to an hour. In the two sessions with Lance, the Daily Scrum meetings provided the terminus for the composing session, and provided the direct exigency for the composing task as he scrambled to prepare materials for the Scrum or post-Scrum meetings. The two sessions with Lucy occurred at natural workday boundaries: the first when Lucy stopped work for the day in preparation for going home and the second at the end of a specific work task.

Meeting Observations

When I began this study, it quickly became apparent that one of the principal mechanisms through which invention at Software Unlimited takes place is meetings. This is unsurprising since the importance of meetings to the conduct of symbolic-analytic work has long been recognized by researchers of knowledge-intensive workplaces (Brown & Duguid, 2002; Winsor, 2003; Johnson-Eilola, 2005). For the Information Developers at Software Unlimited, however, the Daily Scrum and the smaller post-Scrum meetings appeared to be of particular importance to their inventing and composing. Consequently, this study reports the findings from observations of two Daily Scrum and post-Scrum meetings between Lance and several software developers. Data from the first of these meeting observations was recorded entirely via my handwritten field-notes, while the other was recorded with field-notes and videotaped using a Webcam placed so as to capture the speech and gestures of the participants. I used this video to check and clarify my field-notes when I wrote them up.

Follow-up Interviews

As soon as possible following those observation sessions in which I was not free

to ask clarification questions of participants as they worked (i.e., meeting observations

and sessions observed remotely using *Morae*), I conducted debriefing session

interviews with participants. These short, informal interviews were loosely structured

based on questions I had noted in my field-notes or using the Observer Log feature of

Morae. The purpose of these interviews was to better understand any actions or other

elements of the scene that were not readily apparent to me based on the context. An

example of this type of question included asking Lucy to explain the purpose behind a

highlighted portion of her text that I observed during one composing session.

Artifact Collection for Corroboration

Whenever possible, after composing or meeting observations, I requested hard-

or soft-copies of any texts the participants interacted with during the session. Instances

of these artifacts included participants' texts-in-progress, their to-do lists, and their

meeting notes. Having these artifacts provided a fuller picture of participants' memory

practices in given scenes. For instance, several texts-in-progress contained lacunae

where participants were unable to find the information needed to complete the

document, while others served dual purposes as both talking-point reminders and as

objects of joint attention during meetings with software developers.

Data Collection Schedule

Altogether I logged over 120 hours at the research site between September 2007

and March 2008. Table 1 gives the dates of the interviews and observation sessions.

Table 3: Data Collection Sessions

Participant	Initial Interview	Composing Session Observation	Meeting Observation
Becky	9/19/07	--	--
Lance	9/26/07	10/25/07 11/21/07 2/6/08	10/25/07 11/21/07
Peter	10/4/07	--	--
Monica	10/18/07	--	8/29/07
Angela	10/24/07	--	9/13/07
Lucy	11/16/07	1/17/08 2/29/08	1/17/08

Data Preparation

My research methods resulted in four basic categories of data: 1) the

handwritten field-notes that I took while observing a large number of meetings, three

composing sessions with Lance, and follow-up interviews with Lucy; 2) videotapes of

initial interviews with all five participants and a meeting between Lance and a Web

developer; and 3) *Morae* video/screen recordings of two composing sessions with Lucy;

and 4) artifacts. Each of these data types required different steps in order to prepare it

for segmentation and coding. For handwritten field-notes, as soon as possible after an

observation session (typically within 24 hours), I converted my notes into coherent

write-ups and attached to these write-ups cover page contact summary forms (Miles &

Huberman, 1994) on which I recorded salient contextual information about the session,

including the participants involved, the location, any software or hardware employed by

the participants, and any particular issues, themes, or unanswered questions related to

my research questions that arose during the scene. The composing session with Lance on 2/6/08 had to be removed from the data analysis reported in Chapter 4 because of my failure to produce one of these write-ups in a timely fashion after the session.

For *Morae* recordings of initial interviews and Lance's meeting with the Web developer, I transcribed the audio and made extensive annotations from the videos, noting participant gestures, facial expressions, posture, and object manipulations indexed to the corresponding audio. The two work sessions with Lucy recorded with *Morae* captured her onscreen actions (mouse cursor movements, clicks, and keyboard activities), audio, and video from a video camera placed atop her monitor pointing directly at her face and automatically indexed to the corresponding onscreen actions. For these recordings, I transcribed speech and wrote detailed accounts of Lucy's activities on her computer and any gestures or physical object manipulations captured on the video. Additionally, as with the work sessions recorded using field-notes, as soon as possible after the observation session, I created cover page contact summary forms on which I recorded background information about the session.

Data Segmentation and Coding

I segmented transcriptions of interviews and meetings into discourse units or "d-units" (Colomb & Williams, 1985). Colomb and Williams (1985) define a d-unit as "any stretch of continuous text – a whole text, a section, a paragraph, even a small group of related sentences – that functions as a unit and whose parts are more related to each other than to those outside the d-unit" (p. 102). They further elaborate that the d-unit is an appropriate tool for rhetorical analysis because it helps us account for contextual features of connected text that other analytic tools, such as the t-unit, do not:

"what we lack is a consistent, systematic vocabulary that correlates perceptions of coherence with features of text structures" (Colomb & Williams,1985, p. 101).

Although Colomb and Williams first formulated the concept of a d-unit as a means of describing structure in *written* rather than *spoken* texts like interview and conversation transcripts, I selected it as my unit of analysis because the d-unit, more than any other analytic unit, met my need for understanding speech about activities as indicators of those activities. The central structure of a d-unit is an issue statement and a discussion about that issue. Therefore, I reasoned that the d-unit, as a coherence-explaining structure, corresponds well with the question and answer format of interviews in which I asked participants to describe the work processes that I later hoped to see in action: my questions demarked an issue and the participant's answer to the question constituted the discussion. In other words, I believe that, as it does with written text, the d-unit possesses descriptive power for the coherence that interlocutors perceive and achieve during structured conversations such as interviews as the interviewee listens to and then responds to the interviewer. In short, if we substitute the word "interlocutors" for "readers" in the following passage, Colomb and Williams' (1985) point applies equally as well to structured conversations as it does to written texts: "coherence is not an inherent feature of texts. Readers create coherence and, for the most part, are eager to do so. They will do so when the texts they encounter allow them to generate appropriate expectations for what is to follow" (p. 105).

Two further aspects of the d-unit, as Colomb and Williams formulate it, are also useful. First, the component parts of the d-unit, the issue and discussion, do not correspond to sentences or even groups of sentences, as in the traditional notion of a

topic sentence, but instead are "fixed discourse position[s] or slot[s]" that can vary in length, ranging from a clause to a paragraph, depending on the phenomena of interest to the researcher (Colomb & Williams, 1985, p. 108). I found this helpful in several instances for understanding my participants' answers to my questions (i.e., the discussion portion of the d-unit) as divisible into multiple d-units. So, for example, when responding to my interview question: "What resources do you typically consult when conducting research when you begin a new project?", Lance began by referencing other people as resources:

> I try to make friends with all the programmers who are doing the website or doing the recorder or anything. Now it's actually getting better – on Monday morning or Tuesday – [Becky] and I had a meeting with some marketing people, which doesn't really happen that often. So I'm learning how to get something done. So today for example, there's some technical things that I don't really understand or spend my time on like how to download or install or point my recorder to the right server. So now I know this [...] guy who'll take care of that problem really quick for me.

In answer to the same question, however, Lance continued by talking about a finding activity:

> Other things, [Software Unlimited] on the N drive has a history of all the things associated with a project. So if I went into [product name] when I got here I could kind of go back and look at what had been said in other meetings and Sprints. So far it seems like it's not really organized or used very well, so one of

my goals with the Wiki would be that I could click on [product name] and

there'd be a lot better organization of what's going on.

The affordances of the d-unit enabled me to segment the two passages separately.

Second, d-units themselves can be nested inside other d-units, again depending on the phenomena of interest, a characteristic that makes the d-unit powerful in describing the format of semi-structured interviews and of speech about activities as indicators of those activities. That is, the concept of nested d-units can help us account for the structure of the inevitable side-roads and follow-up questions that occur in semi-structured interviews, but it can also help index talk about activity to the activity such talk describes. So, continuing with the example above, Lance resumed talk of referencing once he finished his digression about finding: "If I got transferred to [another product] that would be really scary to me because I don't know much about it. [...] So the first thing I would do is talk to Peter who's on it now and get the behind the scenes kind of [stuff]." The affordances of the d-unit, then, enabled me to, where necessary, segment these based on the different memory activities or practices Lance described.

As for coding these activities, I coded data according to the type of memory activity being performed (in the work session observations) or indexed (in the interviews). This coding scheme is based on my reading of the vast and multidisciplinary literature on memory. However, because this literature *was* so vast and multidisciplinary, arriving at definitions and boundary conditions for the activities

of "doing memory," of necessity, involved a degree of interpreting and eliding to better fit my focus on memory as rhetorical action, as I will explain below.

The codes that I adopted were archiving, reminding, finding, referencing, and gesturing. First, I labeled as *archiving* any activity or practice whose primary purpose was storing knowledge for later use. I chose the term "archiving" over other possibilities like "storing" because of the richness of the term in the literature, including especially Derrida's (1998) emphasis on the jussive and sequential aspects of archiving and Bowker's (2005) focus on archiving as the process of rendering knowledge useful through classification: "a structure of record keeping [that] subtend[s] this common time, rendering it useful through permitting the collocation of accounts of said events" (p. 10). The following are examples of activities that I label archiving: taking notes at a meeting; creating a directory structure on a hard drive; storing a document in a paper file folder; copying a file to a network drive.

By contrast with archiving, I use the term *reminding* as shorthand code for an activity which could best be thought of as "creating reminders." Where archiving activities entail saving memories for the long term and for multiple or not always clearly-defined future uses, I distinguish reminding as creating a limited-term memory (basically a memory aid) with a single clearly-defined purpose or a very limited number of purposes. Where archiving primarily facilitates conscious searching and browsing, reminding principally facilitates unconscious recognizing. Larsen and Wactlar (2003) distinguish recognizing from finding, which they term recalling, this way: "cognitive psychologists distinguish between two fundamental types of memory: recognition and recall. Recognition occurs when you see something familiar, while recall requires that

you remember something and are able to articulate it" (p. 15). The following are examples of activities that I label reminding: creating a list of questions to ask at a meeting; creating a post-it note and sticking it in a spot where it will be seen; using the calendar feature of Microsoft *Outlook* to create a pop-up meeting reminder.

I code as *finding* any activity in which a participant attempts to locate digital or non-digital memories. For finding performed with computers, this principally includes the activities of conventional information retrieval: logical searching and location-based browsing, to use Barreau and Nardi's (1995) language. According to Larsen and Wactlar (2003), in logical searching "the user has to describe what he/she wishes to retrieve, formulate a query, and submit a search [while in] browsing [you have to look] around until you find something of interest that you recognize as useful [...] most browsing still requires that the user describe a starting point." (p. 15). In sum, I operationalize logical searching as a keyboard-enabled activity in which a user types text that he or she wishes to search for and location-based browsing as a mouse-enabled activity in which a user navigates a graphical user interface of some type, such as *Windows Explorer* or the menu structure of a software application. I also attempt to take into account intentionality: Where recognizing a reminder is often unintentional, finding something stored in an archive is intentional (searching) or semi-intentional (browsing). The following are examples of activities that I label finding: browsing through files on a hard drive; querying using the Find and Replace feature of Microsoft *Word*; rummaging around an office; searching the Web; looking for reading material in the company library.

Ackerman and Halverson (1998) point out that organizational memories are "complexly distributed, interwoven, and occasionally overlaid. They [are] sometimes the province of the individual [...] or the group" (p. 46). Distributed cognition theory recognizes that memories are also distributed to artifacts (Hutchins, 1995b). So, I code as *referencing*, then, activities in which the knowledge of another person or artifact is consulted or referenced in speech. In a sense, then, referencing could be thought of as the activity that follows successful finding: after we have found a source document, we reference it as we write as an aid to short-term memory, or we ask a colleague for help on a particular problem after we have found out who possesses that knowledge and how to go about asking for it. The following are examples of activities that I label referencing: reading information from a white board or a document; asking someone for information during composing; referring to knowledge or a type of knowledge held by another person during an interview; alt-tabbing to look at the user interface of an application while writing documentation for that application.

Finally, borrowing from the gestural coding method advocated by McNeill (2005), if the participant performed a gesture high in the dimensions of iconicity (picture drawing) or *deixis* (pointing), I double-coded the segment *gesturing*. My rationale for paying attention to these types of imagistic gesturers is that they represent an important means of "seeing" what is going in my participants memories as they speak and work. According to McNeill (1992), "gestures are the person's memories and thoughts rendered visible. Gestures are like thoughts themselves. They belong, not to the outside world, but to the inside one of memory, thought, and mental images" (p. 12). Further, gestures give a glimpse into the spatial, embodied nature of a person's

memory: "The gesture reveals not only the speaker's memory image but also the particular point of view that he had taken toward it" (McNeill, 1992, p. 13). In other words, I believe that gesturing, particularly gesturing that reflects my participants' memory-images of scenes, plays an important role in helping me understand the role of embodiment in memory.

Departing from traditional methods of coding gestures such as McNeill's (1992, 2005) schemes in which he labels as "gesture" only those physical movements coinciding with speech, I also code as a form of gesturing mouse cursor movements that do not entail software manipulation, which, for lack of a better term, I label "touching." In more specific terms, these are mouse cursor movements that do not play a role in triggering "events," such as clicking a button, scrolling a menu bar, highlighting a text in order to copy it, hovering the cursor over hyperlinked text in order to trigger a pop-up, or dragging a dialog box. Instead, they appear to be some form of *deixis*, in which participants attempt to physically touch the information displayed on their screens. As with hand gestures, then, I am interested in these unintentional or semi-intentional gestures as indicators of embodiment in memory work.

Data Analysis

The purpose of my analysis of the scenes from Lance, Lucy, and Angela's working lives was to understand the role of embodied contexts in mediating the memory-related activities of invention. As my research questions state, I wanted to know if these contexts played a role; if so, when and where they were most important; and, finally, how they helped or hindered composing. The process of analysis, then, involved searching for patterns of the categories of memory work identified above in

these scenes, and contextualizing and corroborating those patterns with reference to my entire corpus of data from all my participants' meetings, job shadowing, and interviews. My method of presenting this research in Chapters 4 and 5 is to provide an introduction to the participant (Lance in Chapter 4 and Lucy in Chapter 5), an overview and synopsis of the two scenes in which I attempt to highlight the action of the scenes that I found most salient to my purposes, and finally, an analysis in which I offer tentative hypotheses of the patterns I found in each of their scenes, again corroborated by data taken from the entire corpus. Finally, Chapter 6 attempts to bring these patterns and hypotheses together by considering a scene of memory work with Angela in order to offer some tentative answers to my research questions and to suggest future directions for research into the embodied theory of memory in invention that I am attempting to formulate.

CHAPTER 4: TWO SCENES OF MEMORY WORK WITH LANCE

Introduction

In this chapter, I focus on Lance's memory activities in two scenes of memory work that I observed. I will argue that there is a pattern to the ways in which Lance engages in these activities and that the other information developers display a similar pattern, and hence that the activities constitute a practice. Moreover, I will argue that this practice of memory is shaped in large part by the memory regime at Software Unlimited.

My method of analysis is to compare two of the memory activities from my coding scheme – archiving and reminding – as a way of speaking to a range of memory practices in this regime. It is, therefore, worth repeating here that the principal distinction between archiving and reminding as I define it lies in differences of time and purpose: archiving practices have multiple, often not clearly-defined purposes and are intended to store memories for the longer-term while reminding practices are generally shorter term and have a single (or quite limited) number of purposes. As the scenes recounted below show, the distinction between these "input" activities of memory is not always easy to discern and one activity can often merge into the other, but, as I hope my analysis reveals, it is precisely these overlaps that can provide the most insight.

At the time of our interview and observation sessions, Lance had been employed at Software Unlimited for less than half a year, making him the newest member of the Information Development team. Despite this, he came to the company with considerable previous experience working with technology and had already earned the

respect of his teammates, who highly praised his knowledge and research skills, one teammate averring "he's really great at research. We haven't worked together that long but he comes up with stuff [...] I want to learn more about how he does research in the future because he seems to come up with a lot and come up with new ideas from places I never would have thought to look."

This high degree of competence and desire to learn was demonstrated in my interview with Lance, in which he informed me of his enthusiasm for working for a company that values innovation and encourages its Information Development team to act as user advocates (a duty that was actually listed in the job description) by helping shape the design of the product user interfaces and workflows. In fact, all five information developers, including Lance, informed me that acting as user advocate in the software design process was their *primary* job duty, more important even than writing documentation, one participant even adding that "writing per se [is] the smallest part of our job." Not surprisingly, then, persuading the software developers to improve the user interface workflows was the substantial motivation for both of Lance's composing activities described in the scenes in this chapter. The company's encouragement of innovation also influences Lance's archival practices. For instance, he keeps a directory on his computer titled the "back of the mind" because "it's conceivable that some of those crazy ideas that I might get a chance to do some of them, so it's worth writing them down whereas at some companies it's like don't even bother thinking about them."

Since he arrived at the company, Lance has been assigned as the primary information developer on a new product, a "lite" web-based version of an older

conventional "boxed" (i.e., sold as a disk in a box) Software Unlimited product. Understanding and influencing the evolving workflows of this new software has become Lance's primary preoccupation and it influenced many of his job activities and his attitudes toward these activities that I witnessed during my research at the site. For instance, Lance interpreted my question asking him to describe his project management practices entirely in terms of understanding his product. Of the product he says:

> Even though it doesn't exist yet, I pretend it does and I might use freehand paper and I draw out what I think it might look like even if the UI people don't come up with the design or anything. And then I try to write help for it even before it exists basically. That really helps me get the workflow stuff down and then [...] we might see a mockup or something and I see if I compare my workflow to that document how would it work.

This quotation points to an important domain of knowledge and means of storing that knowledge in this organization: the product itself. I will be examining this in more detail in the analysis which follows.

The scenes recounted below took place during job shadowing sessions in October and November 2007. I selected these days and times for job shadowing and for more detailed work session observations for the following reasons in order of priority: 1) Lance's indication that these would be convenient times for me to observe; 2) his consideration of the sessions' relevancy to my project (i.e., he knew that he would be engaging in extended composing tasks within bounded spans of time. Both composing

sessions were terminated by his daily Scrums, which I was also allowed to observe and which also formed part of the scene); and 3) my own teaching schedule.

Scene 1: Arguing for Changes to the User Profiles

Overview of the Scene

This scene took place the morning of October 25, 2007. The activities of this scene of memory work occur in three parts, each with a different cast and setting. The first part of the scene took place in Lance's cubicle from about 9:00 am until 10:30 am, and primarily involved Lance working alone on a documentation task while I sat behind and slightly to the right of him, observing and taking field-notes (see Figure 3). He had his laptop open on his desk. This laptop was attached to an external monitor, keyboard, and mouse, and sat slightly to his right while the external monitor sat directly in front of him. He had enabled a function that allowed his laptop display to act as a subsidiary display for the monitor so that he could view information on both. The second part, the Scrum meeting, took place from 10:30 am until 10:40 am in the "Scrum Hall" and consisted of the 12 product team members standing in a semi-circle facing a large Gantt chart (see Figure 4) detailing each team-members' progress toward the 30 day Sprint goal. The final part of the scene began immediately following the Scrum, when Lance asked two developers to stay behind and meet with him. The three remained standing in the Scrum Hall for the duration of this short meeting (about 10 minutes). In both the Scrum and the follow-up meeting, I stood slightly behind the participants in order to see and hear the discussion without being obtrusive.

Figure 3: First part of scene one – Lance's office

Laptop, external
monitor, mouse,
and keyboard

Lance

Researcher
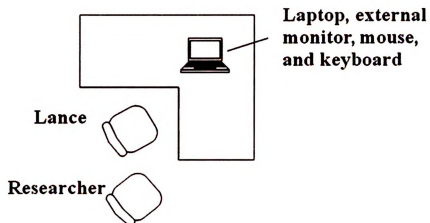
Figure 4: Second part of scene one – Scrum hall
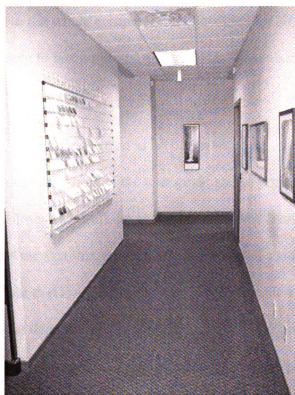
Synopsis of the Action of the Scene

When I arrived at 9:00 am, I found Lance already at work in his cubicle. He informed me that his main task for the period I would be observing was to start updating a section of the draft of the product user guide to reflect changes in the user interface and in the workflow for updating user profiles in his product. He further informed me that he was troubled by the latest version of the user interface, which had been changed completely from earlier iterations, and that he believed it "wouldn't work" because it would be too complex for most users to update. He explained that this was particularly frustrating because a big goal of his product team all along had been to make setting up profiles easy. He also added that the "End of Sprint demo" of the latest version of the product to the whole company was scheduled for November 6, so any changes to the UI would have to be completed no later than November 1, six days from the time of my observation session.

Lance's first action as he began working on this task was to open the most recently updated draft of the user guide and to print a copy; however, rather than working from this draft, he chose to start a new *Word* document from scratch. He informed me that this was because the extent of the changes to the product had made him decide that it was better to start a new document than to update the old, even though the deadline was looming. He created the primary headings in this new document, naming them "Set up users," "Create a new profile," and "Assign profiles." Noticing that he was not referencing the printed version of his draft as he wrote these headings, I asked him if he was working from memory. He informed me that he was "thinking like an admin," or thinking about the prototypical administrator tasks that

would need to be performed in the product. Thinking and acting in the person of the user was to be a recurring theme with Lance in my observations.

As he began to write the text for the "create a new profile" section (again not looking at his draft), Lance extensively referenced his product, which was running on his secondary laptop, but he did not appear to refer to the original draft or to the printout very often. He worked on this new document for about 20 minutes, alternating his attention between the document-in-progress and the product several times, and quickly writing about one page of documentation (see Figure 5) as he navigated through the product. At about this time, Lance turned to me and told me that he was beginning

Figure 5: New section of the user guide
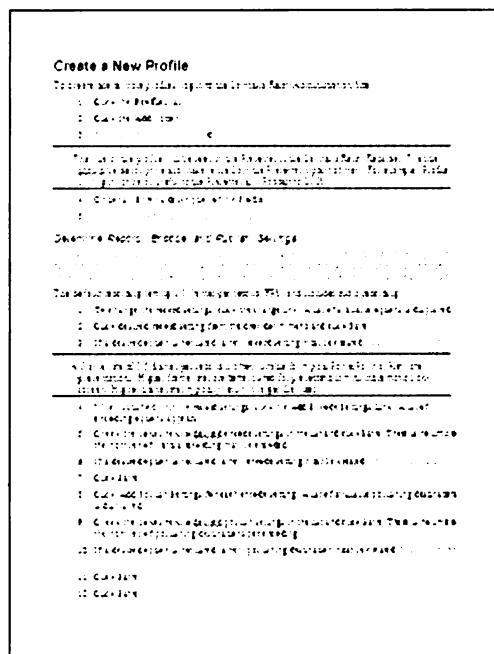
to perceive some serious problems in the product workflow. At this point, he stopped documenting and began exclusively navigating and experimenting with the product interface. He had an intent look on his face as he did this.

Lance next informed me that he had already had a conversation with the software developer about the workflow for this procedure but that he could not remember exactly what she had told him about it, so he was not entirely sure if the software developers were planning to change the interface again or not. So, at this point he created another *Word* document and wrote down a particular question about the workflow for the developer, informing me that he would ask the developer this question after the day's Scrum meeting. After writing his question, he resumed documenting the procedure and stepping through the product interface. However, after just a minute, he realized that he had another question for the software developer and then another and another and another. He updated his second document, which I am terming his "reminder document," with these questions as he worked, alt-tabbing between the product interface and the two documents many times. After about 30 minutes of this, he opened a screen capture program and began taking screenshots from the user interface to clarify his questions in the reminder document, even going so far as to add annotations and callouts to this document (see Figure 6).

While working, Lance wrote himself a post-it note reminder to ask his colleague Peter to show him the documentation for his own product. Lance informed me that he likes the user interface of Peter's product, which he believes "makes the doc almost unnecessary" and would like to see a similar solution for his own product and documentation. He further added, that, based on the problems with the workflow and the number of questions he had for the developer, he suspected that the procedure he was documenting for the user manual was going to change substantially.

Figure 6: Lance's reminder document

At 10:25 am, an *Outlook* Calendar reminder popped up on his screen, giving

him five minutes' notice that his Scrum was about to start. He printed his reminder

document and then saved an electronic copy to his desktop, where he informed me he

tends to save documents that have only a limited lifespan, and saved the new draft of

the user guide to the network drive. He grabbed a pen and his printout of his reminder

document and we hurried off to the Scrum, which was located on the other side of the

building, so that we would not be late (Scrum rules discourage tardiness). As we

hurried, Lance informed me that he uses *Outlook* reminders because he has trouble

remembering to attend his Scrums now that they are no longer held in the Scrum Room

adjacent to his cubicle.

The rules of Scrum, which dictate that the Scrum not become a working

meeting, prevented Lance from addressing his issues with the developer in the Scrum

itself, so he simply noted the workflow as an impediment and asked if the developer,

"Andie," had time to meet with him afterwards. Even though he was not using the

Scrum itself as a forum for achieving his goals, as a vehicle for team awareness and for securing face-to-face time with the software developers, it nevertheless played an important role in Lance's work: on our way to the Scrum, he had informed me, "I guess the Scrum was a motivating factor this morning."

After the Scrum, Andie and another software developer, "Gene," remained behind to talk to Lance. The developers began by reassuring Lance that the version of the product interface that he had been working on would indeed be changing again. At this

Figure 7: Annotations to Lance's reminder document
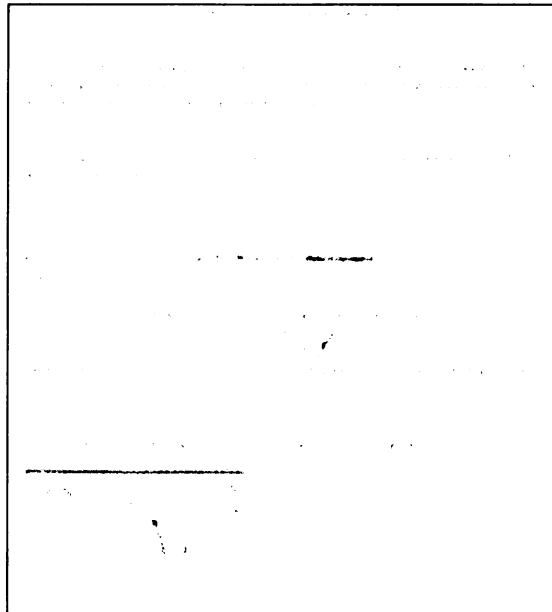
point, Andie wrote answers to several of Lance's questions and drew a small mockup of the new interface in the white space at the bottom of the first page of Lance's reminder document (see Figure 7) and she and Gene proceeded to explain how this interface would function. However, Lance countered by noting that the workflow would still be confusing and Andie responded by asking if he could give them any advice. Lance

gave his advice and there was some back and forth discussion of the workflow, with considerable attention paid to Lance's screen captures and Andie's sketch, and many iconic gestures as each of the three participants drew potential interfaces in the air for each other as part of their discussion. Lance, in particular, used these iconic gestures as he articulated his vision for a redesigned interface, in part perhaps because he was no longer holding his reminder document or pen. After this, there was a general silence for about fifteen seconds as the developers looked at the page and appeared to be thinking through the implications of what Lance had said. Finally, the developers acknowledged that there were problems with the workflow and agreed to try to correct them. Andie drew another mockup in the large white space at the bottom of the second page, and showed it to Lance, who approved of the change. Lance told them to keep the reminder document to help them make these changes, but Gene noted that their answers to his questions were on the document. So, Lance ended up taking the first page with him and leaving the second page (the one containing Andie's second screen drawing) with them. On the way back to his cubicle, Lance expressed satisfaction at the way the meeting had turned out.

<div align="center">Scene 2: Meeting with Wallace</div>

<div align="center">*Overview of the scene*</div>

This scene took place almost one month after the first scene, on the morning of November 21, 2007. As with the previous scene, this scene occurred in three parts: 1) Lance composing in his cubicle from shortly after 9:00 am until 10:30 am; 2) a short Scrum meeting in the Scrum Hall; and 3) a post-scrum meeting with a Web developer, "Wallace," to discuss another user interface and workflow issue. During Lance's

composing and the Scrum, my positioning was similar to that in the first scene in that I tried to position myself behind Lance or outside the semi-circle of meeting participants gathered around the Gantt chart in the Scrum Hall (see Figure 4) in order to be as unobtrusive as possible. In the third part, which took place in Wallace's office rather than in the Scrum Hall, I positioned myself in between though slightly to the side of Lance and Wallace, so that I could see both of their faces and gestures clearly and see the desk surface that lay between them (see Figure 8). In addition to taking field-notes during this meeting, I also recorded video using *Morae*, which I later transcribed and annotated with data about Lance and Gene's movements, object manipulations, and

Figure 8: Wallace's office
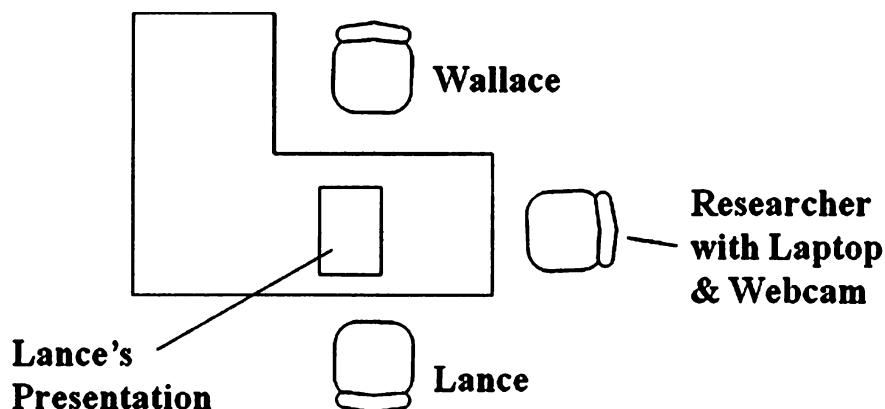
gestures. This helped me achieve a fuller picture of the action of this part of the scene than I was able to achieve in the earlier post-Scrum meeting.

Synopsis of the Action of the Scene

When I arrived at 9:00 am, Lance explained to me the purpose of the activities he would be engaged in. As with the first scene, he was concerned with a user interface and workflow problem that he perceived in his product. In this case, the issue

concerned the manner in which this product, a Web-based product, would be integrated

with its much more complex and full-functioned boxed cousin if users happened to try

to use both on one computer. He had been made aware of the issue by one of the

customers currently involved in the beta test of the product, who had posted a message

to the beta Wiki indicating that she was confused by several aspects of the integrated

interface. After learning of this, Lance had grown increasingly alarmed that the

integration of the two products was not being thought through carefully enough – a

notion reinforced by a meeting of product managers he had attended the previous Friday

in which the integration was presumed to be "an uncomplicated affair." His purpose

during this work session, therefore, was to update a *PowerPoint* presentation to take to

the post-Scrum meeting with Wallace, "a talented web developer," on his team who had

particular clout as the person in charge of all the interactions with beta testers for that

product. Lance hoped, in short, to win Wallace's support in his effort to change the

integration interface, though he acknowledged that this might be difficult because

Wallace "gets pulled in two directions a lot."

Lance began work by opening a *PowerPoint* presentation that he had created on

a previous day. In our follow-up interview, he informed me that he had created and

delivered this first portion of the presentation to his information development

teammates, their manager, Becky, and their director the day before so that they would

all be "on the same page" when talking to the rest of the company about the issue. Even

though his meeting with Wallace would be one-on-one dialog instead of a presentation

delivered to a group, he had opted to update this *PowerPoint* instead of creating a new

document from scratch. He was planning to add slides containing sequential

screenshots depicting step-by-step walkthroughs of two scenarios users might encounter when using the integrated product interface. Rather than recapturing the screenshots himself, though, he told me that he hoped to find the screenshots, which he knew that Monica, who had earlier been assigned to the product, had already taken and placed somewhere on the N drive. After a few minutes of fruitless browsing on the N drive for these, however, he gave up, muttering, "we gotta get a Wiki or something."

He next opened his screen capture software and the product itself and proceeded to navigate through the product's interface, taking screenshots as he went and pasting these into the *PowerPoint*. At first he was, for speed, pasting every screenshot into a single slide, with the intention of breaking them out onto separate slides when he finished with his capturing, but, informing me that he was afraid he would forget the proper sequence, he started cutting and pasting the screenshots into individual slides, sequencing them to imitate the functioning interface for the scenario he wished to show to Wallace. When Lance finished this, he went back and polished up his slides by adding some explanatory text and graphics to enhance the visual appeal. Finally, he informed me "that's good enough for Wallace," printed it, set the printout on his desk where he wouldn't forget to take it to his meeting, and began to work on another short task in the interval before his Scrum. As before, he worked right up until his *Outlook* reminder informed him his Scrum was about to begin. He took his pen and printed version of the *PowerPoint* and we left for the Scrum Hall.

As in the first scene, the Scrum meeting itself was quick and fairly uneventful, with Lance using it mainly as an opportunity to remind Wallace that he wanted to meet with him afterwards. Lance did update the Gantt chart by moving the note containing

the task concerned with fixing the integration issue, which he said had become "like a cancer," to the next Sprint so that he could cross it off his to-do list for the current Sprint.

Immediately after this meeting, Lance, Wallace, and I proceeded to Wallace's office, down the hall from the Scrum Hall, in the software developers' wing of the office. Wallace began by asking the purpose of the meeting. Lance recapped for him the previous Friday's meeting in which the product integration was described as "seamless" with, Lance believed, no consideration of the development effort involved in making it so: "make it happen, developers, make a button or something." At this point, Lance placed his *PowerPoint* printout face up on the desk facing Wallace and, for the next minute and half, stepped Wallace through the workflow in detail, pointing frequently to the screenshots with his pen and alternating his attention between the printout itself and Wallace.

After Lance finished his walkthrough, Wallace indicated that he was not particularly worried about the issue Lance had identified, or at least that it was not a new or unique problem to the new software they were developing. Wallace made this point by invoking his superior knowledge of the product history: "It's not necessarily a new problem [...] to me this is not really a new thing, this is the same kind of drawback [as in the previous versions of the product]." Wallace also made use of Lance's *PowerPoint* printout to make his points, especially when asserting that he considered the problem more a matter of providing adequate documentation than of correcting the workflow in the software itself. For instance, Wallace suggested "I think it's you choose 'upload' and like it gives you exactly, it gives you the synopsis" while pointing

to the spot on a particular screenshot where he thought such a "synopsis" or embedded user assistance ought to go.

Lance held his ground, however, countering each of Wallace's points by appealing to his own knowledge of the user, and at several points even speaking in the person of the user, as when he said, "if I'm using [the product] and I want something and then I do all that work and I send it out there and I don't understand if I get surprises then I'm going to get so mad because the profile took out something or [think] 'why is it like this?'" Lance also attempted to convey to Wallace his own vision of what an improved interface and workflow would look like by alternately pointing to his screenshots and "drawing" pictures of a revised interface in the air. This attempt to offer viable alternatives rather than simply critiquing is a strategy that Lance identified in our initial interview as key to successfully performing his job:

> One thing that I think [Software Unlimited] does well [...] is that it seems like we accomplish a fair amount per minute compared to a lot of meetings I've been to in my past [...] We usually have some sort of printed agenda [...] You know – concrete, just go and just pound it out. What I've learned lately too is if you don't like something, it's not effective just to [only critique it]. It's good to have alternatives and I don't even care if they take those ideas or not, but it was good to be able to compare apples to oranges instead of apples to nothing.

Finally, Wallace, seemed to accept Lance's view, if a bit half-heartedly: "I can see the benefit, now I don't think that they are going to do this a lot, but I could see the benefit." The meeting concluded with Lance planning to refine the *PowerPoint* in order

to continue trying to gain traction on the issue: "So I'm going to fix this up and try to better define that."

In our follow-up interview, Lance seemed cautiously optimistic that he had made his case to Wallace, and in a follow-up email about the issue that I sent to Lance a few months later, he updated me on his ongoing struggle to make his point and he informed me that Wallace "probably sees my point of view 75%, but is not nearly as passionate and has other problems of higher priority for him." But Lance also indicated that some progress was being made, even though it was not necessarily a direct result of his own efforts: "In related news since then, people working more in sales and marketing that have to talk about this with real paying customers I think share my points."

<center>Analysis of Lance's Memory work</center>

<center>*Archiving Versus Reminding*</center>

Comparing Lance's performance of memory work in these scenes with his descriptions of his memory work practices in the initial interviews reveals an interesting discrepancy, a discrepancy that holds significance for understanding the ways in which different types of memory are valued and utilized at Software Unlimited. Remember again that, as I define them, the distinction between reminding and archiving practices lies chiefly in that the former are principally concerned with preserving memory for a limited term and for a single (or very limited number) of uses while the latter generally exist to preserve memories for longer periods of time and for multiple or less clearly demarked purposes.

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The discrepancy is as follows. In the interviews, Lance assigns his archiving practices a far higher degree of importance than his reminding practices while in the scenes of memory work, it turns out to be reminding practices that consume much of his time, attention, and effort. First, as I noted above, Lance indicated in the interview that he considered the archival work of preserving his long term memory in his "back of the mind" folder to be quite important because Software Unlimited encouraged and rewarded innovative thinking and he believed that he would likely be able to use this information productively in the future.

Perhaps even more importantly, Lance indicated that he regarded these archiving practices as critical to his success in his current job tasks. For instance, in response to my question asking him if he finds that the projects grow more difficult as they proceed, he rather emphatically indicated that his archiving practices, particularly the sequential and jussive aspects of those practices, make the job relatively easy, freeing him up for more innovate work:

> It's not a big deal. I think like with the core deliverables [...] those deliverables, those go in a very special place like it's all perfect and that's no problem. Then I have this battery of stuff I might or might not use to create those and that stuff gets kind of wild sometimes [...] So like there's this pile of stuff that seemed insurmountable so I made up this table – this is many iterations of this – and what it does is it sort of makes it into bite sized chunks and then I can sort of prioritize stuff or whatever.

That is, Lance sees these archiving practices fueling his invention processes. At another point in the interview, he says:

> If there's a big debate [...] then for that I'll actually take the time to write up [...] things that nag at me a lot I put sometimes in the 'back of the mind.' [...] Stuff that goes in here is stuff that might someday be useful or it's some note that I had [...] like sometimes people ask me if you have anything for a session description or for a flyer, and maybe if in the future we work with marketing too. Anyway, this is just three sentences or two different sentences that have pros and cons so that in one breath of air you can explain it and that's come in handy quite a bit

In other words, Lance uses this archive as a resource to meet the day-to-day demands of his composing situations. He believes that this archiving practice contributes to his success in his job.

In comparison, Lance does not assign nearly as much importance to his reminding practices. First, whereas he talks about his archiving practices in 14 segments of our initial interview, he spends half as many talking about his reminding practices. Further, he does not simply fail to mention his reminding practices, when he does talk about them he seems in general somewhat dismissive of their importance to his job performance. For instance, of the reminding tools in *Outlook*, such as the Calendar function, which I was later to see him rely on in both the scenes of memory work recounted above, he said: "I know some people use *Outlook* way more efficiently than I do. I only use email. I don't use the journal; I don't use the other stuff." And,

even though he was willing to concede that *Outlook* Calendar was "better than nothing" he did not see it as very important for his own reminding purposes: "it's really funny how everyone is so chained to their *Outlook*. I guess you have to be and one good thing is that if you have a meeting scheduled to end at two then it probably has to end at two because they have a meeting somewhere else. I guess it keeps things from dragging on a bit."

Lance was similarly dismissive of another of those ubiquitous tools for reminding in contemporary workplaces: post-it notes, telling me twice during our initial interview that he did not use them for work very much, but, again, using them for work purposes on several occasions when I job-shadowed him. Instead of ephemera like post-it notes, Lance indicated that, for work-related purposes, he preferred rolling his reminders into longer-term solutions (archiving, in other words), as the following quotation illustrates:

> Like the matter of that skip button, it consumed me and so what will happen is I'll just be at home or in the morning on the drive in or in the shower or something like that and I'll have like this list of things in my mind I don't really write down on post-it notes or scrap paper that much and then I come here and I'll write it and I'll stick it in this [back of the mind] folder.

As I questioned Lance about this preference for archiving over reminding, his answers indicated that memory stored as reminders lacks two characteristics that he values: classification and contextualization. The first, classification and its attendant phenomenon of sequencing (Bowker & Star, 1999) relate to the permanence, stability,

and accessibility that Lance perceives in memories stored in archives. Thus, of one of

his primary reminding practices Lance says somewhat disparagingly, "I've thought

about getting a little notepad you can stick up there [gesturing to the top of his laptop

screen] but pretty much my scheme for that is like if I need something short I actually

just open Word and then I usually just save it to my desktop and when I'm done I delete

it, which is probably not as efficient." By contrast, Lance believes that an archiving

tool like Microsoft's *OneNote* would allow him to store these small chunks of

information in more permanent, classifiable, and, hence, more useful ways: "supposedly

you can get a lot of stuff in one place [...] you know like I need a little information [. . .]

put into a little document you know? Consolidate lots of little things I guess was what I

was thinking it [*OneNote*] might do for me."

Derrida (1995) offers a possible explanation for the type of affordance that

Lance believes he needs in a memory tool. Tools like *OneNote* would allow Lance to

"consign" his memories to safe keeping in the archive: "consignation aims to coordinate

a single corpus, in a system or a synchrony in which all the elements articulate the unity

of an ideal configuration. In an archive, there should not be any absolute dissociation

any heterogeneity or secret" (Derrida, 1995, p. 3). In a sense then, although he certainly

uses remind*ers*, Lance prefers not to engage in remind*ing* as a practice, preferring

instead to store his reminders in an archive where they can be standardized, classified,

and stored in an orderly structure that will render them usable if a future need should

arise.

The second aspect of archiving that Lance appears to value is contextualization.

Because reminding is, by definition, about creating transitory objects or cues, reminders

do not in general need to contain much information about the circumstances surrounding their own creation, instead relying on the circumstances of their use to provide any necessary background context. That this is a problem with reminding for Lance became especially apparent when he discussed the memory practices of his product team. Lance informed me that, since becoming the semi-official meeting "note taker" for his product team, he had brought a new rigor to the job of preserving knowledge generated in meetings so that this knowledge would remain useful. Lance contrasted this rigor with the earlier slapdash reminding practices employed by the team during its crucial Sprint planning meetings. Showing me an example of these earlier efforts on the N drive, he said:

> Okay, so see what someone has done here is copy the whiteboard. But see there's no … that's another thing too like a lot of times we can't remember what does 'error this consistent with Mac' mean? [with rising intonation] What does that mean? Whereas with the notes, I just type like crazy and then I would like write actually more than what would be on the [whiteboard], like the whiteboard didn't say that. [...] Next time what I'm going to do is cut and paste all the meetings and put them on a separate page that just has meetings and then what we like to do is get those done early in those thirty days.

Lance prefers the greater contextualization that the activity of consigning these whiteboards to an archive allows him. By transforming the reminders on the whiteboard into written accounts, he ensures that what started as, essentially, lists of de-contextualized "action items" from meetings become permanent, accessible, and interpretable records in the company's memory.

Archiving practices such as Lance's contextualization of the whiteboard are quite time consuming and labor intensive; they form, in short, one of Lance's major job activities. As Bowker (2005) points out:

> The more information you provide in order to make the data useful to the widest community and over the longest time, the more work you have to do. Yet empirical studies have shown time and again that people will not see it as a good use of their time to preserve information about the data beyond what is necessary to guarantee its immediate usefulness. (p. 117)

The software developers and other members of his product team obviously did not believe this was a good use of their time. But Lance clearly did and he was not alone in this – his emphasis on archiving as a key element to his success was repeated by the other information developers in their interviews, as was the de-emphasis on reminding. For example, while discussing a relatively new practice that she had adopted of keeping a carefully-organized notebook of meeting notes, Lucy said, "I can go back and see if we made decisions or whatever," which makes her more effective and influential in meetings with her own product team: "they want me there." Lucy similarly compared her new archiving practice favorably with her earlier, more reminding-like method of taking notes: "Much more than I ever used any of those notebooks that I just, you know, had randomly. And I think it helps me be a lot more productive [...] I know what's going on and I know that I know what's going on, so I speak up much more often than I used to on a lot of that stuff." Peter, too, noted the importance of archiving to his job duties, particularly emphasizing those duties concerned with acting as an advocate for users. Of his own complex system of utilizing multiple legal pads for keeping notes,

Peter says: "I find a lot of what I do is like when people have trouble designing things or implementing things I tend to write that down because that's going to be something a user might have trouble with later if it was hard to design." Becky and Monica also expressed similar preoccupations with keeping their memories classified and contextualized.

Only Angela, the information developer with the most seniority, differed somewhat in her approach to memory work – and understanding this difference offers a possible roadmap towards understanding the emphasis placed on archiving by the group as a whole. The difference is that, where the other information developers described a lot of careful articulation work and use of external tools to assist them in their archiving practices, Angela indicated that she had, by virtue of her lengthy tenure with the company, virtually transcended the need for external tools or careful articulation work: "other people, they have file folders and they keep track of things. I just don't." That is, Angela's nearly six years with the company meant that archiving for her appeared to have become largely internalized and that when she did employ external tools for archiving, she did so largely to help other people rather than herself:

> There are several people on the [information development] team who are very, very structured. They like lots of lists and check lists [but] I've been doing this so long and I've been here [...] a long time. I'm able to just know a lot of stuff – historical stuff – and why we did things. Whereas people who are new coming on board, they don't have that historical perspective and so they have a need for that information and so I spend, you know, some down time if I have any documenting things about the way they were or how we do things because it

used to just be 'ask [Angela],' 'ask [Angela],' 'ask [Angela].' So, um, I think I try to remember as much as possible and we have a place where other people can go for stuff, if they can find it.

Angela's attitude toward archiving applied equally to her reminding practices. For example, she informed me that she does not take notes at meetings, preferring instead to doodle on a piece of paper: "Doodling frees up some place in my brain that helps me free think on something that's being discussed. In some way doodling helps me focus more on the conversation and think through the complicated processes." Similarly, of everyday reminding practices like creating to-do lists, Angela noted her lists live only "in the back of my head."

These were not boasts: Angela's grasp of the "historical stuff" and the effectiveness of her memory were confirmed by every one of the other information developers. Lucy, for example, informed me that Angela had been her mentor and expressed awe at the extent of Angela's knowledge: "And I think that one thing that I've noticed here is all of the reasons – back reasons – Angela's been huge – I can't even imagine going into that mind for all the stuff she has in there. Angela could explain to me the three year reason – you know the reasoning over the last three years of how something had gotten…" Similarly, the information development manager Becky asserted, "We are really lucky because she's got so much background and understands sort of how we got to where we were with some of these choices and different things that were tried. So we are really lucky to have that. Some of the teams don't have as much history."

Fentress and Wickham (1992) help shed light on Angela's internalization of archiving practices in the following passage in which they articulate a concept rather similar to the standing wave of memory I introduced in Chapter 2:

> If, in certain situations, memory seems fragile and volatile, it is because so much of our memory is the memory of context-dependent information. As long as we remain in these contexts, we remain surrounded by clues which prompt our memory. Here, in what we earlier called our 'present continuum', the external environment itself takes over the job of ordering memory into a sequence: we remember things in the order in which they habitually appear. [...] Take away the external, material support, and the memory of the ordered sequence tends to fade. (p. 73)

An important source of this context for Angela lies in her involvement with the same product for six years: "One of the goals that has been in place since I started with [Software Unlimited] was design a [...] product that Angela can actually use. [...] I am the first customer." In short, working in the same physical and informational context for so many years has helped Angela to develop a *hexis*, which has largely supplanted the need for the archiving tools used by her newer colleagues. Carruthers (1990) has this to say about such a *hexis*:

> Quintilian defines *hexis* as that 'assured facility' (*firma facilitas*) in any art which supplements and transcends the rules themselves, and constitutes what we call mastery. [...] *Hexis* is physiological, as the memory is trained to respond to certain movements, just as a dancer's muscles are, but it is also reasoned, for it

is a 'facilitated' rather than 'automatic' response. [...] For the trained memory

was not considered to be merely practical 'know-how,' a useful gimmick that

one might indulge in or not [...] It was co-extensive with wisdom and

knowledge. (p. 69)

Finally, Angela's *hexis* contributed not only to her memory practices but also to her

authority in the company, a consideration which takes on additional significance when

read in light of the discrepancies I noticed between my participants' accounts of their

memory work and the ways in which that work was actually practiced.

Reminding Versus Archiving

So, to reiterate the discrepancy that I noted between participants accounts of

their work practices and those practices themselves: I noticed that despite all their

dismissing and downplaying of their reminding practices compared to their archiving

practices in our interviews, in the observation sessions in which I observed my

participants actually engaged in work, reminding appeared to play a far greater role than

my participants had given it credit for.

This was particularly true of the two scenes of Lance recounted in this chapter.

In the first scene, recall that while he was working on the user guide for his product,

Lance created a *Word* document in which to write the list of questions he wanted to ask

the software developer, Andie, after the daily Scrum. Before he ran off to the Scrum, he

printed this document and saved it to his desktop, and then, at the conclusion of the

meeting with the developers, he offered to leave it with them. These two actions –

saving the file to his desktop (the place where he stores temporary reminders – "they

[...] find their way to the recycle bin pretty quickly") and his willingness to part with the hardcopy after it had fulfilled its purpose – indicate to me that the creation of this document represents a nearly ideal example of a reminding practice: the document was ephemeral, it was created in order to serve a single purpose, and it did not have a future in any of the company's official archives. By comparison, the user guide Lance was writing during the same scene would seem to have been by far the more important document – it was an official text, a "deliverable" of the type that Lance made sure to store in "a very special place" on the N drive where "it's all perfect." Yet, in comparison to the reminder document, the portion of the user guide that Lance was working on during this scene was not only not as visually complex, containing no screenshots, but it also would, if the reminder document did its job, be radically changed or replaced when the software interface changed.

Thus, the archived document ended up being the more ephemeral and less important of the two documents: the reminder document would live on in the interface while the user guide would be supplanted. Further, the reminder possessed affordances for responding to a particular scene of *kairos* that the user guide did not. It travelled where a user guide could not easily travel and it spoke to the developers in their own language. In this meeting, therefore, the reminder document served as an object of joint cognition, an "(im)mutable mobile" enabling Lance, Andie, and Gene to invent together (Latour, 1987). The document would remain invisible and would not live on in either Lance or the company's memory, but the product of its labor would. In sum, reminding practices in that scene appeared to play a far greater role in Lance's work activities than he realized.

While it seems certain that the undue emphasis that my participants placed on archiving over reminding activities in their interviews was at least partially a result both of my interview questions (see Appendix) and of the manner in which I had characterized the purpose of my research to them, this undue emphasis was also possibly an indication of what my participants believe counts or qualifies as memory work in their organization. That is, I would argue that it reveals what Lance and my other participants think of when they are asked about to describe memory work: stable structures and databases rather than the (im)mutable mobiles and ephemera of articulation work. Further, this behavior might be an indication of the memory regime in place in this organization, a regime that privileges particular forms of knowledge over others. The second scene raises several issues that help illustrate this point.

Although the *PowerPoint* that Lance took with him to his meeting with Wallace in the second scene was intended to serve multiple purposes and to live on in the company's archives, and hence was not purely a remind*er*, remind*ing* was unquestionably the main purpose of Lance's work on it during this scene. Certainly, it appeared that his addition of the screenshots was intended primarily to serve as a reminder to both himself and to Wallace as they tried to hash out the issues: "that's good enough for Wallace," he said when he finished updating it just prior to the Scrum. That is, even though the *PowerPoint* was intended to communicate and persuade Wallace, it was also, though perhaps a bit less obviously than the document in Scene 1, intended to serve as reminder document so that Lance could remember the points of his argument and Wallace could follow along. I would, therefore, characterize the memory

work that Lance performed in this scene as primarily an example of reminding rather than archiving.

As Lance and Wallace worried over this *PowerPoint*, passing it back and forth several times during the meeting, a key theme that emerged was that Lance and Wallace considered different types of knowledge as warrants for their arguments: Lance appealed primarily to knowledge of the user while Wallace appealed primarily to knowledge of the product itself. That is, in both his initial resistance to and in his eventual (grudging) acceptance of Lance's critique of the product interface and workflow, Wallace primarily invokes his superior knowledge of the product and its history. He, for example, suspected that the issue Lance was raising was not a new problem, "to me this is not really a new thing" and, if it was, he believed that it could be solved by simply finding some real-estate on one of the user-interface screens in which to insert embedded documentation.

Wallace was, it appears, invoking Lucy's "back reasons" or Angela's "historical stuff" to warrant his arguments. This "historical stuff" is important, and it lives quite concretely, though often unnoticed in Software Unlimited's archives and infrastructures, particularly, as this scene shows, in its product interfaces. Bowker (2005) makes an observation about programming languages that applies equally well to Software Unlimited's products:

> A programming language that operates as part of an organizational infrastructure can have potentially large effects on the nature of the organization [...] So object orientation is on the one hand a model of the world, and on the other hand

the world is learning how to model itself according to object orientation. This

kind of bootstrapping process is common when you deal with infrastructures.

[...] The programming language is very much part of the organizational history

and vice versa. (p. 31)

In other words, as both the primary objects of attention of the company's employees

and as the products of their ongoing labor, Software Unlimited's software products

themselves hold perhaps the most important memories of the organization. That is, the

"back reasons" exist in the present in the evolving products themselves, a circumstance

which both preserves and obscures these memories: "you don't need a memory if

evolution is doing your thinking for you" (Bowker, 2005, p. 100).

The back reasons, held in the company's products, determine which warrants are

justified and which are not justified. Newer employees or comparatively lower-status

(than the software developers) employees like information developers, such as Lance,

then, believe that they must constantly strive to consign these memories held in

products and interfaces to usable archives by classifying and contextualizing them.

Hence, it is not too surprising that, when they are asked to talk about their memory

practices, information developers think in terms of stabilizing and permanently

preserving memories – that is what the memory regime implicitly requires them to do.

Or, as Bowker (2005) again puts it: "It is not just the bits and bytes that get hustled into

standard form in order for the technical infrastructure to work. People's discursive and

work practices get hustled into standard form as well. Working infrastructures

standardize both people and machines" (p. 112). At Software Unlimited, this "standard

form" is principally determined by the tools and infrastructures of the software

developers – as Lance points out, "it's a very developer-centric work environment," so what counts as memory for developers counts for the other employees as well.

In contrast to the comparatively solid and concrete knowledge of products exhibited by interfaces or held in more senior (like Angela) or higher status (like Wallace) employees' heads, knowledge of users of the type that Lance uses as warrants for his arguments is "homeless" and without concrete representation in the organization. To illustrate this: when I first began this study, I was quickly struck by the emphasis that Software Unlimited seemed to place on users and the user experience. Usability testing and product demonstrations for customers were, apparently, regular occurrences. This led me to ask Becky if there was any single repository or archive of knowledge about users in the company and, if so, who "owned" this information. She answered in the negative: "I think you just have lots of little sources for it when you are doing your work. It would be amazing to have that sort of one stop place to get all that information for research or whatever but I just don't know that anyone has that as their job. It's sort of all of our jobs but we do it for different reasons and for different things." That is, unlike product knowledge which is literally placed before the eyes of virtually every employee every day, knowledge about users exists in a much more ephemeral state in this organization.

This phenomenon of dispersed knowledge about users was reinforced by the other information developers. For instance, when I asked Monica if user-testing data was made available to her, she said that she and the other information developers were free to watch the user testing as it occurred, but she seemed to imply that more permanent records or detailed studies were not generally made available to everyone but

instead had to be acquired from the group conducting the test: "They show us an overview and if we wanted to see more details or if I had specific questions about something I could go and ask someone to show me their findings and research or data." In fact, the issue of which groups were permitted to conduct user testing became a source of controversy during the period of my study. The information developers conducted their own user test of a product but doing so led to a conflict with another group over who possessed the right to conduct user tests of products. The information developers eventually ceded the issue and did not conduct any further user testing during the study time-period.

So, lacking full access to the back reasons concerning either the products or the users, newer information developers like Lance must perform a great deal of articulation work to achieve their goals. Often this articulation work takes the form of efforts to stabilize, contextualize, or embody knowledge about users in some fashion. In Lance's case, he sometimes performed this work through gestures, as he traced his vision of the interface in the air, he sometimes created reminders for himself or his interlocutors or to serve as objects of joint attention, and he sometimes even acted in the persona of the user. In each instance, however, this articulating entailed a great deal of memory work to help Lance share his phantasms with other people so that he could convey his vision of the user experience.

Conclusion

These scenes of Lance's memory work have begun to delineate some of the details of the memory regime at Software Unlimited. Understandably, this memory regime seems to most highly value knowledge of its software products. However, this

knowledge, though it resides in the product interfaces and is therefore in a sense universally available to everyone in the company, is nevertheless inaccessible to many employees because the constantly-evolving product interfaces do not describe the circumstances and contexts of their own creation in a language that is equally accessible to everyone. The information developers, particularly newer ones like Lance, then, seem to expend a great deal of effort on articulation work to contextualize this knowledge and place it into a system where it can be readily found if needed.

In addition to product knowledge, these scenes also revealed user knowledge to be important to this organization, especially to the information developers, for whom user advocacy is a principal job duty. It was in trying to transform this domain of knowledge so that it would be visible and comprehensible to other employees that Lance appeared to rely most on his embodied contexts for invention. That is, it appeared that it was to solidify and give a "place" to user knowledge that compelled Lance to employ all the tools at his disposal to bridge the gap between his position and that of his interlocutors. In other words, Lance was attempting to raise the status of user knowledge as a *topoi* to the same level as that of product knowledge as a basis for arguments. The limited measure of success he experienced in these efforts is some indication of the obduracy of memory regimes.

CHAPTER 5: TWO SCENES OF MEMORY WORK WITH LUCY

Introduction

In this chapter, I focus on several breakdowns and recoveries that Lucy faces in

two scenes of memory work that I observed. I will argue that these breakdowns and

Lucy's efforts to recover from them further delineate the memory regime at place at

Software Unlimited, a regime that exerts specific demands requiring specific types of

"street smarts" or articulation work of its subjects (Star, 1999, p. 387). In Chapter 4, I

focused on what might be thought of as the "input" aspects of this memory regime: its

influence on the archiving and reminding practices by which information developers

attempt to transform and stabilize certain types of knowledge for later use; in this

chapter I will focus more on the converse, the "output" aspects of the memory regime,

in which it influences the behaviors of the information developers as they attempt to

retrieve stored memories via the activities of finding, referencing, and gesturing.

At the time of our interview Lucy had been employed at Software Unlimited for

about two years, giving her a fair degree of seniority in the company. However, illness

and the birth of her second child had kept her on leave or working part time up until one

month before our initial interview when she had returned full time and begun serving as

the "lead writer" on a product team once again. Before joining Software Unlimited,

Lucy had earned a university degree in technical communication and had worked for

five years at a much larger company as part of a team of around 100 technical

communicators. This history meant that Lucy has had to make a number of major

adjustments to her work patterns in recent years: adjusting to working at a much smaller

company, adjusting to working as the only information developer on a product, and adjusting to balancing full-time employment with the task of parenting two children.

These adjustments played a major role in Lucy's memory practices, and she appeared to be the information developer with the most carefully-planned system of organizing and preserving her memories. First, her comparative newness as a full-time employee and lack of experience at a company as small as Software Unlimited, strongly motivated Lucy to try to keep "historical stuff" readily at hand. That is, similar to Lance, Lucy engaged in several carefully thought-out archiving practices. One of these practices, which she alluded to as a "data dump," entailed keeping careful records of each stage in the evolution of her product, including critical contextual information about what precipitated each evolutionary step in the product's design:

> One thing that I've noticed here is all of the reasons [...] the reasoning over the last three years of how something had gotten . . . There was a lot of stuff like that around here – you know just being a small company with all this stuff it was like all these reasonings, so I think that's why I even started collecting a lot of that, the reasoning part, because it makes a difference around here a little bit. I don't know if we are kind of getting away from that as we get a bit bigger. People expect that you know the reasoning, like why it is the way it is.

Lucy organizes this data dump archive by Sprint and by product feature in order to keep track of every stage of the product's evolution: "I have a 'Sprint' folder and then in there I have different things but I have one folder called 'Features' and in the folder features I have a different folder for each of the things that we are working on."

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Second, as another consequence of the size of Software Unlimited in comparison with her earlier job, Lucy has had to learn to deal effectively with the relative lack of structure and increased independence that her current situation gives her. Where archiving tasks were performed automatically in the previous job, at Software Unlimited Lucy has to be thoughtful and proactive about them: "we had very specific things that we did. We had to keep things. Our computers were backed up every night. We didn't have to do anything. I didn't have to do anything then." Further, because there were almost 100 technical communicators in her earlier job, there was a degree of management oversight that left them with little need – or ability – to innovate or to manage information themselves:

> It was very disconcerting for me when I started working here that I didn't have templates. That nobody had templates they were giving me. I considered that I could work pretty independently – and I could – but it was really much more than I thought it would be […] having learned that I wanted those things and I remember complaining about them when I had them. You know, having to fit in to those things, but it's really kind of comforting. So I think the more stuff like that I have to do the better I am at tracking things.

Despite the initial discomfort she expresses in this quotation, Lucy had gained confidence in her system for managing information. She had, in short, become "really proactive" because "no one else is going to track it." In fact, Lucy's organizational practices had come to be admired by the other information developers as well. Peter, for instance, noted: "She's really great at being organized. She works very differently from me. When I worked with her it was enlightening to see how she worked and then

I tried it and it didn't quite work but it was really good to try that. She's very organized and has detailed documentation plans and likes to do tables and is very organized."

One of Lucy's major innovations in project tracking was the "documentation library plan," a new genre at Software Unlimited that Lucy herself had introduced to the company and, consequently had been given the privilege of naming. This document served a variety of audiences and purposes, both memory and communication related:

> So we had this huge [...] we put everything in there [...] and then I go through and each feature I have a table that says the name of the feature [in] the heading [...] That's kind of the first part – describing the feature with enough information so that the developer could know that we know what this feature is going to be [...] The whole reasoning behind it was so that I could go through it later and I could see that my first initial instincts were for how this feature was going to affect my help basically.

Lucy attributed the idea for this document to her experience at her previous employer, and Becky, the information development manager, indicated that, although she allows each information developer considerable latitude in its contents and format, the document had achieved the status of a genre at Software Unlimited and become a standard part of the team's process for beginning a project "so if the next writer picked it up, they'd have a history. All of them do it a bit differently but the idea is to sort of present to the team 'here's what I think we are going to have to do to support this product.'" In sum, Lucy's memory practices were considered so effective that they had

influenced those of the team as a whole; Lucy was regarded as the organizer par excellence among the information developers.

Finally, her busy home schedule (which meant that she worked from 6:30 am until 3:00 pm each day in order to pick up her children from school) combined with the frequent meetings required by her job as the lead information developer on her product team compelled Lucy to dedicate considerable attention to her reminding practices every day. Significantly, she couched the need for these reminding practices and the difficulty in finding time to get her work done by invoking an embodied metaphor from the domestic realm:

> I do better when I can concentrate on things for a long time rather than doing a little bit here and there. And that's really what my schedule helps me with is that I know – once I'm started on something I'm good – but lots of times if I'm not getting started on something I kind of can't concentrate. It's like you go and find a cup in the living room and you take it in the kitchen but on the way you see something in the dining room and then you start cleaning that – you know, that kind of thing.

Lucy keeps this schedule using Microsoft *Outlook* Calendar, which she uses in a far more structured way than any of the other information developers. She essentially schedules almost every hour of every day in the *Outlook* Calendar, including her blocks of "free" time, the descriptions of which she labels "private" so that people will not attempt to arrange additional meetings during the precious blocks of time that she uses for extended composing tasks. At the end of the week, she also uses her *Outlook*

Calendar to remind both herself and others of her progress during the week: "it helps to jog my memory for what I really did and to be able to show it." The *Outlook* Calendar, then, serves multiple functions for Lucy: it is, of course, a memory tool with both reminding and archiving affordances, but Lucy also employed it as a communication tool to demonstrate to her colleagues that she has worked as hard as they have.

Lastly, two other points are worth keeping in mind as I discuss the scenes of Lucy's memory work. First, unlike Lance's product, the product to which Lucy was assigned as the primary information developer was an older "boxed" product. And second, like all of the other information developers, Lucy identified her role on her product team more as one of user advocating than of writing: "I think the biggest roll that we do is user advocate. I really don't think that writing per se – I think that's the smallest part of our job."

The scenes recounted below were recorded in January and February 2008, using the webcam and software recorder features of *Morae*. Additionally, I was able to simultaneously view the proceedings from the office assigned for my use (see Figure 2) using *Morae Observer*, which streamed the video live over the company network. As I watched, I took notes about Lucy's actions and noted anything that I did not understand, and, using these notes, I conducted short follow-up interviews with her. Not surprisingly, using *Morae* helped me to achieve a much more finely-grained account of Lucy's work activities than I was able to achieve through journaling alone in my observation sessions with Lance. Further, because she frequently worked with a webcam pointing at her and was frequently recorded with *Morae* as part of her normal

job duties, it also likely allowed Lucy to work in a more unselfconscious and natural fashion than if I had observed her directly.

However, I did not find the experience of conducting research remotely to be entirely satisfactory. For instance, because of the lack of physical proximity to Lucy, I was unable to ask for clarification as she worked, nor, understandably, did she volunteer this information to the camera, as Lance had done to me in person. So, I relied on my *Morae Observer* annotations and handwritten notes to a far greater degree in formulating follow-up questions for Lucy than I had with Lance. This made it more difficult to interpret some of her actions later, and, while undeniably adding to my ability to analyze her moment-by-moment actions as she composed, it also contributed to some loss of contextual or motivational detail. In short, I believe conducting observations in this way deprived me somewhat of an *emic* or insider perspective such as I achieved when observing Lance due in large part to his many explanatory comments and asides in which he bounced ideas off of me. In other words, I felt myself to be much less of a coworker and much more of a researcher with Lucy than I did with Lance.

As with the scenes with Lance, I selected these days and times for work session observations and recordings for the following three reasons: 1) Lucy indicated to me that these would be convenient times for me to observe; 2) her consideration of the sessions' relevancy to my project (i.e., she planned to engage in extended composing tasks); and 3) my own schedule.

Scene 1: Updating the User Guide

Overview of the Scene

This scene took place the morning of January 17, 2008. When I arrived at

around 9:00 am, I found that Lucy had placed a laptop running *Morae Observer* in the

cubicle set aside for my use by the company, which would enable me to watch remotely

as she worked. Although I knew beforehand that Lucy had *Morae* installed on her

computer, I had originally planned to observe directly from her cubicle as I had with

Lance so that my observation methods would match. However, even though she

offered me the choice of watching remotely or directly, I opted to use *Morae Observer*

since she had clearly gone to some effort to set it up.

Lucy's actions during this scene occurred entirely at her desk in her cubicle,

facing her computer monitor (see Figure 9). Her goal, she informed me during the

Figure 9: Lucy's office
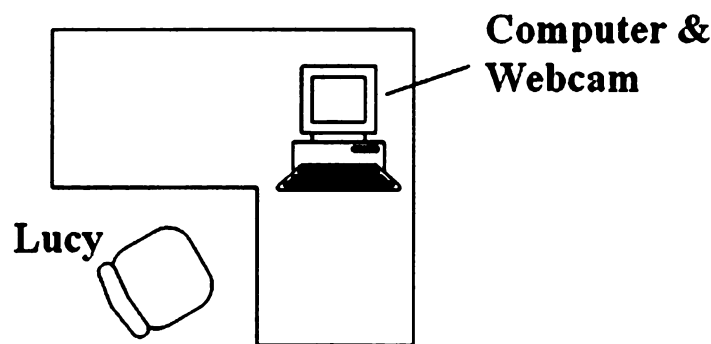
follow-up interview, was to continue her work on a user guide that she was creating for

the next release of her product. The purpose of this particular user guide was to help

people who were new to the product, so Lucy wanted to make the guide as short and

streamlined as possible. As source material, Lucy was using the large *Word* document

that served as the source file for the online help for the current version of her product. She was copying and pasting text from this online help document into the new user guide, shortening or simplifying it to make it more appropriate for beginners, updating the terminology and procedures where necessary to match the new release of the product, and adding helpful notes giving readers suggestions for online help topics that they could consult if they needed additional details.

Synopsis of the action of the scene

Lucy began work by browsing in *Windows Explorer* to find the current Sprint folder under My Documents. She was looking for her working file, a chapter from the new beginner user guide. She navigated to the Sprint folder quickly and then ran her mouse cursor down the list of files as if running her finger down a list on a piece of paper. Apparently she was unsure which chapter she needed to work on that day, because she soon switched to her *Outlook* Calendar, found the calendar entry for the current block of time, which was labeled "Work on Method.doc Stewart Observing," and viewed the details for the time block, which contained the text "Start at C:\\Work\Prerelease\[product]\Sprint 30006\Methods\Sections\03_Planning.doc." She copied and pasted this path into the address line of the Web toolbar in *Word* in order to open the file.

After the document opened, Lucy scrolled through the document until she came to a block of text highlighted in yellow. In the follow-up interview, Lucy explained to me that she used *Word*'s color highlighting such as this one to remind herself where she needed to start working, adding that she preferred the highlighting feature over *Word*'s Comment feature because highlighting enabled her to select additional colors for

different reminding tasks. She removed the yellow highlight and then began to read the text for the next several seconds. As Lucy read, she engaged in the gesturing behavior that I introduced in Chapter 3 as "touching." Recall that I defined touching as moving and hovering the mouse cursor over a portion of one's computer screen while reading text or viewing information where manipulating the software does not appear to be the goal.

After working on this document for about two minutes, Lucy apparently realized that she needed the *Word* document containing the text of the online help because she left a gap in her text-in-progress and began to look for this second document. She relied on browsing for this finding activity by opening *Windows Explorer* and navigating up and down the Sprint file structure until she found the file she was looking for, a process which took about 30 seconds. As she browsed, she leaned in towards her monitor and rested her chin on her left hand, a movement that she was to repeat at least four times during my observations. Three of these four instances occurred when she appeared to be having trouble finding a file via browsing; the other instance occurred when she was intently reading a large block of text. I interpreted these movements, then, as signaling that Lucy was dedicating extra attention to onscreen information, and paid special attention to them in my analysis as moments in which she was expending extra effort.

After opening the online help text compilation document, a very large file of several hundred pages, Lucy performed a logical search for a particular word using the Find and Replace function of *Word*. This took her to a specific section of the document. In this section, she found the text she wanted and copied-and-pasted it into her first document. After copying the text in, she revised the wording to reflect the new context

and the new version of the product. She repeated this process several times over the next 15 minutes.

At this point, Lucy apparently realized that she needed a third document because she abruptly stopped typing in the middle of a sentence and began trying to find a file in *Windows Explorer*. It seemed that this process took more effort than she had anticipated because it took an extended time to find the right folder in the folder tree (about 45 seconds), during which she again placed her chin on her left hand. An additional indicator of effort was that she apparently first opened the wrong file because she quickly closed it and opened another. This newest document was only three pages long, and she found the section she wanted by scrolling rather than by using Find and Replace. She intently read this section for several seconds, again touching the text as she read before returning to her text in progress. She then proceeded to take out the gerund (–ing) constructions from the section she was writing, signaling that she was using the third text as a style guide rather than as a source of content. Though she left it open, this was the only time she used this third document.

Lucy continued working as before, switching between her first document and the help compilation document, until an *Outlook* Calendar pop-up reminder appeared at 9:55 am, reminding her that her daily Scrum would begin in five minutes. Lucy then performed several steps to prepare herself for her next work session. She first highlighted the section she was working on in her document in progress so that she would know where to begin work next time. Next, she created a comment for herself on another section, writing "does this need an intro section?" Finally, she saved the file and left to attend her meeting.

Scene 2: Attempting to Solve a Problem

Overview of the scene

This scene took place the afternoon of February 29, 2008. With one exception, noted below, Lucy's actions during this scene occurred at her desk in her cubicle. Her goal, she informed me during the follow-up interview, was to finish creating the *Word* document that was the source file for the online help of a new feature in the upcoming release of her product.

Synopsis of the action of the scene

Lucy began by attempting to find the *Word* document that she planned to work on – the document that served as the source file for the online help of a new "Export to *Word*" feature of her product. Similar to the first scene, she started by browsing through the contents and subfolders of her "Prerelease" folder on her local drive using *Windows Explorer*. She did this for about a minute without success before performing a logical search using the Search function of *Windows Explorer*. The logical search also failed to return any results, so she resumed browsing. After about 4 minutes spent in unsuccessful searching and browsing, she selected a help file source document for a similar feature, "Export to *PowerPoint*," opened it, replaced all references to *PowerPoint* with *Word* using the Find and Replace function, and then selected "Save as," renaming the document for the new feature.

She then opened Quadralay *Webworks*, the standard software used by the Information Development team to generate its help files. She created a new project, added the "Export to *Word*" document she had just created to be the source file for the online help project, and prepared to save the project file. In the save dialog box, she

first browsed to the folder of the most recent Sprint, "Sprint 3006." After pausing for a second, however, she navigated one level up to the folder "Prerelease" and created a subfolder for a new Sprint, "Sprint 3007," into which she saved the project. While she waited for her help file to generate, Lucy spent several minutes updating her *Outlook* Calendar. Interestingly – and in keeping with the role Lucy said the *Outlook* Calendar plays in helping her track her activities – she retrospectively updated one event that had already occurred by expanding the planned duration in order to, presumably, more accurately reflect the actual duration for reporting purposes.

When it finished generating, Lucy opened the online help file. It appeared that she instantly recognized that something was wrong with the file because she immediately began browsing through the menus of the *Webworks* application. She was apparently unable to locate the information she was looking for in the menus, so she opened the *Webworks* online help. As soon as the help opened, she performed a logical search for a particular term. This search returned about 20 topics, ranked in descending order of match. She quickly selected the first topic in the list and proceeded to read it for almost an entire minute. The topic was text-heavy and contained screenshots and Lucy read it with some care, touching the text at various points as she read and scrolling down and then back up several times. Apparently dissatisfied, she opened two more topics, which she quickly scanned. Altogether to this point, she had spent almost five minutes trying to solve her problem.

She next opened the *WebWorks* website where, after scanning the home page, she "hovered" her mouse cursor over the entries in the left navigation bar to deploy pop-up submenu options, eventually selecting the FAQ page from one of these pop-up

menus. She scanned this FAQ page for about one minute before switching back to the

WebWorks application, where she continued to explore her project settings. Next, she

opened the *WebWorks* Wiki where *WebWorks* users are able to contribute to the general

store of knowledge about that application, but again she was unable to locate the

information she needed, through she both browsed and searched the site. She continued

switching between these four sources – the two websites, the online help, and the

application settings – for the next ten minutes.

At this point, Lucy left her cubicle and went to consult Monica in her office to

see if she could help solve the problem. Monica informed Lucy that she was having a

similar problem finding some critical information herself and suggested that they meet

on a future day to discuss Lucy's problem. Lucy returned to her office where she spent

the next 40 minutes alternately searching the websites, adjusting her project settings,

tinkering with the *Word* document, and regenerating the help file. At one point during

this period, Lucy made extensive use of a particular Wiki page, which appeared very

technical and contained several step-by-step procedures. Lucy read this page very

carefully with a great deal of touching before using one of the procedures on the page to

modify her *Word* document. While following this procedure, she carefully referenced

the Wiki page by alt-tabbing between the browser and *Word* at each step.

Still apparently unable to resolve her problem, Lucy eventually bookmarked the

Wiki page, placing it in her browser bookmark folder "Doc Tools" and renaming it so

that it was descriptive of the problem she was attempting to solve. She saved the Word

document to the N drive, appending "_draft," to the file name and sent an email and

hypertext link to this file to a software developer, asking him to review its contents for

accuracy. Finally, she concluded this activity by shutting down *Webworks*, taking one last look at the Wiki page, and closing her browser.

Analysis of Lucy's Memory Work

Breakdowns and Recoveries

Although each of her colleagues praised the special care with which Lucy organizes her working life and keeps her memories in order, the two scenes recounted here are perhaps most interesting for the breakdowns in Lucy's memory practices that occurred during them. I would argue, however, that these breakdowns do not imply that Lucy's colleagues had underestimated her organizational abilities or that they were symptomatic of carelessness or disorganization on Lucy's part. In fact, Lucy actually demonstrated the careful information management practices that she and her colleagues had alluded to in their interviews: she took care in naming files, she maintained a meticulously well-planned and coherent folder structure, and she made excellent use of her *Outlook* Calendar for reminding and archiving tasks – all of which serves to make the breakdowns that occurred in spite of such careful preparations all the more interesting and insightful.

To recap the breakdowns in the two scenes, recall that in the first scene Lucy experienced difficulties finding each of the three documents she worked on. In all three instances she was able to overcome these breakdowns relatively quickly by using the skills she has developed while working at Software Unlimited. For example, in the first breakdown of this scene, in which Lucy was unable to find her document via browsing in *Windows Explorer*, she used her *Outlook* Calendar entry, into which she had copied the file path, to quickly recover from the breakdown – a clever redundancy in her

memory practices that, I would argue, is a definite indicator of the kind of "street smarts" that Star identifies. Recall that Star (1999) maintains that "small disruptions in the articulating processes may ramify throughout the workflow of the user" but that expert users have, by virtue of their experience, learned to recover from these disruptions with a minimum of difficulty (p. 387). It appears, then, that at some point in her previous experience, Lucy had encountered a similar situation in which she was unable to quickly locate a file via browsing and had, therefore, begun employing her *Outlook* Calendar as a method of keeping the precise location of any information she knew she would need ready at hand during a given span of time.

Similarly, although Lucy was ultimately unable to locate the document she wanted to work on at the beginning of the second scene, she was able to recover from the breakdown by using Find and Replace to modify a similar document to serve in its stead. In the follow-up interview, she informed me that this was not a major problem because the effort to Find and Replace the feature title was not measurably more difficult than it would have been to update the existing document to reflect the latest version of the product: "And see what took me a while was I was looking for one [the document "Export to *Word*"] – I know I did one for *Word*, I just couldn't find where I did it and it wouldn't be up to date anyway, so I left it." In fact, Lucy indicated in the follow-up interview that, similar to Lance, she prefers to over-document or over-populate her archive rather than to leave things to chance, even though this can sometimes make finding the right file more difficult:

> Each Sprint we were working on stuff. So I just started 'boom' here's what was going on with this [feature] at that time with a screenshot. [...] I have a tendency

to – like I absorb things and then I just write. I've always been good at just writing like dumping the stuff out of my head onto a piece of paper.

In our initial interview, Lucy had characterized this process of "dumping stuff out of my head" as an archiving practice and indicated that it helped her both internalize and externalize product knowledge. That is, Lucy believed that repeatedly writing about the product both helped her learn the product and gave her a usable (i.e., searchable and browsable) external resource for invention:

> So and then I'm documenting things as I go along. They are not the final implementations of how this is going to work, but what I try to do is capture what has gone on during the month we are working on something so that the next time we work on it I know where the product is [...] It's kind of a data dump of everything I know about this feature that we are doing right now with screenshots of where it is so that the next time I get to it I know right where...

Lucy appeared to view this data dump process as a necessary step in developing in herself the "assured facility" or *hexis* that Angela possesses (Carruthers, 1990, p. 69). In other words, similar to Lance's "back of the mind", Lucy's "data dump" was her method of learning and recalling the "back reasons" and "historical stuff" that would make her a more effective employee in this organization. However, as the occurrence of so many breakdowns in the two scenes illustrates, the memory regime that compels Lucy to preserve so much detail exacts a price in time and effort. Where the scenes from Lance's working life help illustrate the time and effort required to store this information, Lucy's help illustrate the time and effort required to retrieve it.

Effects of the Memory Regime on Retrieval: Finding, Referencing, and Gesturing

So, what did Lucy's work processes reveal about the articulation work required to retrieve information in this memory regime? First, while two observation sessions of a single participant obviously do not allow me to propound any firm rules that would apply to the organization as a whole, I nevertheless observed that Lucy's retrieval preferences appeared to follow a pattern and that this pattern (or a quite similar one) was discernable in the interviews and job shadowing data I collected from my other participants. This pattern can be summarized in the following statement: when performing routine work tasks, Lucy prefers location-based browsing over logical searching and over referencing other people (i.e., asking them for help) *except* when she perceives that time is a major factor, such as when a progress-stopping breakdown occurs or when the sheer volume of information appears to be overwhelming. As I will show, this order of preference is, at least partially, shaped in response to the exigencies of the memory regime of this organization.

Consider the seeming inefficiency of Lucy's preference for location-based browsing over logical searching or referencing. Browsing can be, as Barreau and Nardi (1995) note and as Lucy's breakdowns illustrate, less precise and more time-consuming than logical searching. Yet, Lucy began every instance of routine information retrieval in the two scenes by location-based browsing: in order to locate all three documents in the first scene and her working document in the second scene she began by navigating through her folder structure in *Windows Explorer*. Even when attempting to overcome breakdowns, Lucy showed a preference for browsing over searching, such as when she consulted the *WebWorks* website or when she browsed the *WebWorks* application

interface. While this behavior was doubtless partially influenced by the affordances

Lucy perceived in *Windows Explorer* and in the *WebWorks* website, both of which

emphasize browsing over searching, it also seems contrary to the best interests of

someone who places a high value on squeezing the maximum productivity out of every

uninterrupted block of time in the workday, as Lucy's initial interview revealed. In

fact, Lucy did not hesitate to use logical searching in moments in which she seemed

overtly conscious of the need to save time, such as when she needed to locate specific

text in a lengthy *Word* document or when she wanted to find an answer to her problem

quickly in the *WebWorks* online help.

Why then, given the number of search tools available to her and the comparative

speed and accuracy of such tools, does Lucy appear to prefer the slower and less precise

method of location-based browsing for her routine finding activities? To answer this, it

is worth revisiting Star's (1999) explanation of articulation work:

> The obdurancy of these 'tiny' barriers presents, at first glance, a puzzle in
>
> human irrationality. [...] Why do people persist in using less functional, but
>
> more routine actions when cheaper alternatives are nearby? Are people so
>
> routinized, so rigid in their ability to adapt to change that even such a slight
>
> impediment is too much? [...] One way to explain this magnification process is
>
> to understand that in fact two processes of work are occurring simultaneously:
>
> Only one is visible to the traditional analysis of user-at-terminal or user-with-
>
> system. That is the one that concerns keystrokes and functionality. The other is
>
> the process of assemblage, the delicate complex weaving together of desktop
>
> resources, organizational routines, running memory of complicated task queues

(only a couple of which really concern the terminal or system), and all manner of articulation work performed invisibly by the user. (p. 386)

Browsing, it appears then, accomplishes some sort of important articulation work for Lucy that searching does not.

Part of what browsing seems to do for Lucy is to impart a greater sense of control. As Barreau and Nardi (1995) put it: "users prefer location-based filing because it more actively engages the mind and body and imparts a greater sense of control" (p. 40). As with Lance's archiving practices, I would speculate that a significant contributor to Lucy's sense that she needs to control her memories lies in the kind of knowledge that is most valued at Software Unlimited and the ways in which this knowledge is used to accomplish the work of the organization.

The data I collected from the other information developers helps clarify this sense of control by pointing to the enhancement to memory that the engagement of multiple senses can give. Although I was not able collect data at the same level of detail from my other participants as I was from Lucy using *Morae*, most of them indicated a similar preference for location-based browsing. Certainly, Lance's principal archiving practice, his "back of the mind folder" was precisely the kind of carefully-organized filing structure that encouraged browsing. Similarly, Monica, in answer to my interview question asking if she found that the process of managing projects grew more difficult as the project continued, replied that it did not thanks to the careful file folder structure and naming conventions she employs at the beginning – habits that facilitated browsing:

I feel like I do a pretty good job at the beginning trying to set things up – a structure. We did a really good job I think of organizing our N drive and I try to follow that and put documents where they should go. I have multiple files or folders and piles of paper. I usually get the initial structure for how I want to set up the documentation, where I'm going to put . . . set up on the N drive.

When I asked a similar question of Peter about how he got up-to-speed when he first joined the company, he couched his answer in terms of browsing too: "I'd find out that there's a folder on the N drive called 'current software'. And then once I did go there to look for it, I looked at everything else that was there too. So I did a little exploration as I needed to." Becky, for her part, characterized her success at managing multiple projects simultaneously as a result of the carefully organized folder structure she maintains in *Outlook*: "as I start getting stuff, I usually for every project have a specific email folder so I can file everything. And if it gets too big I break it down, like 'meeting notes' and different pieces of what I have to do. And in my inbox if there's anything I have to address, it doesn't go in a folder so I'll know I haven't addressed it yet."

Only Angela appeared to have a different set of preferences, again, apparently, due in part to her lengthy tenure with the company, and, as with archiving and reminding in Chapter 4, the ways in which Angela's preferences differed from everyone else's may help illuminate the characteristics of the memory regime that help shape these preferences. In short, Angela indicated that browsing was not her preferred method of finding information and she lamented the time and effort required to render

information browse-able. For instance, of *Outlook* email, which Becky and Lucy spend so much time organizing, Angela asserts:

> Typically email is one of the biggest ways that we communicate, and it's not the best way. Things get lost, you know I've got 1500 emails right now in my inbox and 600 of them aren't read yet. [...] Not only just emailing and sending email, but sorting it, filing it, cleaning it up, deleting it, you know all the stuff that comes with email. [...] This has always been a challenge.

Angela further expressed a degree of pride in her ability to function efficiently without dedicating much time to organizing memories, as her newer colleagues must do: "other people, they have file folders and they keep track of things. I just don't." In other words, it appears that Angela simply does not consider the time and effort required to create and maintain a careful location-based memory system to equal the benefits to be gained by doing so.

Yet, as I noted in Chapter 4, this is not a sign of carelessness on Angela's part. It appears instead that Angela's disdain for the effort entailed in archiving in order to enable location-based browsing springs from the *hexis* that her lengthy tenure with the company has enabled her to develop. This *hexis* has made maintaining a detailed apparatus of external memory unnecessary. In other words, I would posit that Angela's memory "locations" are principally the spaces in which she works: the product interface, the location of her office, and the team of people she is surrounded by. Consequently, Angela does not need to create and maintain other browsable structures.

She does not feel that she needs the additional level of organization in order to control information.

I noted in Chapter 4 that the source of the digital aspect of Angela's *hexis* lies in part in her intimate connection with the origins and evolution of her product: "One of the goals that has been in place since I started with [Software Unlimited] was design a [...] product that Angela can actually use." But it also lies in Angela's relationships with the product team members with whom she has worked for years to build that product: "I worked with the developers to, for the first time ever, put in workflows and processes into the systems." Moreover, these relationships are strengthened by her close physical proximity to these product team members, which enables her to, in a sense, absorb information from her physical and social environment without conscious effort:

> From the da y that I got here I was always part of development and I sat with the development team in their project area and then all of a sudden we started to grow and they were trying to figure out how to seat everybody [...] So at first they divided us [i.e., the information developers] up [...] But we noticed that we were out of the daily hub of what was happening with the product [...] we weren't able to glean as much information just from floating from what you hear or being able to just walk next door and ask a question. And it started to show in the development of the products that we weren't keeping – being kept – abreast of as much as we should have because we weren't there for all that spontaneous discussion and talk and brainstorming that takes place. [...] Right now everybody besides myself has their own place in the information

development area. I moved into another area. [...] I'm part of an experiment which is different from the rest of the people on my core team, and it's proving to be much better. Being able to be with the product team we know that that's the best way to go.

Angela's team occupies this experimental, "Petri dish" area (see Figure 2), which consists of several two-person offices surrounding a common team meeting area. This combination of familiarity and proximity enables Angela to find the information she needs quickly by referencing her colleagues rather than searching and browsing a database: "So on a continuous basis, if I run across something in the product as I'm using it, I can either IM somebody or get up out of my chair and holler around the door [...] We have meetings that are right outside everybody's door [...] So I could just step outside the door."

The other information developers have, by contrast, learned to rely more on digital tools, such as instant messaging or 37signals' *Campfire*, to maintain team awareness and coordinate group work. According to Angela, "the other teams are spread out across four buildings. They need a collective way of gathering thoughts. We have lots of white boards that have writing on them and, we are kind of the envy of the rest of the company, we've got the huge monitor. We can set it up. We've got movable furniture for moving configurations and tables." In comparison, Peter noted the difficulty in coordinating work on his product teams without interrupting his own work or intruding on his colleagues:

I spent some time this summer actually over there in the other building. And

that was very good when I was working with that team, but at the same time it

made working with other teams harder [...] We use *Campfire* a lot, which is

kind of a team chat room. That happens a lot during the day when anyone has

questions – even when they are in the same building and they have offices next

to each other – they can't quite talk to each other all the time without getting up.

It's just a way to ask questions real quick.

Similarly, Lucy informed me that the only person she tended to routinely consult if she

had a question while working was Lance, primarily because his cubicle was adjacent to

her own and she could yell to him without leaving her seat.

The difficulties in coordinating teams using software alone have been

documented in studies from various theoretical perspectives, including joint-cognition

theory (Hayne, 2005; Perry, Fruchter, & Rosenberg, 1999) and activity theory (Swarts,

2005; Spinelli, Perry, & O'Hara, 2005). The evidence from these studies points,

generally, to the conclusion that physical or spatial proximity adds an informational

dimension to quotidian objects and interactions that enhances communication and is

hard to duplicate in software. In other words, the lack of physical proximity adds a

need for an additional level of articulation work just to stay on the same page (to borrow

a metaphor from the age of print). In fact, one of the major purposes of Software

Unlimited's adoption of the Agile methodology, with its emphasis on daily face-to-face

team Scrum meetings, was to maintain just this kind of team awareness.

However, despite their overall enthusiasm for the brevity and conciseness of the Scrums, the majority of the information developers expressed some reservations about them, indicating that Scrums alone were not adequate to coordinate the teams' work and that the Agile methodology had not been uniformly implemented or adhered to by all the product teams in the organization. Lance, for instance, noted that although he appreciated the team momentum generated by the Scrum he did not always find it very useful: "it's not the most insightful thing in the world and a lot of people don't have anything to say really." Similarly, Lucy noted that, because her team's Scrums did not always provide the kind of information about her teammates' progress and activities that she needed, she was sometimes unable to complete her own tasks: "nobody ever says there are impediments – there are never any impediments […] we do go over stuff but it just comes out like […] sometimes it's like something should have gotten done, but no one mentioned that they had worked on it or were going to work on it – it seems that there's something missing in this tracking."

In summary, it appeared that the other information developers lacked the sense of control of their working lives that Angela possessed as a result of her deep and thorough knowledge of her product, her lengthy relationship with her product team, and the spatial organization of her office area, which made communicating with her product team 'natural.' I would posit, then, that one possible contributor to the other information developers' preference for location-based browsing may be that browsing gives them a sense of control, both mental and physical, of the memories of the organization – it "places" product and other organizational knowledge into a "real" space where it can be both seen and touched. This corresponds with Haas' (1996)

notion of "tangibility," which she calls "a complex of both visual and tactile aspects of interacting with texts" (p. 71). Haas notes that "a computer system or other technology has high tangibility when users feel that they are in direct contact with the text" and that this sense of contact is enhanced when users can "touch" the objects on their screens, such as they can during location-based browsing: "pointing a mouse directly at a word the writer wants to highlight is more tangible than using arrow and function keys to select the word" (Haas, 1996, p. 71). Interpreted in this light, the prevalence of Lucy's "touching" behavior during browsing and reading, then, appears to be yet another manifestation of the urge to establish control by bringing knowledge into the world of the senses.

Finally, one other type of gesturing – the imagistic gesturing that Lucy performed when describing her memory practices during our initial interview – may suggest another, perhaps even more important function that location-based browsing serves for the information developers. To describe this function, I will consider in detail one particular portion of my initial interview with Lucy, a brief excerpt from her description of her "data dump," and juxtapose this description with her use of this same data dump during the second scene of memory work described above.

Before I begin, however, I will, again, preface my discussion by noting that, although a single incident performed by a single participant cannot be generalized to the organization as a whole, I interpret the incident as significant because I recorded, to varying degrees, the same type of gesticulation among all of my participants when recounting their interactions with the software interfaces by which they perform their memory work. Also, I should note that, as I have done at several other points in this

dissertation, I have added my interpretative descriptions of Lucy's hand and body movements in brackets in the transcription. My descriptions of these movements are, of course, based on my subjective interpretations of what I believe I was seeing in the videotapes as I reviewed them multiple times. My descriptions are, therefore, inherently less objectively reliable than the verbal portions of the transcript. Further, I have not at this stage in my research attempted to subject my interpretations of these movements and gestures to the test of inter-rater reliability. Instead, I have indexed the movements to individual frames extracted from the video (Figures 10-12), which will serve, I hope, to substantiate my interpretations to some degree. The transcript is as follows:

> I have like a Sprint folder [Figure 10, drawing the folder on the tabletop with her fingers as she speaks] and then in there I have different things. But I have one folder called 'Features' [Figure 11, drawing this folder on the tabletop] and in the folder 'Features' I have a different folder for each [Figure 12, drawing these folders] of the things that we are working on: 'Power . . .' [interrupting self] 'PPT,' um 'Undo,' um [looking off into distance for several seconds] 'Camera Recording.' Just everything that we are working on and then I have those documents in there.

I will begin by calling attention to the two memory "lapses" that are noticeable in this transcript. First, Lucy starts to describe one feature folder as "PowerPoint" but interrupts herself and changes the folder name "PPT." Second, in a classic example of a movement indicating a "speech failure" (McNeill, 1992 , p. 77), Lucy pauses and looks

off into the distance while trying to recall the name of another subfolder, which she ends up calling "Camera Recording."

Figure 10: Lucy "draws" the Sprint folder

Figure 11: Lucy "draws" the Features folder

Figure 12: Lucy "draws" the subfolders

Next the form of the gestures appears significant. Lucy informed me that she is right-handed and that she only uses her right hand when manipulating her computer mouse, which was confirmed by my observations. Yet generally, with the exception of the imagistic gesturing in which she describes using her computer mouse such as those occurring in the transcript above, Lucy tended to be ambidextrous when gesticulating. For instance, Figure 13 provides an example of Lucy gesturing with her left hand when describing the action of replacing text on a screenshot. The significance, then, is that the memory that Lucy recounts in the transcript lives not just in her mental image of her folder structure but also in the kinesthetic memory of her right hand. This finds additional confirmation by considering the motion of Lucy's hand that can be perceived by observing Figures 10-12 in order.   As she describes the folder structure, Lucy moves her hand progressively to her right in the same pattern she follows as she navigates
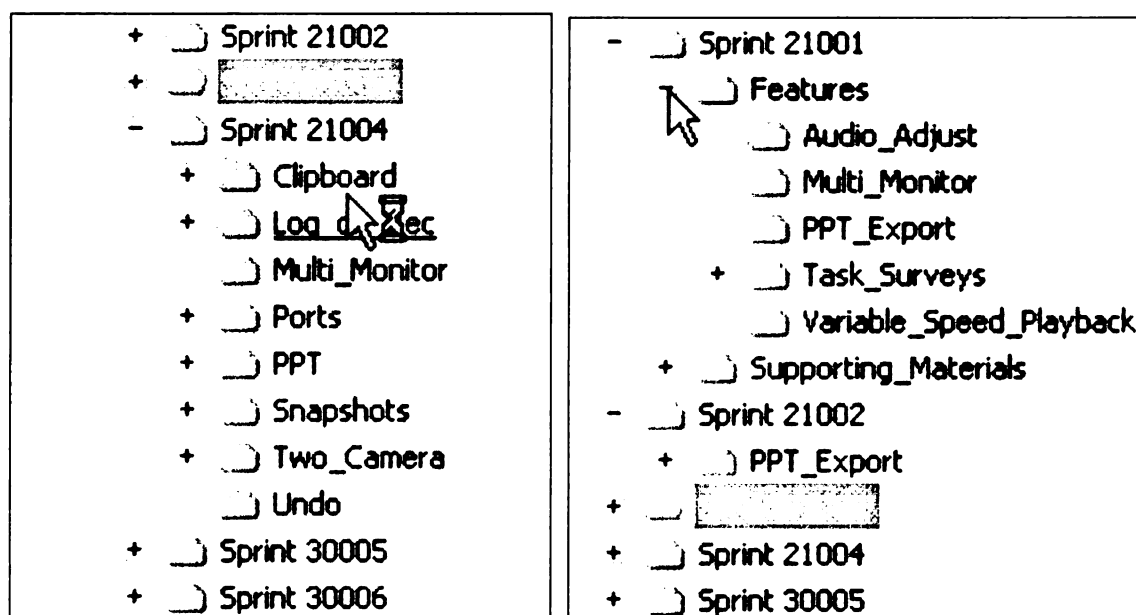
Figure 13: Left-handed gesture

the folder and subfolders with her mouse cursor in *Windows Explorer*. That is, when compared with the two views of Lucy's data dump folder in *Windows Explorer* in Figure 14, which are excerpted from the *Morae* recordings of Scene 2 when Lucy was attempting to find her working document, Lucy's hand motion appears to follow the

same path. In short, I would argue that Lucy's gestures are, as McNeill (1992) predicts,

revealing her "memory image" and "particular point of view" of one of her typical

activities, but that they are also showing, as Aristotle predicts, that this memory image

is composed of both visual and kinesthetic components (p. 13).

Figure 14: Two views of Lucy's data dump folder structure

```
+  _) Sprint 21002              -  _) Sprint 21001
+  _)  [............]              \_) Features
-  _) Sprint 21004                   _) Audio_Adjust
      +  _) Clipboard                _) Multi_Monitor
      +  _) Log d...ec               _) PPT_Export
         _) Multi_Monitor        +  _) Task_Surveys
      +  _) Ports                   _) Variable_Speed_Playback
      +  _) PPT                 +  _) Supporting_Materials
      +  _) Snapshots        -  _) Sprint 21002
      +  _) Two_Camera          +  _) PPT_Export
         _) Undo             +  _)  [............]
+  _) Sprint 30005           +  _) Sprint 21004
+  _) Sprint 30006           +  _) Sprint 30005
```

Further, comparing Lucy's gestures with the momentary lapses that I noted in

the transcript above – her mid-word self-correction from "Power-" to "PPT" and her

pause to remember another subfolder – it appears that the gestures are serving an

important function for Lucy: they are not merely *displaying* her images, they are

actually helping her to remember them. As McNeill's more recent work on gestures

puts it: "gesture can materialize the spatial structure of the problem [...] Spatial

structure is a mnemonic, especially when externalized. The linkage of memory to

spatial structure was known in ancient times. Roman orators made use of the layout of

space around them to recall the points of a speech (2005, p. 148). Lucy's picturable and

touchable folder spaces, then, are serving a multi-sensory mnemonic function for her as she attempts to remember and articulate for my benefit their contents. This is especially apparent in Lucy's shift of phrasing from "Power-" to "PPT." If her attention was focused primarily on describing for me the folder's contents with maximum clarity, it seems to me that Lucy would have finished the word "*PowerPoint*" and left it at that, but, as her pausing and frequent "ums" indicate, she was actually focusing a great deal (perhaps the majority) of her attention on just remembering those contents. So, as she scanned her mental image with the eyes of her mind and touched it with the memory of her hand, she articulated the contents as she saw them – "PPT" instead of "*PowerPoint*," as Figure 14 reveals.

This incident highlights, then, the other major function that location-based browsing appears to serve for the information developers: it is a method of locating, stabilizing, and embodying product knowledge, the knowledge most highly valued by the memory regime at Software Unlimited. In particular, Lucy's data dump folder structure, which collects and organizes products into Sprints and Features, appears to be an externalization of her standing wave of memory about the evolving product interface. That is, Lucy "consigns" the product to her memory in both of Derrida's senses of that word: by writing about it, she transforms the product into the signs with which she is most comfortable, text (e.g., she says "I just write"), and by placing these texts into her data dump she gathers them together into her own memory places. She then routinely "walks" these memory places through the activity of browsing, a litany-like process by which she imprints the knowledge into her visual and bodily memory.

Conclusion

Even when her elaborate filing scheme does not appear to be working correctly – such as in the breakdowns recounted above – Lucy's memory systems are still performing important articulation work for her by helping her learn her product better. What ultimately appears to be most important about this memory work is less the written products with which she populates her archive than the processes of archiving and finding themselves, which implant knowledge more firmly into her memory. In other words, the activities of memory are contributing to the development of Lucy's *hexis*. A point that Winsor (2003) makes about the employees of the engineering center that she studied seems to apply equally well here: "The tools they used were not incidental to the communication and knowledge generation in which they were able to engage. Rather, knowledge about how to analyze and classify knowledge had become stabilized and accessible in the material form of the tool" (p. 136).

Perhaps the most interesting finding of this chapter, though, lies in the fact that the memory regime compelled Lucy to expend such time and effort in the first place. That is, where the scenes of Lance's memory work demonstrated that the effort of stabilizing less-valued forms of knowledge, like user knowledge, could also at times yield valuable results, such as changes to the product interface, those of Lucy show her, I would argue, forced to spend undue amounts of time engaged in non-creative, non-inventional labor (the equivalent in some sense of rote memorization) just to fulfill her most basic and lowest-status job duty: writing documentation. As was the case with Lance, the obscuring of the effects of the memory regime by the quotidian practices

necessary just to cope with these effects appears to be the principal barrier to reforming

the memory regime: it is hard to change what you are too busy to see.

CHAPTER 6: CONCLUSION

Introduction

The original aim of this study was to explore the role of embodied contexts in mediating the memory-related activities of invention. I anticipated that such an exploratory study would increase our understanding of the digital, physical, and social interfaces and infrastructures for doing memory work in organizations, thereby giving us a basis for arguing for changes to those interfaces, spaces, and organizations. To accomplish this purpose, the study asked the following research questions, which I envisioned as a first step towards articulating something that might be understood as a rhetorical practice of memory:

- Do writers use the affordances of their embodied contexts to support memory-related demands of composing?

- Where/when in the composing process do embodied-contexts seem to be most important?

- How, if at all, do embodied contexts aid composers' memory work during invention?

Based on the analyses in Chapters 4 and 5, I would tentatively answer "yes" to the first question and add that, as I will show below, the process of explaining why I answered in this way will probably end up answering the second and third questions as well. During the course of my research, however, I began to discern a possibly more important theme running through my findings. This theme may help illuminate and

expand upon Bowker's concept of the memory regime and enrich our understanding of the memory work that technical communicators perform in their workplaces in ways that go beyond the original aims of my research. I will address each of these sets of findings – the findings related to answering my research questions and those related to expanding Bowker's concept of the memory regime – in turn below.

What the Study Revealed about an Embodied Rhetoric of Memory

To begin considering how my findings help answer my research questions, it is worth revisiting several aspects of the conceptual framework that I articulated in Chapters 1 and 2. I will start with the three-part formula for understanding memory work as a rhetorical practice of invention in knowledge-intensive workplaces that I formulated in Chapter 1. First, based on my reading of contemporary workplace theorists like Reich combined with my understanding of memory practices in the classical rhetorical tradition, I posited that responsiveness to *kairos*, or the ability to retrieve and use memories in a timely and appropriate manner, was more critical as an indicator of successful memory work than raw storage capacity. I tied this necessary responsiveness to *kairos* to the perceived need to avoid information overload, a problem which we all seem to face these days. Second, I noted that affordances for offloading the cognitive burden of performing memory work to infrastructures or tools or to coworkers was an important component of successful memory work. Third, and perhaps most germane to my research questions, I argued that the ability to 'touch and feel' information, to bring it into the world of multiple embodied senses was crucial to making memories usable (e.g., responsive to *kairos*, offloadable, and manipulable). I derived this last insight principally from my reading of the rhetorical memory

techniques of the *ars memoria*, particularly the walking mnemonic, which seemed to me to be an ingenious and effective, though laborious, method of responding to rhetorical situations, of offloading information to a "software" tool, and of using bodily perceptions to *do* memory – in other words, of thinking *on* (or perhaps *with*) one's feet. I further held that any interface or other infrastructure that did not take into account these three aspects of memory work in invention would to some degree impede or make more difficult writers' abilities to perform symbolic analytic work for their organizations.

So what about my research questions? Did embodied contexts appear to play a role in the information developers' memory practices in this particular memory regime? Did they, in other words, play a role in helping the information developers perform their articulation work by, for instance, making product or user knowledge more responsive to *kairos*, more shareable, or more personalized? And, if so, where, when, and how did they do so? To answer the first question, I will revisit the idea of the "standing wave of memory," which I articulated in Chapter 2 as a sort of ideal condition of memory in which we are able to achieve a working version of the past to enable action in the present. In short, it appeared that the newer employees at Software Unlimited had to perform a great deal of extra work to try to stabilize this standing wave than did the more senior ones. That is, Lance and Lucy appeared to put a great deal more effort into their memory practices than did Angela. From this, I arrived at the notion that achieving this standing wave requires something like a *hexis*, an assured facility of mind and body that renders its practitioner capable of performing both input (storage) and

output (finding) activities of memory work naturally, "just by floating," as Angela puts it.

In addition, there did indeed appear to be a physical, embodied component both to Angela's *hexis* and to Lance and Lucy's attempts to acquire a similar degree of mastery. Angela, for instance, seemed to attribute much of her ability to "just know" things to the fact that she worked in physical proximity to the software developers for such a long time. Similarly, it seemed to me that part of the motivation behind both Lance and Lucy's labor-intensive memory practices was to inculcate in themselves a mastery of product knowledge through mental *and* physical training: Lance dedicated considerable time preparing elaborate and visually-complex documents to take to meetings because they could serve as cues and objects of attention as he articulated his arguments in words and gestures, while Lucy employed her elaborate and redundant archiving system at least partially as a spur to acquire product knowledge through the repetitive activity of browsing through her complex file system. As I noted at the beginning of the chapter, the answer to the first research question, then, appears to be that embodied contexts did play a beneficial role in invention by helping the information developers respond to the *kairos* of Scrumming, to offload memories into reminders of various sorts, and to personalize memories through repetition and habit.

This leads to the final questions concerning where, when, and how embodied contexts played the biggest role in invention. It appears from my data that the answer to all three of these questions is that embodied contexts were most helpful in the times and places in which my participants had to communicate, transport, or rearrange knowledge in some way. In other words, embodied contexts were most important when memory

moved because the affordances perceptible to their senses, principally sight and touch, helped my participants to transform raw information into useful memories: Lance rendered user knowledge concrete using visuals and gestures and through mimesis; Lucy rendered product knowledge memorable and understandable by using browsing to inculcate a habit of both hand and mind. Moreover, this appeared to be true of both storing and finding activities in a scene of memory work: the transformation and movement of memories into the archive through consignment appeared to benefit from multisensory affordances as much as the recall of those memories from the archive during use. That is, as Monica and others indicated, the act of setting up the archival structure of a browse-able file folder system at the beginning of a project served a critical role in all subsequent work on that project.

What the Study Revealed about the Memory Regime: A Final Scene

Although my theoretical framework did appear to answer my research questions in productive ways, on the very first day that I conducted observations at the research site in September 2007, I observed an incident of memory work (the prototype for what I would later came to define as a "scene") for which my theoretical framework proved inadequate to explain. This scene stuck with me and resonated throughout my study because it raised issues and introduced themes that I was to see recur repeatedly as I followed my participants over the next six months. The recurrence of these themes and issues and the inadequacy of my original theoretical focus to explain them eventually led me to reconsider Bowker's memory regime as a concept reconciling the bidirectional influence of local workplace cultures and memory practices. Adapting the method of explicating a scene that I employed in Chapters 4 and 5, I will first describe

the events of this scene before discussing the issues it raises in a way which, I believe, will clarify the role of the memory regime on Angela's *hexis* and on the memory practices by which Lance and Lucy attempt to achieve their own expertise.

Overview of the Scene

I accompanied the Information Development team to lunch on the afternoon of September 13, 2007. After lunch, Angela asked me if I would like to observe her weekly meeting with her "partner" from the training team, "Carl." As the information developers and I walked into the Information Development wing, Becky added that Angela would be a great person to observe because she knew so much about the company and, in fact, was one of the first employees hired, possessing an employee number in the low 20s (employee numbers originally reflected the person's hire number with the company, a practice that I learned had subsequently been discontinued as the company grew).

Angela informed me that she and Carl would be meeting to discuss the number and content of the training tutorial videos Carl would be creating for the next release of their product. I later learned that each member of the Information Development team had recently been partnered with the member of the training team assigned to the same product in order to coordinate the training and documentation efforts, to ensure consistency across documentation, and to avoid unnecessary duplication of effort on each product release.

Synopsis of the Action of the Scene

The meeting took place around a small table in the petri dish area of the Information Development wing (see Figure 15). As I did throughout the study, I attempted to observe the meeting without intrusion by positioning myself slightly behind my participants. When we arrived, Carl had already set up his laptop on one of the mobile tables in the petri dish. He had positioned his laptop so that Angela and I could see the screen as they talked and had already opened on it a "mind map" that he had created using the software Mindjet *Mind Manager*, an application that, I later learned, the training team regularly used as a tool for visually brainstorming ideas but that the Information Development team did not possess. The mind map that Carl had created showed his tasks and ideas for the training videos that he planned to create for the upcoming release of his and Angela's product. Later in the meeting, he also opened the current build of the product itself in order to deploy the most recent version of the online help that Angela was creating for the release.

The discussion concerned how many training videos Carl needed to create for the upcoming release. Carl expressed his concern that there should perhaps not be a one-to-one correspondence between the topics in the online help and the training videos. He reasoned that the 30 topics in the online help would translate into far too many videos for him to create in the allotted time.

Figure 15: Angela and Carl's meeting in the petri dish
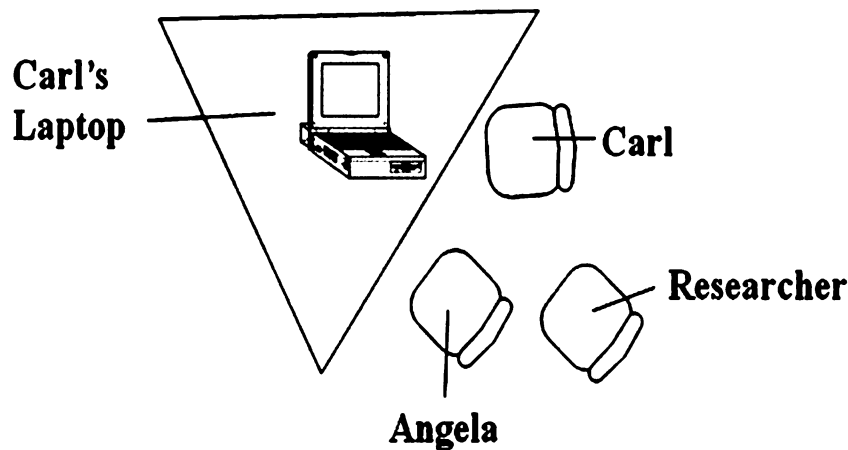
So, Carl's primary purpose in this meeting was to learn which user tasks were most important so that he could produce videos only for those tasks. As part of this discussion however, Carl volunteered some constructive criticism of the online help in its current form, noting politely that the current visual format looked good but that he believed it offered too many options in perhaps the wrong order for users to quickly find what they needed. He contributed one further piece of criticism by asking Angela if it would not be useful to incorporate small icons and pictures of buttons from the product user interface in the text of the online help itself.

As Carl made these suggestions, Angela's body language changed – she sat up straighter, seemingly less-relaxed than before, and when she answered Carl's points, she began to rather stridently jab her pen at his laptop screen to underscore the points she was making. She rebutted Carl's recommendations by referring to her own experience and research, which, she said, showed that users preferred the online help in its current form. Perhaps realizing that he had offended Angela and overstepped the purposes of the meeting in offering these critiques, Carl said he would defer to her superior

experience and knowledge and he added, rather meekly, that he had only been with the company for a short time.

During this discussion, Carl's laptop screen had been the primary focus of attention, as Carl alternated between the online help and his mind map. As I mentioned above, while responding to Carl's critiques, Angela began to use her pen to make deictic gestures frequently to underscore the points she was making in speech. She seemed to be particularly emphatic in these pointing gestures when referencing Carl's mind map. This behavior was so pronounced that I noted in my research journal later that day that it appeared as if Angela were attempting in some way to puncture the invisible barrier between herself and Carl's thoughts as they appeared on the screen as if this would enable her to get inside his head and better understand his reasoning. At one point in this, Angela informed Carl that she did not have the *Mind Manager* software and asked if he would email her a screen capture of his mind map to help her prioritize her own tasks. Angela then added that she would block time for these efforts in Microsoft's *Team System* software, a team awareness application that enables software team members to view each others' schedules in order to coordinate work efforts and arrange meetings. She asked Carl if he used *Team System*, but he indicated that he did not use it much, again mentioning that he had only been employed at the company for six months and adding that he was still adapting to the way things were done there. He further added that he had not experienced a similar degree concern for team awareness in his previous job and had been surprised by this aspect of the work environment at Software Unlimited. At this, the meeting concluded and Angela returned to her office.

Analysis of the Scene

Angela's agitation at Carl's critique was the most interesting thing about this scene. At a number of points later in the study, I attempted to learn from Angela what it was about this meeting and about *Mind Manager* that had so agitated her, but in each instance I found her reluctant to talk about the incident. In fact, although I had initially found Angela to be the most enthusiastic participant in the study – a fact demonstrated by her request that I attend her meeting with Carl on the first day of the study – after this meeting she appeared reluctant to participate in other observations sessions and I began to focus on more willing participants like Lucy and Lance.

At one level, of course, the reasoning behind Angela's change in behavior seems obvious – she was probably embarrassed that I had witnessed her handiwork being critiqued, even though she had won the argument. At another level and in light of Angela's stature with the company and depth of knowledge about the company's products, her behavior appeared somewhat puzzling: why did she care so much if a new employee who was ignorant of the thinking that had gone into her designs should attempt to offer his advice? She clearly knew more than he did and handily won the argument by invoking her superior knowledge and understanding of the company and its users – "why it is the way it is," as Lucy put it. So, why did Carl's criticism appear to sting so?

Although this question cannot be fully answered with reference to the data I have collected – the explanation for Angela's behavior may have nothing to do with the events of this meeting, perhaps she simply got involved in more pressing issues than accommodating my research – Bowker's memory regime offers one possible

explanation, an explanation that does happen to jibe with the rest of my data concerning the status of various memory practices within this organization and the source of Angela's own expertise.

To arrive at this explanation, it will perhaps be helpful for me to first recap Bowker's rather incomplete articulation of the concept of a memory regime and then to explain my interpretation and expansion of the concept with reference to the memory practices that I observed at Software Unlimited. First, as I have already mentioned, I follow Bowker in adopting the notion of the memory regime as a concept describing the role of culture(s) in shaping memory interfaces, infrastructures, and practices. Bowker (2005) says of memory regimes that they "articulate technologies and practices into relatively historically constant sets of memory practices that permit both the creation of a continuous, useful past and the transmission *sub rosa* of information, stories, and practices from our wild, discontinuous, ever-changing past," which is as apt an explanation for the effects of culture on memory and the effects of memory on culture as I have found (p. 9).

I found the concept of memory regime, then, to be a good way of talking about the memory work of cultures, in this case of a particular workplace culture: "culture is the *work of selection:* the selecting, challenging, arranging, and living of these received artifacts and ideas in everyday life" (Slack & Wise, 2005, p. 4). Memory regimes do the cultural work of selecting which memory practices are valued and how those practices are, for lack of a better word, practiced. Further, one of the purposes of a memory practice or set of memory practices is in some sense to obscure the fact of their

own existence – that is, like any other technology, memory technology works best when we do not see it.

Aside from introducing the concept, however, Bowker had not done much to develop the idea in the empirical portion of his research, so it was my task to figure out how to use it to interpret the patterns I was seeing in my data. In short, as my accounts of the scenes with Lucy, Lance, and Angela have argued, I kept finding instances in which my participants would, in one way or another, allude to some sort of gnostic yet important type of knowledge in the organization that seemed to have a large effect on how the work of the organization got done. I reasoned that the unspoken and apparently invisible rules governing this knowledge were the primary indicators and delineators of the memory regime of the organization, and I saw this regime determining three things: a) which *types* of knowledge were considered most important; b) the *forms* in which this knowledge was preserved; and, perhaps most importantly, c) who had *access* to it.

First, as for which *types* of knowledge were most valued by the memory regime at Software Unlimited, it was Lucy who had provided the first clue that it was knowledge of the company's products that was most valued – knowledge both about the features and functions of the current versions of the products and about the arguments and rationales lying behind the design decisions that had been made during the evolutions of those products. I found it highly significant that Lucy introduced the topic of the back reasons by interrupting herself during a discussion of the data dump system to which she consigns product knowledge: "There's probably way more information in it than I'll ever put out. And I think that one thing that I've noticed here is all of the reasons – back reasons – [Angela] has been huge." The interviews and

behavior of the other information developers seemed to confirm my supposition: Lance struggled to make a case for user needs against Wallace' superior knowledge of the product history; Peter informed me that he knew he needed to pay extra attention whenever the software developers appeared to be having problems designing a certain piece of the product; and Angela indicated that she "just knew" the "historical stuff" precisely because of her long association with her product – she had been, quite literally, her product's first user.

As for the *forms* in which this product knowledge was preserved, I have already discussed the fact that the product interfaces provided an ever-present but in large part inscrutable record of their own evolution. Interpreted in light of the cultural work of the memory regime, Angela's *hexis* demonstrates the other, crucial, form of memory which makes the other memories of the organization readable: narrative. In short, by virtue of her long tenure with the company but also by virtue of all the other advantages she has accrued – her physical proximity to her product team, her long-standing relationships with all strata of her fellow employees, etc. – Angela has learned more of the back stories, more of the narratives of the products' evolutions than any of the other information developers. As the scene with Carl demonstrates, it is Angela's access to these stories, to this knowledge that in large part appears to be the source of her influence and authority.

In addition, I found it significant that Angela, more than any other study participant, tended to answer the initial interview questions with narratives of specific events from her work experience, particularly with stories that focused on her relationship with her product. This was especially noticeable when the questions called

for relatively straightforward expository answers, such as in the following quotation

excerpted from Angela's response to the question "what software tools do you use for

composing?"

> When I came here, since it was just me, I used *Word*. [...] One of the goals that
>
> has been in place since I started with [the company] was design a [product] that
>
> [Angela] can actually use. When I got here and started documenting and
>
> looking at [the product] there were lots of things that were not in [it] so I could
>
> use it to do all of my [work] And the workflows may have been there for a lot of
>
> people but they weren't right for technical writers. So we came up with the add-
>
> ins at that point and we developed those. [...] So that was Phase 2 of if [Angela]
>
> can use it. And then we came up with the output from right within [the product]
>
> [...] So, it has really been a goal for the past five years to make [the product] as
>
> robust as possible.

Again, what stands out about this answer, typical of Angela's answers to many of the

questions in the interview, is its narrative quality, the way in which the memories of the

important decisions of the organization are preserved as stories, stories intricately

connected to Angela's own history with the company. Along with Lucy's revelation of

the importance of the "back reasons" and Becky's assertion that "we are really lucky

because she [Angela] has got so much background and understands sort of how we got

to where we were with some of these choices and different things that were tried," the

form that Angela's answers take reveals perhaps the ultimate source of her *hexis* – she

knows the stories of the organization. If we accept Lyotard's (1999) assertion that

"what is transmitted through [...] narratives is the set of pragmatic rules that constitutes

the social bond," the true source of Angela's stature and authority with the company stands revealed (p. 21).

Finally, there is the issue of *access*. As I have attempted to show, the memories of Software Unlimited's products appeared to be the most important memories and the forms in which these memories were stored and most effectively retrieved was in stories or narratives of the design decisions related to the creation of these products, but these aspects of the memory regime were problematic because, of course, access to these back stories depended on an employee's longevity with the company and the right set of skills or team affiliations to acquire them, and thus they were not evenly distributed among the employees. That is, although product knowledge was always present and visible in the software products themselves, principally in the user interfaces, this knowledge was not always interpretable or understandable to those whose newness or status as non-software developers meant they did not know the contexts and circumstances in which these memories were created. The memory practices of the newer information developers, then, appeared often to be attempts to "consign" knowledge in order to make it usable (i.e., contextualized and findable): "In an archive, there should not be any absolute dissociation any heterogeneity or secret" (Derrida, 1995, p. 3).

While knowledge of the products appeared to be the most important indicator of status and served as the ultimate warrant for many of the arguments about the way the work of the organization would get done, another type of knowledge that I encountered – user knowledge – helped to make these uneven power relations visible and perhaps helps to explain Angela's discomfiture at Carl's critique of her online help. As I noted

in Chapter 4, in comparison to product knowledge, knowledge about users appeared to be relatively homeless and less important, and this seemed to have a large effect on the status of the Information Development team members who were, in some sense, the principal custodians of that type of knowledge. Since other teams did not appear to value user knowledge as highly as the information developers and since it did not have a visible habitation as product knowledge did, the newer information developers had to engage in a variety of extra articulation work just to make this knowledge visible, to grant it the status of *topoi* in warranting their arguments for change.

The exception to this tendency to engage in laborious extra memory work was, as I have already shown, Angela, who was able to win her argument with Carl handily just by referencing her superior knowledge of the back story lying behind her product and its online help. In fact, the scene between Angela and Carl demonstrates several parallels to the encounter between Lance and Wallace in which Lance's attempt to argue for user needs was stymied by Wallace's appeal to the back story. This, then, offers one possible explanation for Angela's discomfiture at Carl's critique: despite the much touted role of the information developers as the principal user advocates in the organization, in this instance Carl was adopting the perspective of the user to critique an information developer's work. And, to counter his argument, Angela, perhaps unthinkingly, employed the practice sanctioned by the memory regime: she invoked the back reasons. I would speculate that such a reversal of roles may have left bad taste in her mouth.

In sum, then, over the course of my data collection and analysis, the concept of memory regime proved quite important as a lens through which I interpreted memory

practices as cultural practices at Software Unlimited. Like culture, a memory regime is instantiated at multiple levels and both influences and is itself enacted by practices, each of which forms "a sort of mini-culture that binds the community together" (Wenger, McDermott, & Snyder, 2002, p. 39). That is, in part the memory regime at Software Unlimited was derived from the larger culture – the preference for Microsoft operating systems utilizing the standard file folder metaphor, the privileging of technical knowledge like product knowledge over knowledge about people, like user knowledge, etc. – but it was also profoundly influenced by local conditions, local power relations, and the local history of the organizations and its products, the narratives that bind the organizational culture. Together, these factors guide the memory practices of the organization and determined its *topoi*: what counts as knowledge, how this knowledge is stored, how and when it can be used in arguments, which retrieval practices are appropriate in a given situation, and, by extension, who can access and use this knowledge.

Implications for Practicing and Teaching Technical Communication

At this point, I perceive two main implications for this research: one for teaching and the other for practicing technical communication. First, for teaching, my analysis seems to indicate that, because the acquisition of an "assured facility" in technical communication appears to be a product of both physical and mental training, the "cognitive apprenticeship" model of education advocated by Brown, Collins, and Duguid (1989) would be the most effective (p. 39). It seems to me that such a model would entail longer internships than many technical communication degree programs currently offer – certainly it would emphasize internships lasting longer than a single

summer. The information developers seemed to recognize that such an experience would be helpful because, even though all but one of them had majored in technical communication in college and several had held internships as part of their training, they all indicated that the most important part of their education had only begun once they were on the job. Again, Lucy said it best: "there's a lot of practical stuff I learned in college – like really how to work with technical things [but] the practical stuff to do my job I've learned working."

As for the implication for the practice of technical communication, I would argue that this study, particularly as it illuminates the concept of a memory regime, contributes to our recognition that organizations and organizational memories are rhetorical constructions that are "written" in interfaces, spaces, and databases, and, therefore, that "we can rewrite [them] through rhetorical action" (Porter, et al, 2000, p. 613). The most obvious example of such rhetorical action aimed at regime change that I observed was, of course, Lance's tireless efforts to substantiate the user perspective as an area of knowledge equivalent in importance to product knowledge. He was, in short, attempting to give stories about users equal status to stories about products as transmitters of the company's memories.

However, Lucy's example also contributes insights by highlighting one particularly deleterious influence of the wider memory regime on a local context: the reliance on the file folder metaphor as the dominant metaphor for location-based browsing. As I argued in Chapter 5, Lucy showed a definite preference for location-based browsing, yet seemingly as often as not file folder browsing led her astray or took longer than she appeared to anticipate. In other words, Lucy's example adds weight to

the idea that metaphors are helpful as a way of making knowledge concrete, but it also seems to confirm Selfe and Selfe's (1994) contention that an overreliance on hierarchic metaphors like the file folder may not be the best approach and may also preclude other ways of knowing or remembering.

Finally, the example of Angela's *hexis*, developed through her lengthy social and physical proximity to her teammates and sustained by her authority as a perceived keeper of the stories of the organization, points to another text that may need to be rewritten. As Johnson-Eilola (2005) points out, "it is easy to miss the fact that symbolic-analytic work requires a much larger and more complex information space than can be supported by the computer alone" (p. 73). At Software Unlimited, stories appear to play an even more important role in the organization's memory than information held in the electronic information spaces of product interfaces and network file folders. Rendering these stories accessible and interpretable may be the most important memory work that technical communicators can do in their workplaces.

APPENDIX: INITIAL INTERVIEW QUESTIONS

Questions about Participant Background

1. What is your current job title?

2. What are your job duties?

3. How long have you worked as a technical writer?

4. How long have you worked as a technical writer at Software Unlimited?

Questions about Composing and Writing Practices

1. When you are assigned to a project, what sorts of research do you perform in order to prepare yourself to work on that project? Some examples of this type of activity might include reading the project design documents or meeting informally with other members of the project team to discuss the project?

2. What resources do you typically consult when conducting this research? For example, do you search for information on the company file server or the internet, do you consult colleagues?

3. How do you track and organize the information you learned through this research? For example, how and where do you keep notes and other products of your research?

4. Where do you typically compose?

5. When do you typically compose?

6. How do you prepare your workspace (both your computer desktop and your physical surroundings) before beginning a writing task? Examples of this type

of activity might include creating computer file folders for the writing deliverables or creating a physical file folder for hardcopies of project documents.

7.   What software tools do you use when composing?

8.   In addition to the project deliverables, do you create supplementary documents or files for yourself to help you manage information or track your goals as you compose? An example of a supplementary document might be a working outline to remind you of your place in the composing process?

9.   Do you use any supplementary software tools to support your composing? For example, you might use a text-editor like Windows notepad to create quick reminders for yourself as you write.

10.   Once you have begun writing, do you take many breaks or do you work straight through until you come to a logical stopping point? If you take breaks, what activities do you typically perform during them? For example, do you talk to colleagues, visit websites, or go to the break room?

11.   How often do communicate to your colleagues about the project and what methods do you use for this communication? For example, do you meet with them face-to-face, do you instant-message them, do you email them?

Questions about Project Management Practices

1.   What methods and tools does your employer use to help you track project due dates? For example, what software (e.g. MS Project) or hardware (e.g. a daily planner) do you use?

2.   Do you have any personal methods for managing projects that supplement those your employer provides? For example, do you post sticky notes for yourself? If so, is there a system behind these personal methods (e.g. placing the most important sticky note on your monitor and the rest on your bulletin board)?

3.   Do you find that, as a project continues, the project management aspects of the writing process grow easier or more difficult? In other words, does managing the various deliverables and documents you and others create for a project become more or less time-consuming as the project continues? Please explain why.

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