When Management Becomes Personal:[1] An Activity-Theoretic Analysis of Palm™ Technologies[2]

Cheryl Geisler

Language, Literature, and Communication
Faculty of Information Technology
Rensselaer Polytechnic Institute
Troy, New York 12180
geislc@rpi.edu
http://www.rpi.edu/~geislc

Abstract

Palm Technologies, a group of personal digital assistants or PDAs developed in the early 90s, have rapidly embedded themselves into the daily lives of users. The aim of this chapter is to provide an activity theoretic account of PDAs as technologies of text. Three questions are pursued: Out of what cultural history did Palm Technologies emerge? What motivated users to adopt Palm Technologies? How did Palm Technologies become incorporated into the activity patterns of everyday life? The evidence presented suggests that Palm Technologies work by moving systematic management techniques originally developed for organizations into the personal sphere. When systematic management becomes personal, task management separates from the task itself, leading to a fragmentation of motive that may challenge some of the basic assumptions of activity theory. This fragmentation is mediated through the space-time affordances of textualization and concurrent linearization of time. Like the systematic management of organizations before it, such textual affordances may become subject to surveillance and manipulation - by ourselves if not by others. All of this suggests that some interesting issues will arise as PDA technologies attempt to move outside of their managerial base and into the domestic sphere, in effect *databasing* our lives.

Market figures suggest that a new technology, Palm Technologies, has emerged and rapidly embedded itself into the everyday lives of millions of users. The term "Palm Technologies" refers to a group of personal digital assistants or PDAs developed by Palm, Inc. in the early 90's. The acknowledged granddaddy of these devices was the PalmPilot, which hit the market in April, 1996, and captured half the market by the end of its first year (Brandel, 1999; Bayus, 1997; Graves, 1998). By the end of four years, 7 million devices had been sold (Pachetti, 2000). Since then, Palm has continued to dominate with about 75 percent of a PDA market which topped 6 million units in 2000 (Quittner, 2000a). And, unlike other technology companies who found 2000 to be a bad year, makers of PDAs were seeing strong growth (Rosen, 2001). Indeed, in 2001, sales of PDAs were expected to grow 57 percent to 9.6 million units (Gilroy, 2001), and industry analysts were predicting an even greater increase in profitability (Schaeffler, 2001).

Who are the users of these Palm Technologies? According to a recent profile by Consumer Electronics Association (Gilroy, 2001; Thibodeaux, 2001), current PDA owners belong to what we might call the managerial class: wealthy, well-educated adults under 55, a slight majority of

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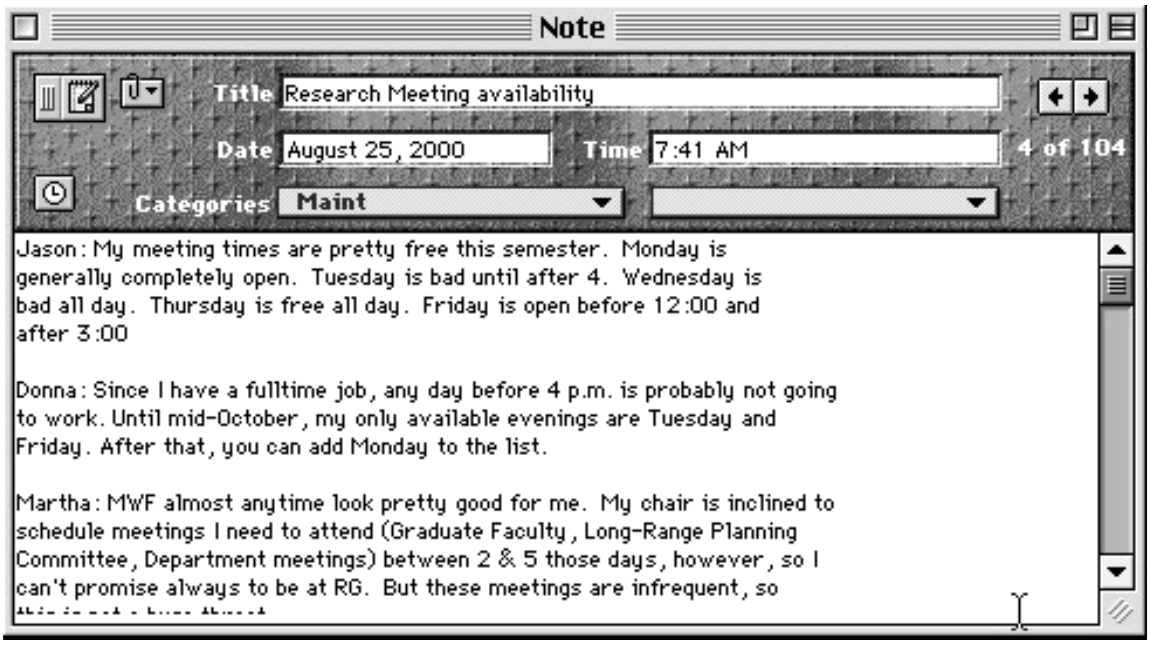
whom are men. They are frequent users: Most use their PDAs everyday. Almost all carry them wherever they go. As projected market growth suggests, however, PDAs are moving beyond this managerial class. At the end of 2000, advertisements for PDAs started appearing in print and on TV for the first time (McCarthy, 2001), and this media campaign was expected to grow (Schaeffler 2001). Technology reviews have begun to represent PDAs in the hands of many outside of the traditional market: Teachers and students in public schools, mothers, Gen Y women, and tech-savvy kids have all been urged to take advantage of PDA mobility (McCampbell, 2001; Quittner, 2000b; Lowe, 2001; Gardyn, 2001; Montoya, 2001). And finally, PDAs have recently appeared on the cover of *Consumer Reports* (May 2001), a certain harbinger of arrival in the mass market.

When a new technology embeds itself into the daily lives of users with the rapidity and thoroughness displayed by Palm Technologies, the time is ripe for analysis. One of the most useful frameworks for this purpose is activity theory. In studies of writing and in studies of human-computer interaction — the two fields for which Palm Technologies are of interest — activity theory is receiving increasing attention (Bodker, 1997; Cole & Engeström, 1993; Gifford & Enyedy, 1999; Kaptelinin, 1997a & 1997b; Kaptelinin, Nardi, & Macaulay, 1999; Nardi, 1998; Russell, 1997; Turner, Turner, & Horton, 1999; Witte & Bracewell, 1988). From the perspective of human-computer interaction, the reason for interest in Palm Technologies is clear. Handheld organizers from Palm have been the agent of a paradigm shift in humans interacting with computers. By packing personal data into a handheld device that fits in the "palm" of the hand, Palm altered the conviction that more was better in a computational devices (Bergmann & Haitani, 2000). The case for Palm Technologies' interest to researchers of writing is not hard to make either. As shown in Figure 1, basic Palm tools involve, without exception, the creation and use of texts:

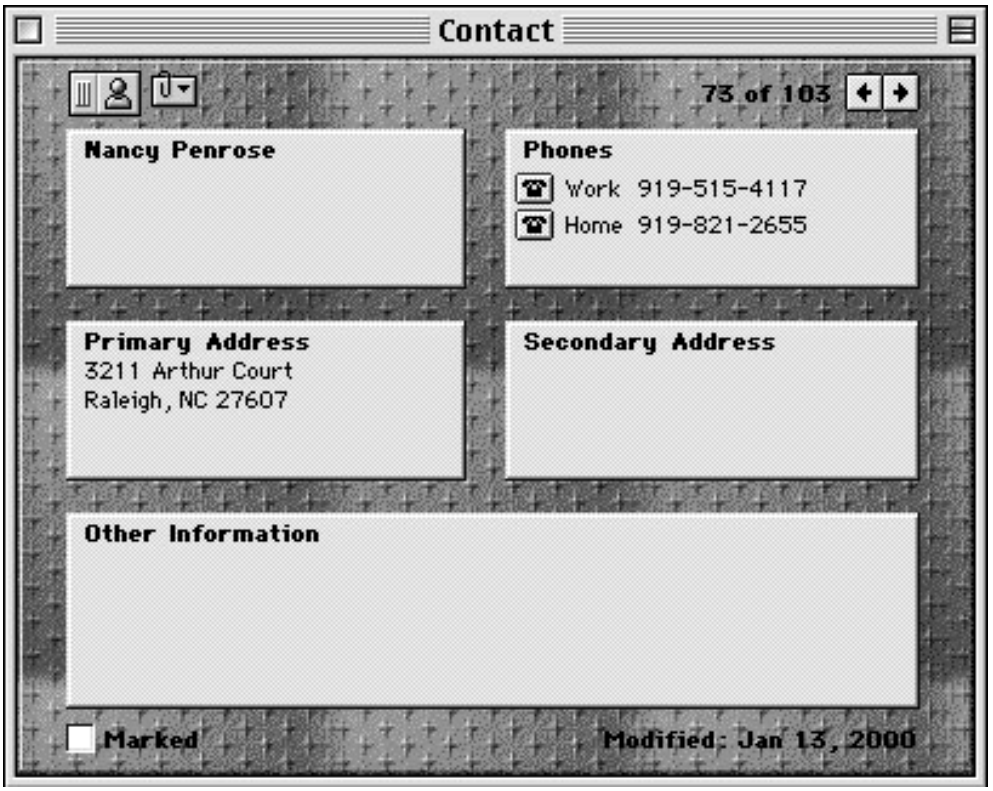
- In Notes (shown in A in Figure 1), users create texts that record information to be remembered. Users can give these texts titles, and they are automatically stamped with the date and time of creation.
- In Contacts (shown in B in Figure 1), users create texts that associate personal information — phone numbers, e-mail addresses, mailing addresses, and other information like web sites and birthdays — with individuals.
- In the Calendar (shown in C in Figure 1), users create texts that record appointments, each assigned to a specific date and time.
- In the Task List (shown in D in Figure 1), users create texts that detail work to be done. Each task may be assigned a priority (from highest to lowest) and a specific date.

These Palm texts are texts because they use the symbol system of language as represented in material form through an alphabetic script. And yet, they are unlike the prototypical texts traditionally examined in writing research. In Palm Technologies, each text has become, in effect, a data structure with assigned attributes whose spatial display is critical to interpretation. Most Palm texts — notes, appointments, and tasks — can be assigned to user-defined categories.

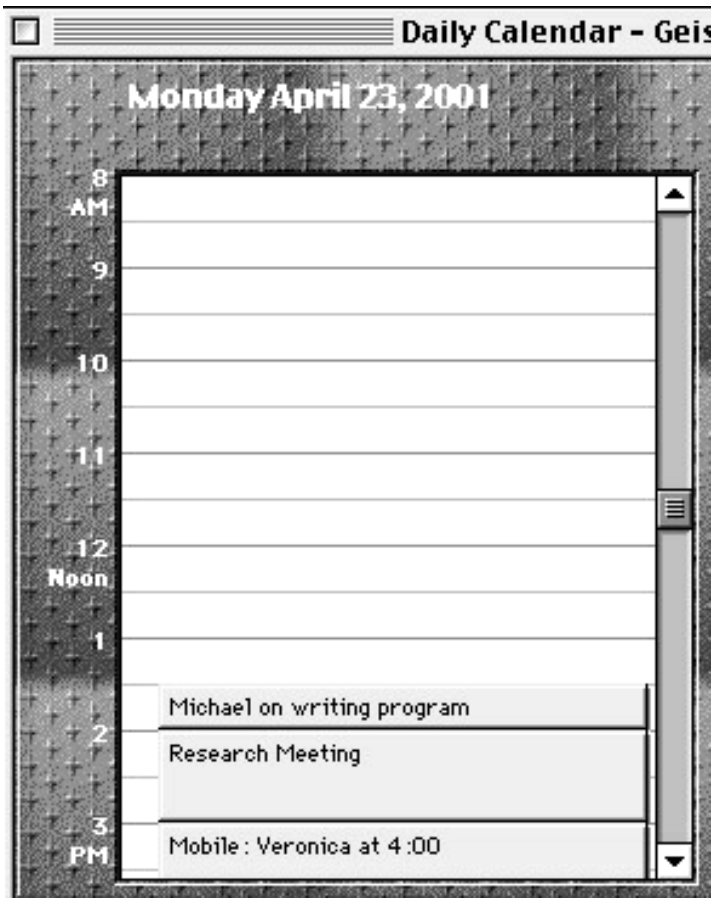
Some Palm texts — notes and addresses — can also be linked to points on the calendar. All Palm texts can be displayed for browsing, searched, sorted, and filtered in multiple ways by content and by attribute.



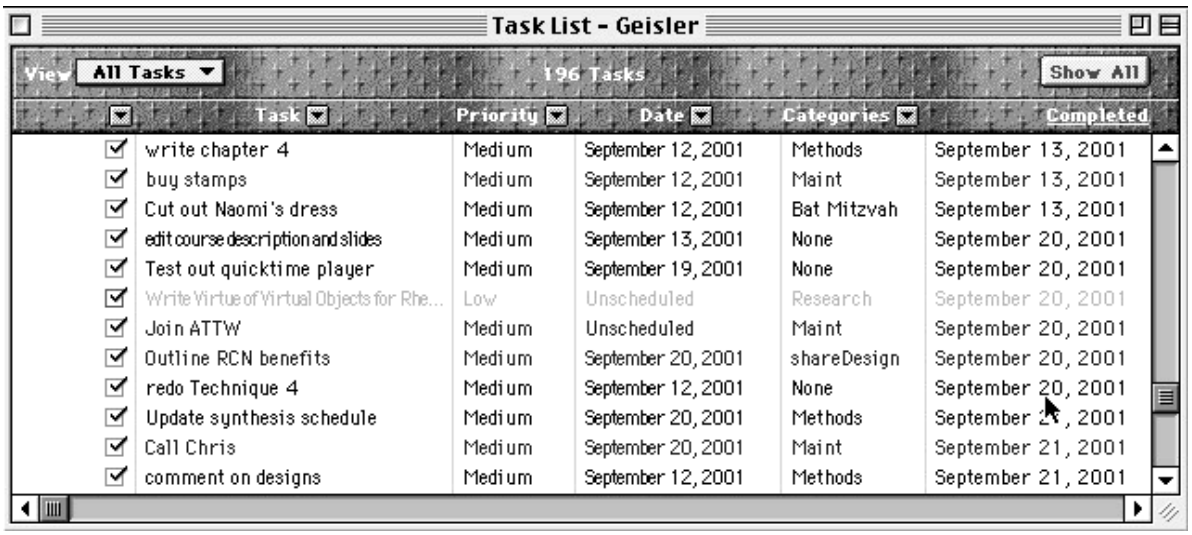
A: Note from the Palm Desktop



B: Address from the Palm Desktop



C: Appointments from the Palm Desktop



D: Tasks from the Palm Desktop

Figure 1. Texts in the basic Palm applications for notes (A), addresses (B), appointments (C), and tasks (D).

In many minds, by contrast, prototypical texts are quite different. As information technologies re-mediate paper-based technologies, however, our prototypical view works less well even for those texts that look like a "text". Texts in word processors, for instance, have many attributes beyond what a paper-based medium affords. Words have attributes of time, date and even authorship, which can be used to display editing changes. Words can be assigned attributes for annotations, hypertextual links, and stylistic characteristics, all of which can be used to control the readers' experience. For this reason, analysis of Palm texts can help to call attention to aspects of texts that become increasingly critical to understanding the role texts play in the information age.

Activity theory provides a useful analytic framework for this purpose. One of the major contributions of activity theory has been the integration of a psychological account of individual development with a sociohistorical account of the development of culture. At any given time and place, the collocation of actors, motives, and mediational means that constitute an activity are taken to be the result of a convergence of two lines of development:

- the *cultural history* of the mediational means that, as a kind of legacy, provides a set of physical, mental, and social resources by which current motives can be pursued; and
- the *developmental history* of individual agents, which produces a set of desires and dissatisfactions embedded in a set of personal techniques and tools.

Both of these lines of development together converge to enable the combination of actions and motives that we call an *activity*.

The aim of this chapter is to provide an activity theoretic account of the interrelationship among the cultural history of Palm Technologies as tools, the individual development of a Palm user's motives, and patterns of Palm-embedded activity. Three questions were pursued:

- Out of what cultural history did Palm Technologies emerge?
- What motivated users to adopt Palm Technologies?
- How did Palm Technologies become incorporated into the activity patterns of everyday life?

The evidence to be presented suggests that Palm Technologies work by moving systematic management techniques originally developed for organizations into the personal sphere. As we shall see, when systematic management becomes personal, task management separates from the task itself, leading to a fragmentation of motive that may challenge some of the basic assumptions of activity theory. This fragmentation of task and motive is mediated, I will suggest, through the space-time affordances of textualization and concurrent linearization of time. Like the systematic management of organizations before it, such affordances may become subject to surveillance and manipulation — by ourselves if not by others. All of this suggests that some interesting issues will arise as Palm and other PDA technologies attempt to move outside of their managerial base and into the domestic sphere, in effect *databasing* our lives. The analysis that follows is a first step in understanding this new role for texts in the information age.

Analysis of Cultural History

As shown in Figure 2, the Palm family of handhelds pioneered the arrangement of the set of basic tools described earlier — Calendar, Contact List, Task List, and Notepad — on a handheld device. With a push of the button, each tool is available nearly instantly, viewable on the screen occupying the top two-thirds of the device. Above the buttons is an area on which the user can "write" with a stylus using a simplified character set. By means of a docking cradle, the Palm handheld can synchronize with a desktop application, the Palm Desktop that displays the same information on the user's desktop. Users thus have a complex personal database available both at their usual places of work and on the run.

The cultural history of these Palm tools is complex, but we can begin with paper-based antecedents like the personal organizers, Filofax and Day-Timer, and rotary files like the Rolodex. Early technology reviews of the Palm called attention to these paper-based antecedents: "[N]o more difficult than opening a Filofax" said *Time*'s reviewer (Jackson, 1998). "[S]uperportable electronic Rolodexes" quipped a reviewer at *Money Magazin*e (Turner, 1998). "I view it as an electronic replacement for a daily planner," suggested another at *Electronics Now* (Holtzman, 1998). Such comments were an important mechanism by which users were able to see the link between Palm Technologies and other tools in their cultural history.

These paper-based time management technologies were all developed around the middle of the twentieth century as a way of extending office technologies to the management of personal data. The Filofax, first developed in 1921 as a "file of facts," quickly became standard equipment for the British army (Meyer, 1996), and was later adopted by the yuppies of the 1980's (Canfil, 1996). In 1947, the Day-Timer daily planner was born as the Lawyer's Day, a similar combination of an appointment calendar, to-do list, time record, and work planner aimed at helping professionals keep track of their billable hours (Daytimer, 2001). And in 1950, the Rolodex, a desktop rotary file of removable cards, revolutionized our approach to keeping address books up to date (Hampson, 1996).

Paper-based systems like the Day-Timer and Rolodex all eventually made their way into electronic form as PIMs – Personal Information Managers — such as Microsoft's Outlook or Micro Logic's Info Select. Originally cast as competitors to the Palm handhelds (Coates, 1996; Jasper, 1999), PIMs soon became their desktop adjuncts when Palm developed conduit software that would move information from the handheld device into a variety of desktop applications.

Electronic antecedents for Palm handhelds were more diverse than just this direct line of time management technologies. Most notably, the consumer market was prepared for handheld devices starting with the craze in the 70's for the handheld calculators we now take for granted (Turner, 1998; Holtzman, 1997). The laptop, as a downsized and portable desktop computer, is also widely recognized as an electronic antecedent, though it may have been more of a distraction than a precursor. In the early days at Palm, venture capitalists and manufacturers repeatedly told Palm president, Donna Dubinsky, that Palm was going in the wrong direction by offering less rather than more in a handheld computing device. Distracted by the laptop as

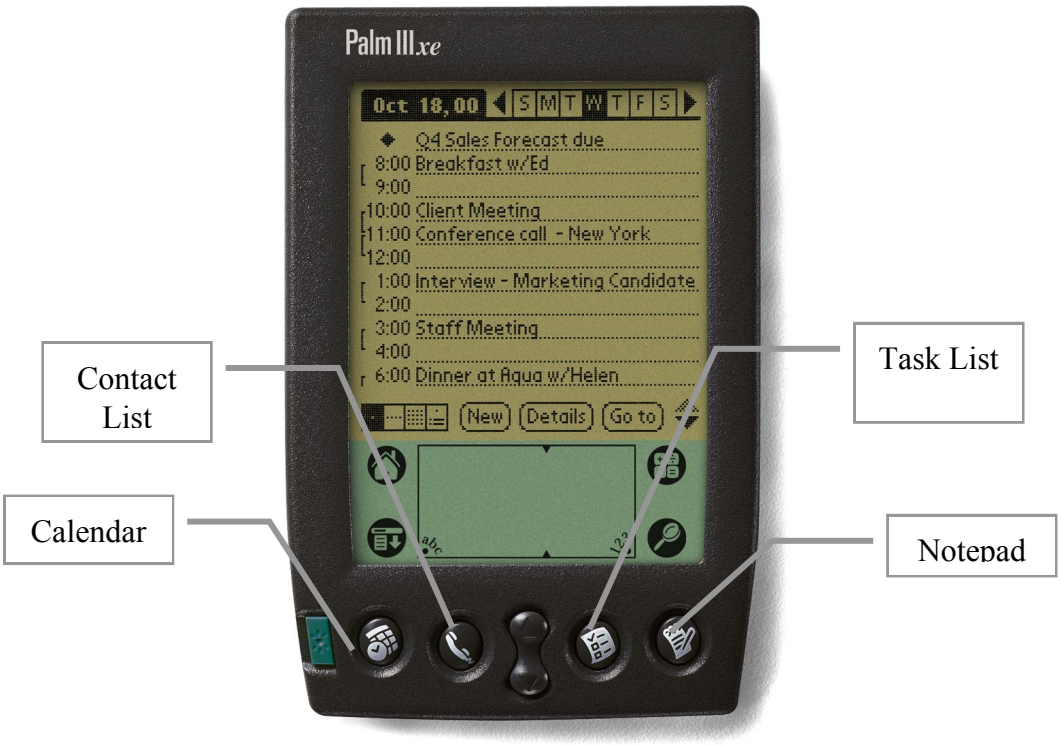


Figure 2. The Palm™IIIxe handheld showing arrangement of buttons for basic applications.

cultural antecedent, these potential partners could not see the connection between the proposed technology and the cultural history of their tools. "Time after time, I'd go into meetings, and they'd say, 'You can't do a device like this without a PC card slot or a spreadsheet or whatever,'" Dubinsky has been quoted as saying (Jackson, 1998).

In addition to physical tools, the cultural history of a device like the Palm handheld includes the social arrangements that support it. In this area, two interrelated social movements are relevant. The first, time management, provided the underlying rationale for using Palm tools. Time management gurus like Charles Hobbs (1987) preached the combination of efficiency and goal-setting that first became embodied in personal organizers like the Day-Timer (Daytimer, 2001), and later appeared in the Palm handheld interface. Based on systematic management, which has received many challenges in recent decades, its tenants of segmenting time into ever finer intervals and separating task management from the task itself (Yates, 1993; Waring, 1991; Kanigel, 1997) remain fundamental to Palm Technologies.

The second social movement making up the cultural history of Palm Technologies is professionalization (Bledstein, 1976; Friedson, 1986; Collins, 1979; Larson, 1977; Geisler, 1994). The creation of associations of what we now call white-collar workers with the prerogative to control their working conditions developed hand-in-glove with systematic management in late nineteenth century. This professional or managerial class developed time

management as one of its tools, so it is no accident that Palm Technologies have made their greatest inroads among so-called mobile professionals — "white collar workers who spend more than 20 percent of their time away from their desks" (Hulak, 1995).

The final set of cultural antecedents relevant to an analysis of Palm Technologies are what we might call technologies of the body. The rapid emergence of Palm Technologies may, in fact, be best explained through careful attention to issues of the body. The size of the PalmPilot (4.7 x 3.2 inches) was a notable break with the form factors that prevailed in earlier PDAs like the Apple Newton which was twice its size (8 x 4.25). The shape was no accident: Jeff Hawkins, Palm's founder, early on challenged his developers to come up with a device that could fit in any shirt pocket (Bergmann & Haitani, 2000; Brown, 1998), an image in keeping with Palm Technologies' professional roots.

Behind the shirt pocket, however, was an even more compelling tool: the hand — or, more specifically, the palm. The ability to hold the Palm comfortably in the palm of the hand while writing on it with the other hand was important for users. Unlike Windows CE machines which aimed to extend the tradition of the laptop into the so-called "palmtop" devices, Palm handhelds had a stylus rather than a keyboard; reviewers pointed out that this seemed more physically manageable on the go (Holtzman, 1997). As one early reviewer harangued, "There's no easy way to use a keyboard while standing up…. Okay, there is one way to use a keyboard when you're standing up: Hold the machine by the sides and type with your thumbs" (Manes, 1997, p. 312).

Analysis of Individual Development

While links to antecedent tools can begin to account for the rapid emergence of a technology like the Palm, decisions to adopt are made by individuals in response to the desires and dissatisfactions that make up what activity theorists label as *motive*. In this section, then, we turn from the general patterns of cultural history to look at more specific patterns of individual development. In particular, we take a look at the ten-year history leading to my own adoption of a PalmPilot in the relatively early year of 1997.

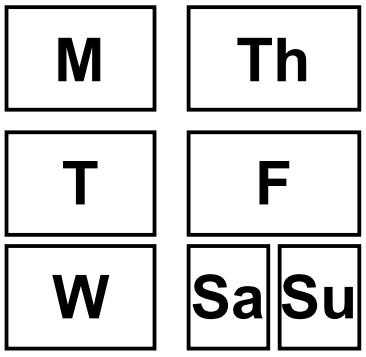


Figure 3. Schematic representation of the Week-at-a-Glance academic year calendar.

Before 1988, I used the still-common academic year calendar, Week-at-a-Glance, available from most university bookstores. A little bigger than the PalmPilot (4 x 6.5), it offered seven days in a 2-page spread as diagrammed in Figure 3. Monday through Friday provided 7 full blank lines; the weekend (on which I would presumably be loafing) provided 7 half-lines per day. A sample week, that of Dec. 7, 1987, showed that I recorded four kinds of information in the Week-at-a-Glance. First, I listed daily appointments by writing a time followed by the name of the appointment: "9:30 Graduate Review Committee." Second, I noted deadlines such as "Final project due." Third, I created numbered task lists like the following:

- Annenberg
- Book revision plans

And finally, I recorded untimed events that, nevertheless, were scheduled to occur on specific days: "David Phillips visits, New Zealand." As might be expected with all of these kinds of entries, the seven lines provided for each day often made space tight in my Week-at-a-Glance.

The following year, at the beginning of my second year as an untenured assistant professor, the impending birth of my first daughter increased my sense of the inadequacy of the simple academic calendar. I particularly remember being concerned with finding a way of keeping myself on track with multiple academic projects with the appealing distraction of a baby at hand. My solution was a large-format Day-Timer daily planner diagrammed in Figure 4. At 10 x 12 inches, it barely met the criteria of mobility, but it gave me a full-page per day with 28 lines in the top for "Appointments & Scheduled Events," marked by the hour starting at 8a.m and running, in half hour intervals, until 10 p.m at night. In the bottom were 14 lines in a section titled, "To Be Done Today," followed by the admonition (which I ignored) to "number each item."

By the end of the first year, I had developed a system for using this Day-Timer. Friday, September 22, 1989, for example, showed 4 back-to-back afternoon appointments (12:00, 1:00, 2:30, and 3:30) in the top left-hand column and 17 To Do's spread over both columns at the bottom of the page, all but two of which were checked off. In addition, at the top of the otherwise empty top left-hand column, I recorded time-keeping notes — the hours which I worked on research ("9:30-12:30"), a note that my baby was sick, and, at the bottom on the column, the sum of hours worked ("3.0.").

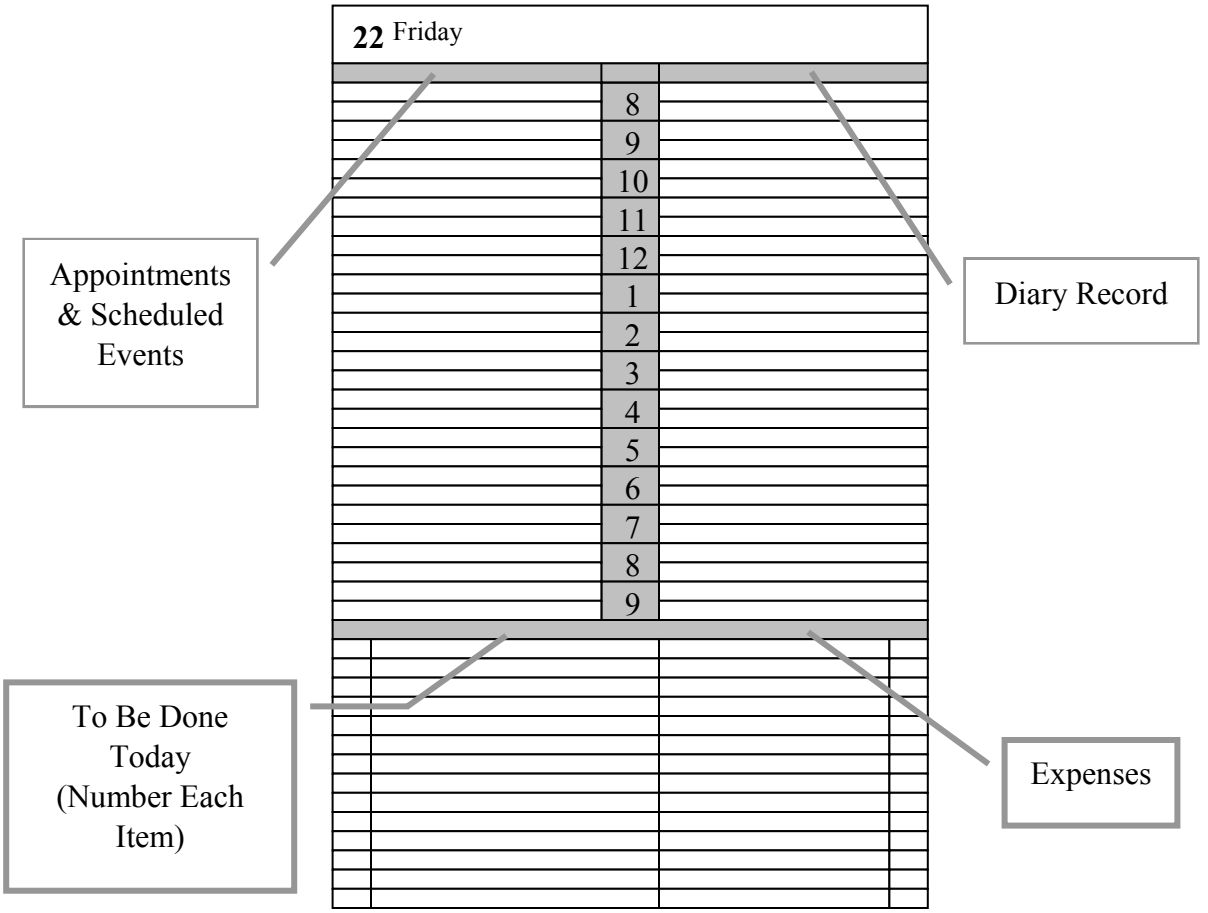


Figure 4. Schematic Representation of a page from my Day-Timer.

My Day-Timer also provided me with other supplemental pages which I incorporated into my daily routine. I used a tabbed divider which arrayed the days of each month to re-record time keeping notes ("9:30-12:30"; "Naomi sick," and "3.0"). Each Saturday was then annotated with the total number of hours worked for the week ("19.25"). I also used a full-page 2-column spread labeled "Notes and Memos" at the end of each week to record tasks that I needed to do long-range.

Activity theory requires us to understand how a tool builds upon the user's prior tools, responds to her desires and dissatisfactions, and, through its affordances, extends the capacity of the user in unexpected directions. We can see all of these factors at work with my use of the Day-Timer. The same kinds of information that we noted in the Week-at-a-Glance — daily appointments, deadlines, task lists, and untimed events found their place in the new Day-Timer technology. In addition, my desire for better control over project tasks and a mechanism through which to assure that I did not neglect my scholarship lead me to develop new mediating means built on tool affordances: not only task lists created in a space whose label ("To Be Done Today") invited

such use, but also time-keeping notes ("9:30-12:30") in spaces (Diary Record) designed for other purposes (billable hours).

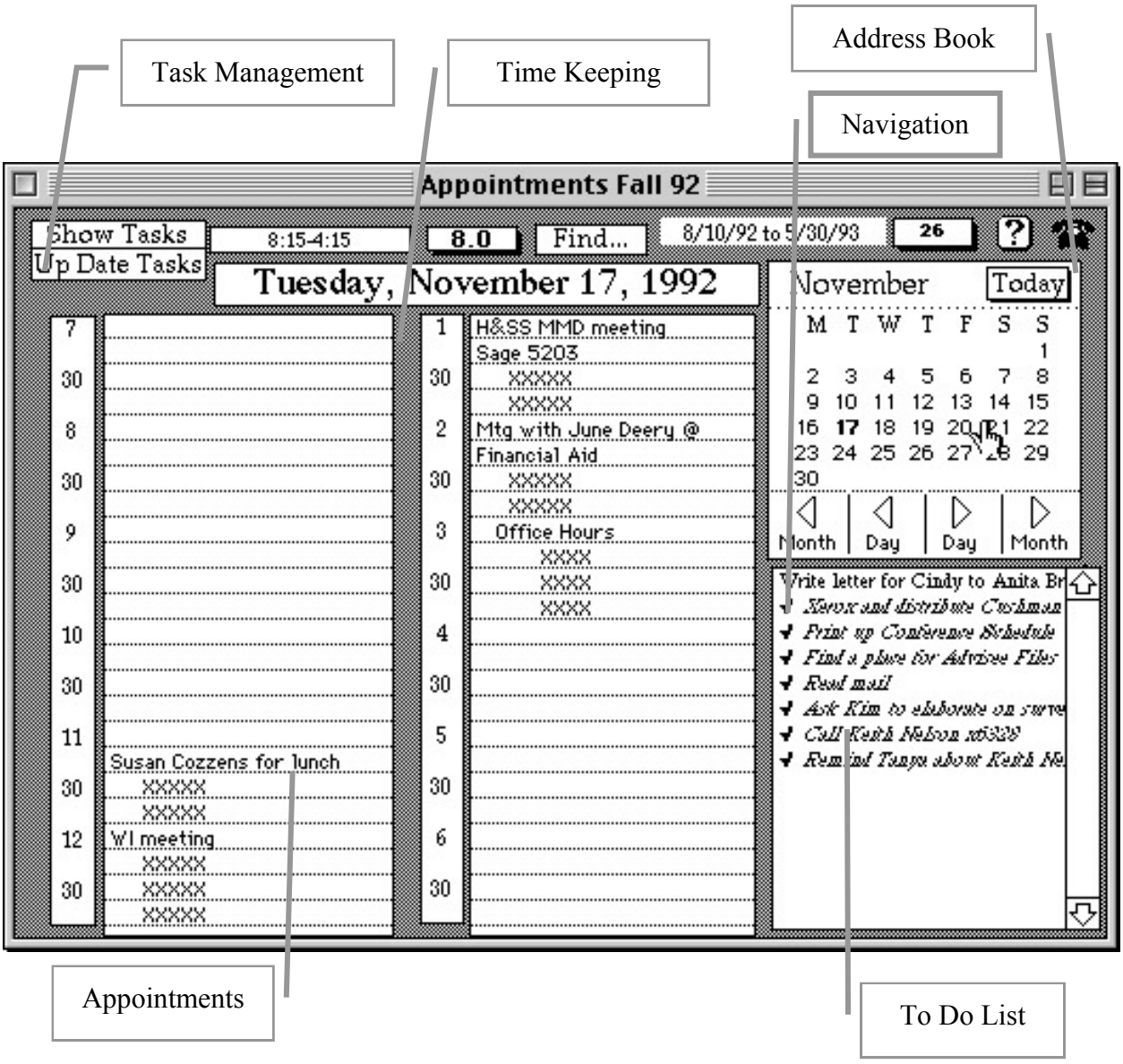


Figure 5. Electronic organizer created in Hypercard, showing the appointments view.

With time, my task management became increasingly complex in response to these new affordances. "Notes and Memos" was used to record long-range goals that couldn't be more immediately assigned to a specific day of the week. Each week called for a review of this long-range list so that I could assign its tasks to a specific day for the coming week. By the end of two years, the long-range task list had started to segment itself by project, so that I could manage multiple responsibilities.

At the same time, I was growing more dissatisfied with aspects of the Day-Timer technology itself. The pages, which at that time had to be special ordered from the company, were expensive; the 10 x 12 format was bulky. And the proliferation of project To Do Lists required me forever to be copying undone tasks from one day to another as things piled up.

During a sabbatical leave in 1990, a new Macintosh with Hypercard 2.0 arrived on my desk. Armed with Danny Goodman's *The Complete HyperCard 2.0 Handbook*, I added to simple appointments and address "stacks" which came installed to recreate my full Day-Timer system in electronic form. Over the course of nearly a year, I added features tailored to my own interests limited only by my programming abilities and the limitations of the application itself.

As shown in Figure 5, the resulting appointments stack preserved many of the features that I had found or created in my paper-based system. An appointments calendar, better adjusted to my work schedule, ran from 7am to 7pm, preserving the half-hour increments of the DayTimer. The day's To Do list was found in the bottom right-hand corner. Time-keeping hours were located above the day's date. Replicating my more cumbersome paper-based system, the sum to the near right ("8.0") showed the total hours worked that day; the sum further to the right ("26") showed the hours accumulated so far for the week. I could see, then, at a glance, how well I was doing for the week.

The biggest innovations with this stage of technology came in task management. On the daily To Do List, a simple Option-Click sufficed to check off a task as shown in the bottom right-hand corner. The "Update Tasks" button in the upper left-hand corner automatically copied any uncompleted tasks from one day to the next, alleviating the need for tedious recopying. Thus, as shown in Figure 5, the task "Write letter for Cindy" which is not checked off, would be brought forward to the next day, while all of the checked-off tasks would be left behind.

The segmentation of task lists into ever finer projects reached its apogee in a second view of the Hypercard stack, shown in Figure 6, for which I was entirely responsible. Reached by clicking on the "Show Tasks" button in the upper left-hand corner in Figure 5, eight different projects were arrayed, each with multiple tasks. Command-click opened up a specific task list for more complete viewing; option-click moved a task onto today's to-do list; option-command-click moved a task onto any specific date clicked on the monthly calendar. By reviewing this complex set of tasks on any given day, I could now better organize the long-range tasks like those I had earlier recorded on the "Notes and Memos" page of my Day-Timer and more easily move them to the To Do List of specific days.

The Hypercard appointments stack lost me the mobility I had considered essential in my two earlier paper-based systems, but it wasn't until five years later that this and other issues became serious sources of dissatisfaction. In that year, I assumed the position of department chair and, for the first time, faced the need to have my schedule "managed." My assistant, furthermore, worked not only on a different computer but also on a different operating system. Pressed for time, I implemented the spreadsheet-based calendar shown in Figure 7. It replicated my hour-by-hour daily appointments in a format that worked on both the Macintosh and Windows platform.

But I gave up much in return —my To Do lists, my mobility, and my ability to schedule my own appointments — complaints all familiar to the managerial class of which I was now a member.

At this point, the trajectory of cultural history reviewed in the previous section and the personal history reviewed in this section collided. The PalmPilot was released within nine months of my becoming department chair. Members of my campus community with whom I routinely interacted were some of the first users. They frequently showed their Palms around in meetings I attended. Not surprisingly, the beginning of 1997 found me with a Palm in hand.

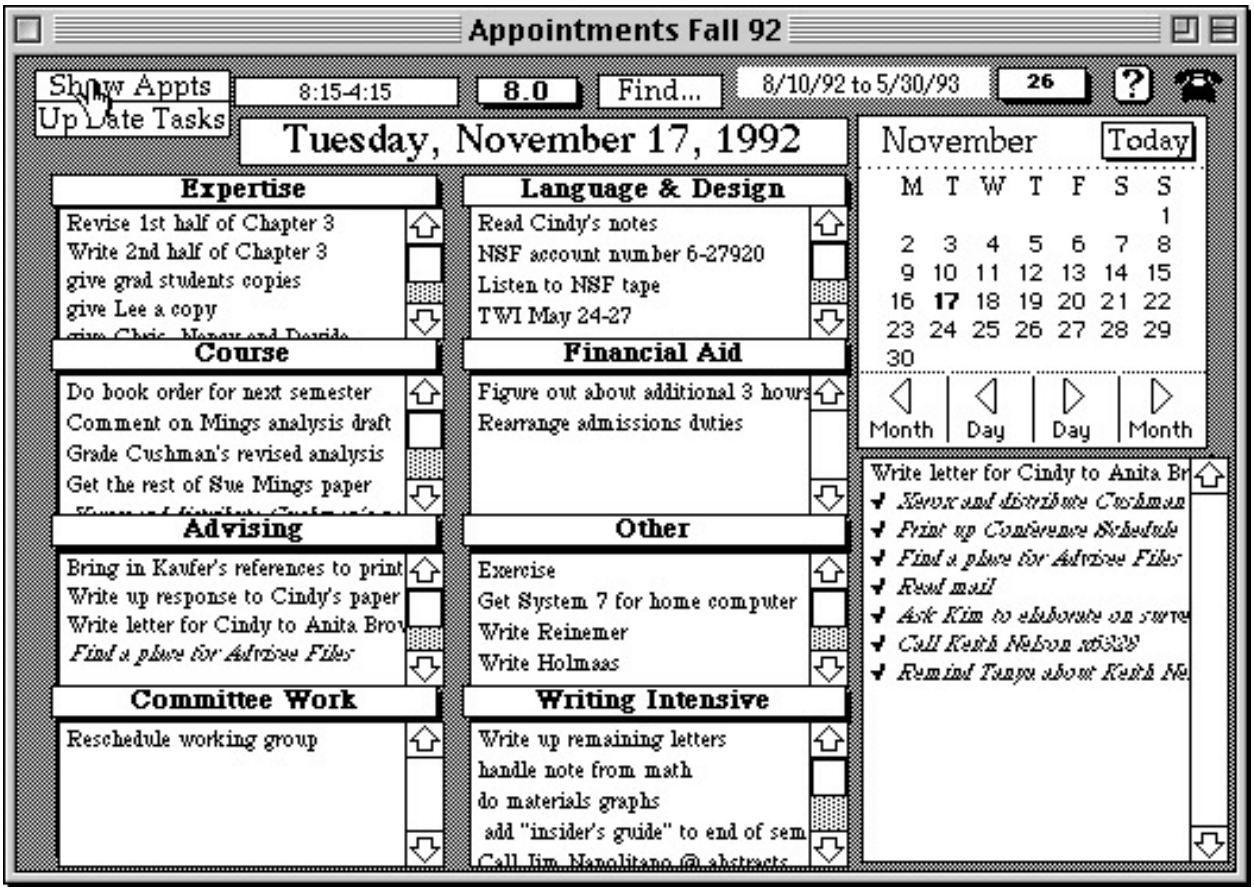


Figure 6. Electronic organizer created in Hypercard, showing the task view.

Week 21	Mon 1/13	Tues 1/14	Wed 1/15	Thurs 1/16	Fri 1/17
8:00	Classes Begin				Hold SCAiT Meeting DCR
8:30					Hold SCAiT Meeting DCR
9:00					Hold SCAiT Meeting DCR
9:30					Hold SCAiT Meeting DCR
10:00					
10:30					
11:00	Research 0n ComposingClass			Chris Boese Orals	
11:30	Research 0n ComposingClass			Chris Boese Orals	
12:00	Research 0n ComposingClass			Chris Boese Orals	
12:30	Research 0n ComposingClass			Chris Boese Orals	
1:00	Research 0n ComposingClass			Chris Boese Orals	
1:30	Research 0n ComposingClass			Chris Boese Orals	
2:00		H&SSExec. Meeting		Chris Boese Orals	
2:30		H&SSExec. Meeting			
3:00		Exec. Meeting	Hold for Faye,Rolnick ,Buton,	Bill Shumway/Rolnick CII 8231	
3:30		Exec. Meeting	Hold for Faye,Rolnick ,Buton,	Bill Shumway/Rolnick CII 8232	
4:00					
4:30					
				Naomi rehersal	

Figure 7. Esched, a spreadsheet-based appointments calendar.

Analysis of Patterns of Activity

Two difficulties face the researcher interested in studying patterns of activity associated with Palm Technologies. The first has to do with privacy: Palm use has the potential to cut across all domains of life and can, therefore, be extremely private. The second has to do with ubiquity: Creating challenges for data capture, the Palm can be used anytime anywhere. Methods for producing detailed records of the human-computer interactions associated with these mobile devices have still to be developed; techniques for gathering the contextual information associated with these ubiquitous human-computer interactions remain untried.

Nevertheless a start can has been made to analyze the patterns of activity in which Palm Technologies are embedded through screen-capture data gathered from a desktop session, one of my own. The session to be described here occurred on Monday, February 5, 2001, one winter Monday of a sabbatical leave that kept my children home from school and forced the cancellation of several afternoon meetings. The sessions, which lasted 97 minutes, constituted the first work of the day. Screen capture was set to record at 1 frame per second.

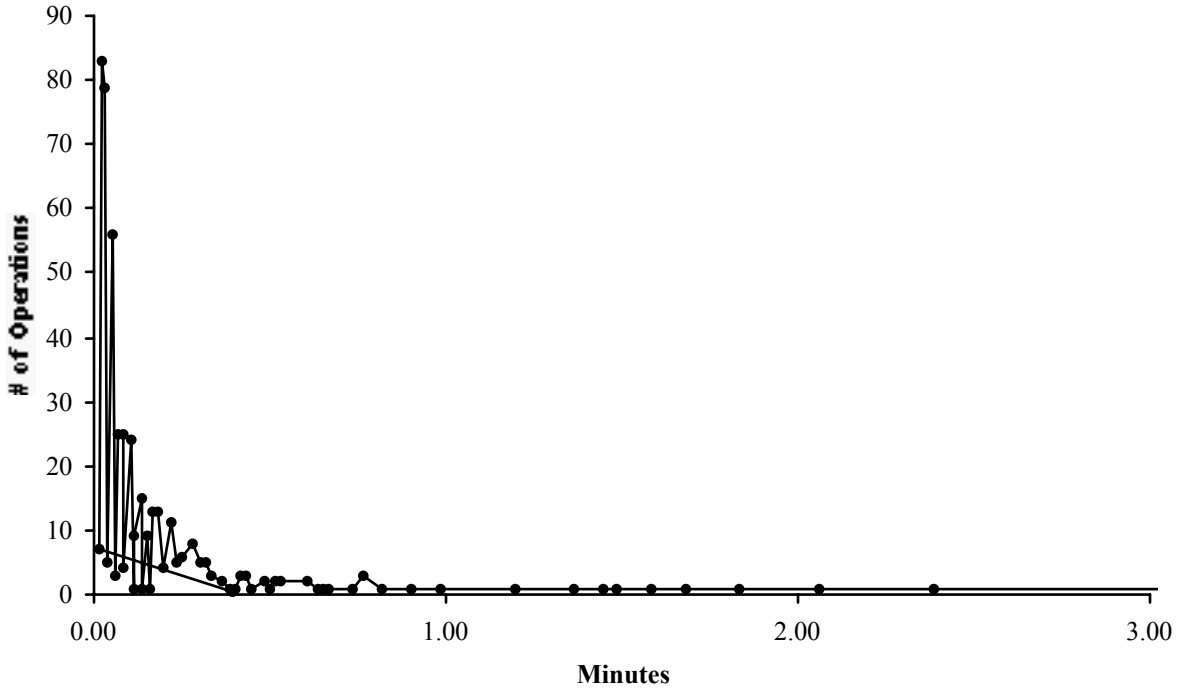


Figure 8. The frequency of operations. Two operations, both periods of off-line activity, one 26 minutes and the other 6.85 minutes, are not shown on this graph. The median duration was .06 minutes

Such data has its limitations: Although, at the time of this session, the desktop was my major location for using Palm Technologies, such data only hints at the kind of embedding in everyday

life that may occur with mobile handhelds. Such data is also limited in scope and the analysis shaped by the constraints of self-consciousness that frame any data about oneself. The data do, however, have the benefit of directly relating Palm-based activity to the history of user motives reviewed in the previous section, providing the kind of depth and breadth called for by activity theory.

Preliminary analysis reported earlier (Geisler, 2001) showed that the Palm Desktop application was one of five applications I used that morning along with e-mail, web browser, word processor, and spreadsheet, as well as two breaks "off-line." That analysis also suggested that the texts in the Palm were used far more frequently and for shorter periods of time than texts in the other applications.

The analysis reported here looks in more detail at the activity patterns underlying this use of texts and its relationship to the mediational tools of the other applications. Analysis was conducted as follows:

- The screen capture was segmented into *operations*, the smallest unit of observable behavior from an activity theoretic perspective. As the graph in Figure 8 indicates, operations tended to be very short. The median duration for operations was .06 seconds, with a distribution skewed toward the mode of .03.
- Each operation was associated with one of the five application *tools* or with work *offline*.
- Each operation was also associated with a *text*, defined as an arrangement of discursive symbols which was read, written, or transformed by the operation.
- Operations were aggregated into *action sequences*, the next larger unit of observable behavior from an activity theoretic perspective. Action sequences were either application-specific (i.e., word processing, e-mail, etc.) or were made up of a mixture of applications. Codes for the action sequences were developed iteratively to best account for regularities in the clustering of actions.
- Finally, these action sequences were plotted on *activity graphs* (Geisler & Munger, 2002) like those shown in Figures 10-13. On these graphs, the duration of each action sequence is represented as a line with a specific time of initiation and completion read from the x-axis. Different line styles indicate different application sets according to the key shown in Figure 9. The elevation of the line is related to the type of action sequence involved. All action sequences of the same type are at the same level on the y-axis. For simplicity, however, these types are noted in the data labels rather than on the y-axis itself. The texts involved in each action sequence are noted in square brackets.

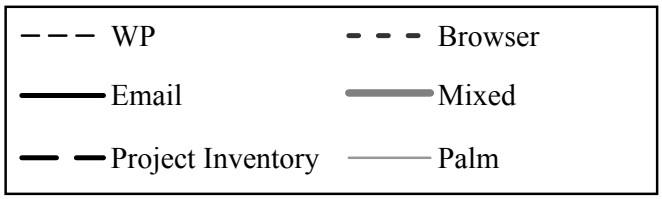


Figure 9. Legend for activity graphs shown in Figures 10-13.

In keeping with the historical roots of Palm in systematic management, the session largely concerned itself with task management, the kind of self organization and maintenance activity that I routinely complete before doing what I would think of as my "work" of the day. For about the first 40 minutes, this task management was embedded in e-mail. After a 30-minute break to dress, check on my children, and take a phone call, it was mediated by a complex of task technologies to which we'll return in a moment. Palm Technologies did not stand apart from these activities, but played a role in each.

Palm in "Doing E-mail"

The largest of these activities could be characterized as "doing e-mail," though the work accomplished through this activity was broader than might be expected. In its simplest form, as shown in the activity graph in Figure 10, doing e-mail involved reading messages and taking one of a number of simple actions in response to messages received:

- archiving many (action sequences 17, 19, 29, 22, 23, 25, 27, 30),
- replying to one (action sequence 21),
- trashing a couple (action sequences 18 & 26),
- holding one for later reply (action sequence 37), and
- responding to one by modifying an earlier reply (action sequence 24).

For most of these actions sequences, texts were processed serially in the order in which they were encountered. Only two new texts were created: Text 31 which served as a reply to Text 30; and Text 35 which became an addition to that same reply later on in action sequence 24.

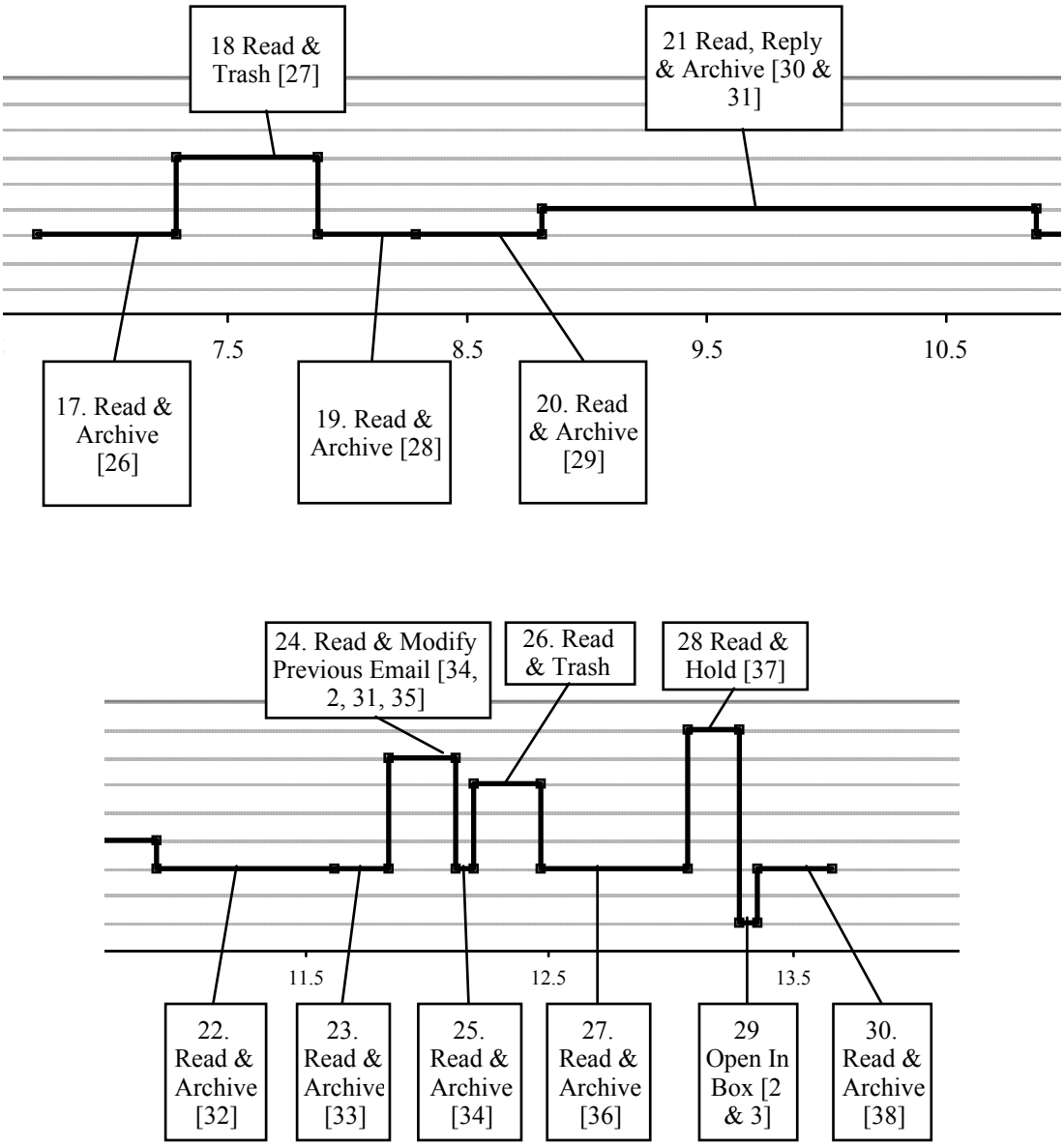


Figure 10. Activity graph of action sequences 17-30 lasting nearly 7 minutes.

While "doing e-mail," I invoked Palm Technologies when messages were linked to task management issues. As shown in Figure 11, for example, I responded to one e-mail message (Text 12) in three different ways, all involving the Palm:

- First, I created the event (Text 19) mentioned in the message by going to my daily calendar for today (Text 1), moving forward 3 weeks (Texts 13, 14, and 15) and 3 days (Texts 16, 17, and 18) to the date of the event.

- Second, in the course of replying (Text 20) to the message, I sought to confirm the time for an upcoming meeting — going back to my Palm (Text 17), returning to the daily calendar for today (Text 1), changing to the weekly view (Text 21), and then checking the start time I had listed for the appointment (Text 22), which I then included in my reply (Text 23).
- Third, while viewing my weekly schedule, I also decided to cancel another meeting (Text 24) earlier in the week, deleted it from the Palm, and then added a note about this (Text 25) to my e-mail reply (Text 40).

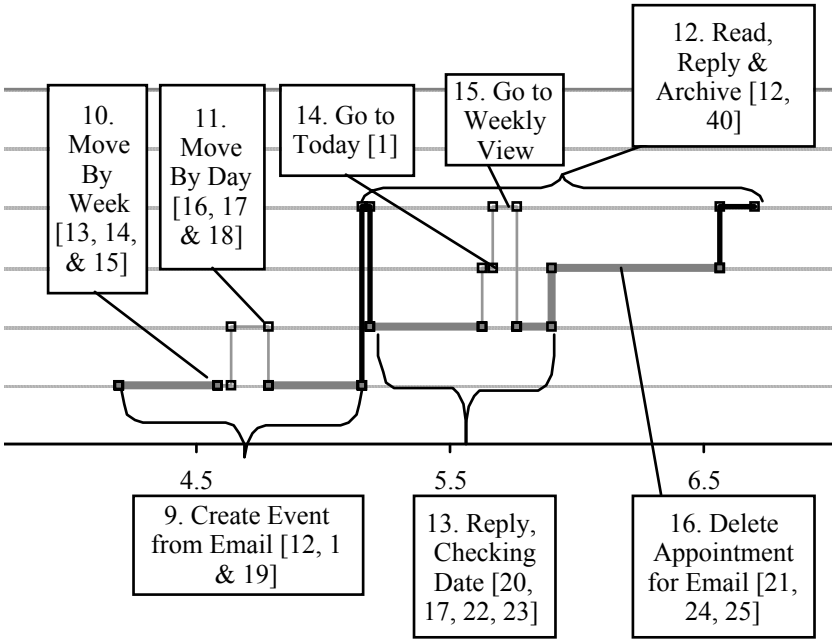


Figure 11. Activity graph of action sequences 9-16 lasting 2.5 minutes.

The activity diagrammed in Figure 11 exhibits distinctive traits associated with Palm Technologies. Although still embedded in routine e-mail, mixed action sequences — to create an event (action sequence 9), to check a date (action sequence 13), and to delete an appointment (action sequence 16) — repeatedly crossed application borders and moved information through a complex series of texts. In an effort to coordinate the original e-mail (Text 12), my eventual reply (Text 40), and the array of events and appointments that made up my weekly schedule (Text 21), these texts became highly layered: Not only was an event (Text 19) layered onto one daily calendar (Text 18) and an appointment (Text 24), as well as wiped from another (Text 21), but the reply meant to communicate all of this (Text 40) was itself built in several layers — one acknowledged the information about the event (Text 20); another confirmed the time of a meeting (Text 23); and a third suggested that there was no need to meet earlier (Text 25).

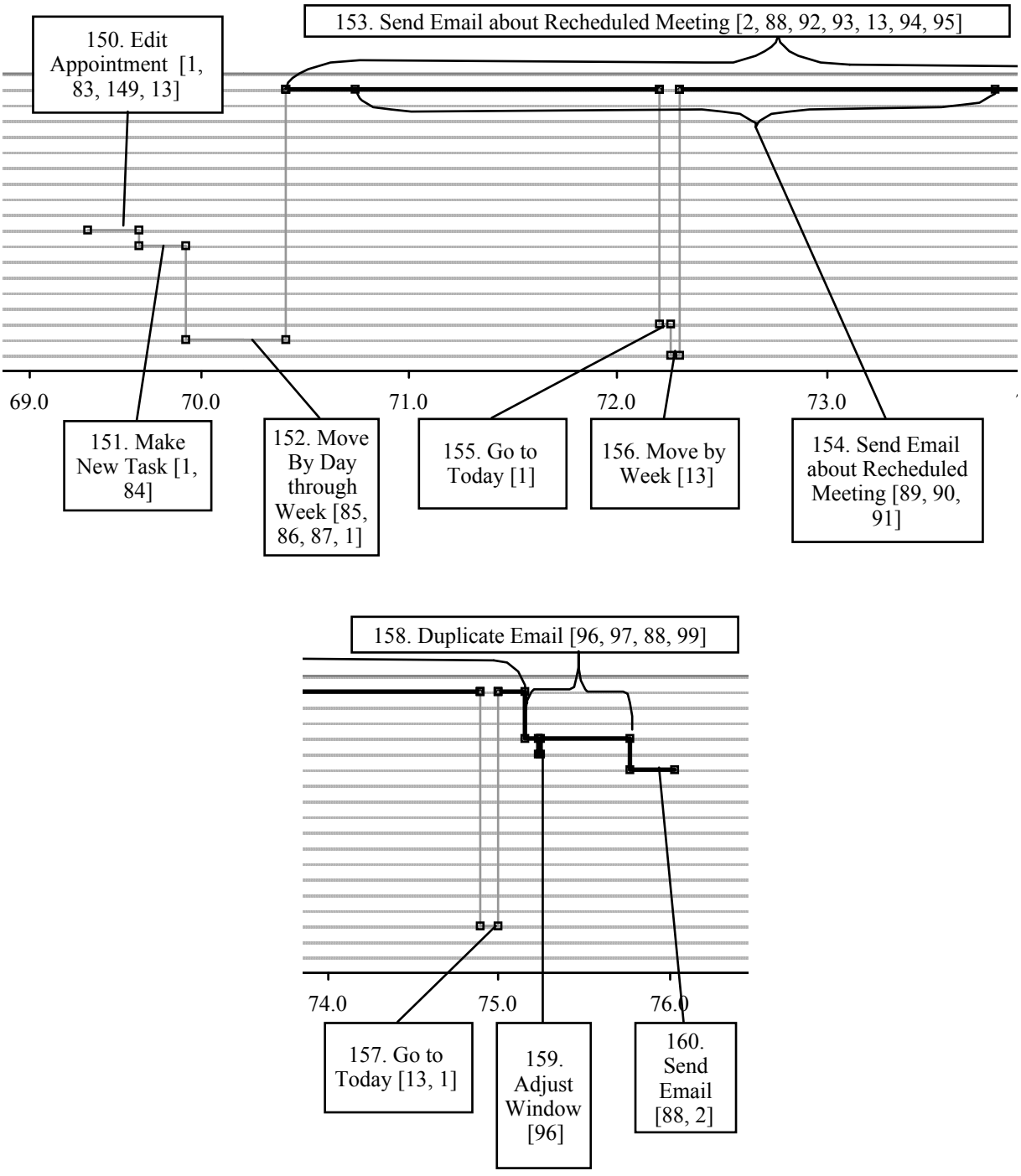
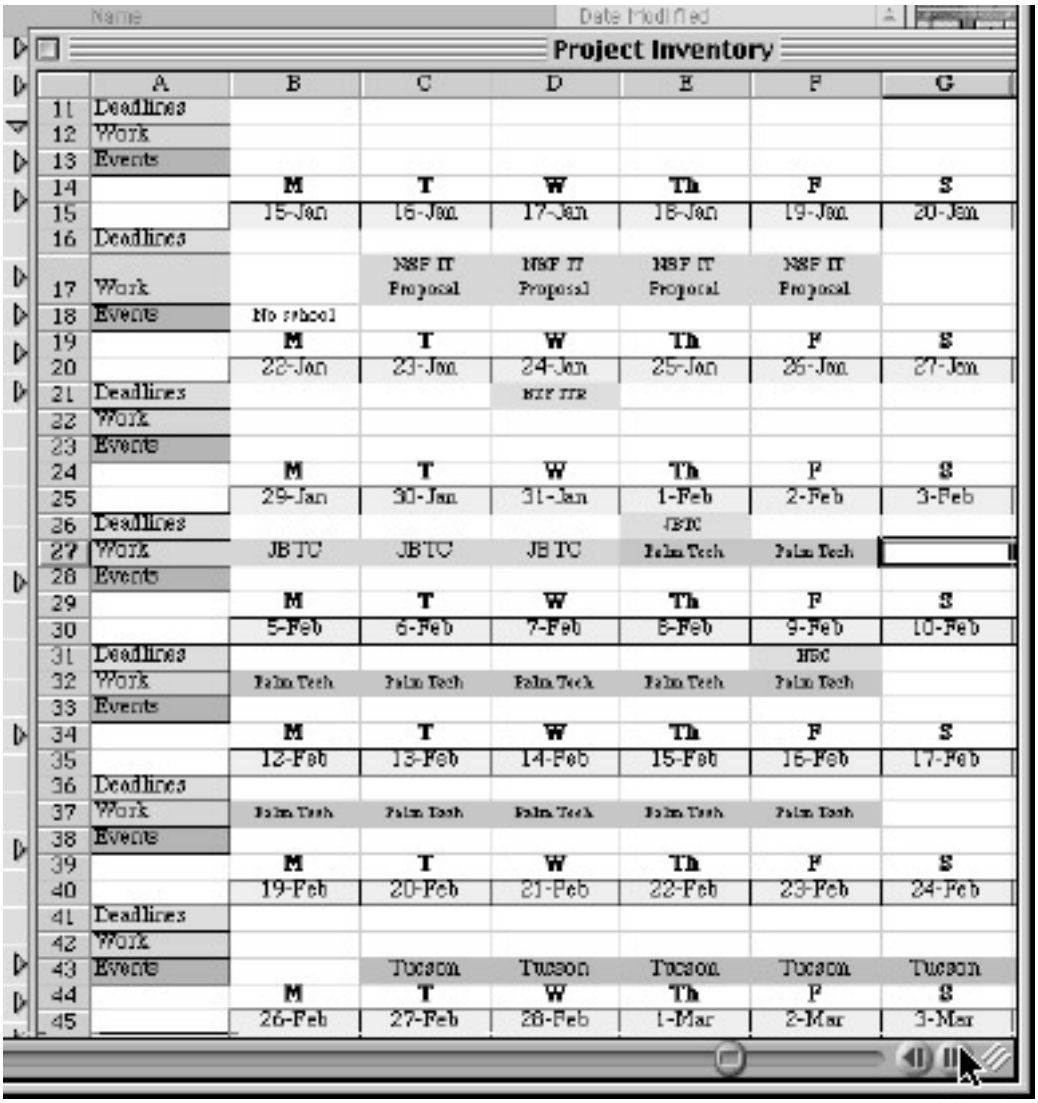


Figure 12. Activity graph of action sequences 150-157 lasting 6.7 minutes.

This kind of layering, the careful construction and reconstruction of textual objects (Geisler, 2001), supported the coordination of project work within a multi-tasking framework. Each project, with its associated meetings, tasks, and interlocutors, needed to be interlocked with the



Project Inventory

	A	B	C	D	E	F	G
11	Deadlines						
12	Work						
13	Events						
14		M	T	W	Th	F	S
15		15-Jan	16-Jan	17-Jan	18-Jan	19-Jan	20-Jan
16	Deadlines						
17	Work		NSF IT Proposal	NSF IT Proposal	NSF IT Proposal	NSF IT Proposal	
18	Events	No school					
19		M	T	W	Th	F	S
20		22-Jan	23-Jan	24-Jan	25-Jan	26-Jan	27-Jan
21	Deadlines			NSF ITR			
22	Work						
23	Events						
24		M	T	W	Th	F	S
25		29-Jan	30-Jan	31-Jan	1-Feb	2-Feb	3-Feb
26	Deadlines				JSTC		
27	Work	JSTC	JSTC	JSTC	Palm Tech	Palm Tech	
28	Events						
29		M	T	W	Th	F	S
30		5-Feb	6-Feb	7-Feb	8-Feb	9-Feb	10-Feb
31	Deadlines					NSC	
32	Work	Palm Tech	Palm Tech	Palm Tech	Palm Tech	Palm Tech	
33	Events						
34		M	T	W	Th	F	S
35		12-Feb	13-Feb	14-Feb	15-Feb	16-Feb	17-Feb
36	Deadlines						
37	Work	Palm Tech	Palm Tech	Palm Tech	Palm Tech	Palm Tech	
38	Events						
39		M	T	W	Th	F	S
40		19-Feb	20-Feb	21-Feb	22-Feb	23-Feb	24-Feb
41	Deadlines						
42	Work						
43	Events		Tucson	Tucson	Tucson	Tucson	Tucson
44		M	T	W	Th	F	S
45		26-Feb	27-Feb	28-Feb	1-Mar	2-Mar	3-Mar

Figure 13. Project Inventory used to plan private work time.

meetings, tasks, and interlocutors of other projects which together made up the near-term horizon of my life. Only constant vigilance and the kind of complex yet routine manipulation of texts shown in Figure 11 allowed me to maintain alignment. Just 7 minutes later, in fact, another e-mail message (Text 39) from the same correspondent caused me to return to the Palm again, change the start time for the appointment I had inquired about earlier (Text 22) and modify my previously composed reply (Text 40).

Efforts after alignment were not always successful. Figure 12, for example, shows the activity that resulted from the day's snowstorm. Following a phone call received from one member of a [second] work group, I went to my Palm and moved the afternoon's meeting forward a week (action sequence 150). I then sent e-mail about the change in schedule to the rest of the work group (action sequence 154). I also sent e-mail to the two students with whom I had planned to

meet before the now-rescheduled meeting (action sequence 153 and 155). Rather than compose a single message to both students or compose separate messages for each, I copied the text of the e-mail to the first student (Text 88) into an e-mail to the second student (Text 96) with a new header (Text 97), changing its recipient (Text 99).

It was only a week later when both students showed up at the same time that I knew that something was wrong. It turned out that the multiplicity of the fourteen texts involved in rescheduling the meetings had become unmanageable. By forgetting to edit the meeting time in the duplicated e-mail, I had scheduled both students for the same time. In this case, then, alignment was not maintained. What I said in my e-mail and what I recorded in my Palm were not consistent with one another.

Palm in "Planning Work"

A second Palm-embedded activity, shown in Figure 14 and comprising 6.55 minutes following a long break, moved away from the short-term workgroup planning embedded in e-mail to longer-term planning of individual work. The distinction between these two kinds of tasks— one structured through interactions with others and the other by the demands of my own private work — had been with me since the Day-Timer days. In planning work, I determined what tasks to take on during the work day aside from the routine of "doing e-mail" and attending the meetings in which such e-mail resulted.

"Planning work" involved the use of a special purpose task management tool, the Project Inventory, created in a spreadsheet and shown in Figure 13. Calendar-like in structure, each week provided room to array three kinds of texts: deadlines such as that for the "NSF ITR" shown for Tuesday, January 16; events such as "Tucson" shown for the week of February 20; and work such as "Palm Tech" shown for Monday, February 5. To the right of the week's array and off screen in Figure 13, texts represented a variety of projects, unscheduled but waiting my attention. Weeks that represented time past were usually grayed out, though this was not true at the start of this session.

In the activity shown in Figure 14, I was working in a multi-application environment that involved this Project Inventory as well as the Palm Task List and Palm calendar:

- With the Palm Task List, shown in Figure 15, I numbered tasks associated with a specific research project to reflect the order in which I thought they should be done (action sequences 165-168). I then sorted the tasks into the correct order (action sequence 170).
- In the Project Inventory, shown in Figure 13, I grayed out weeks now past (action sequences 176-178) and recorded a new event established by recent e-mail (action sequence 180). I also spent nearly a half-minute just looking at the work of the weeks to come, trying to figure out when I could do the tasks just numbered on the Task List.

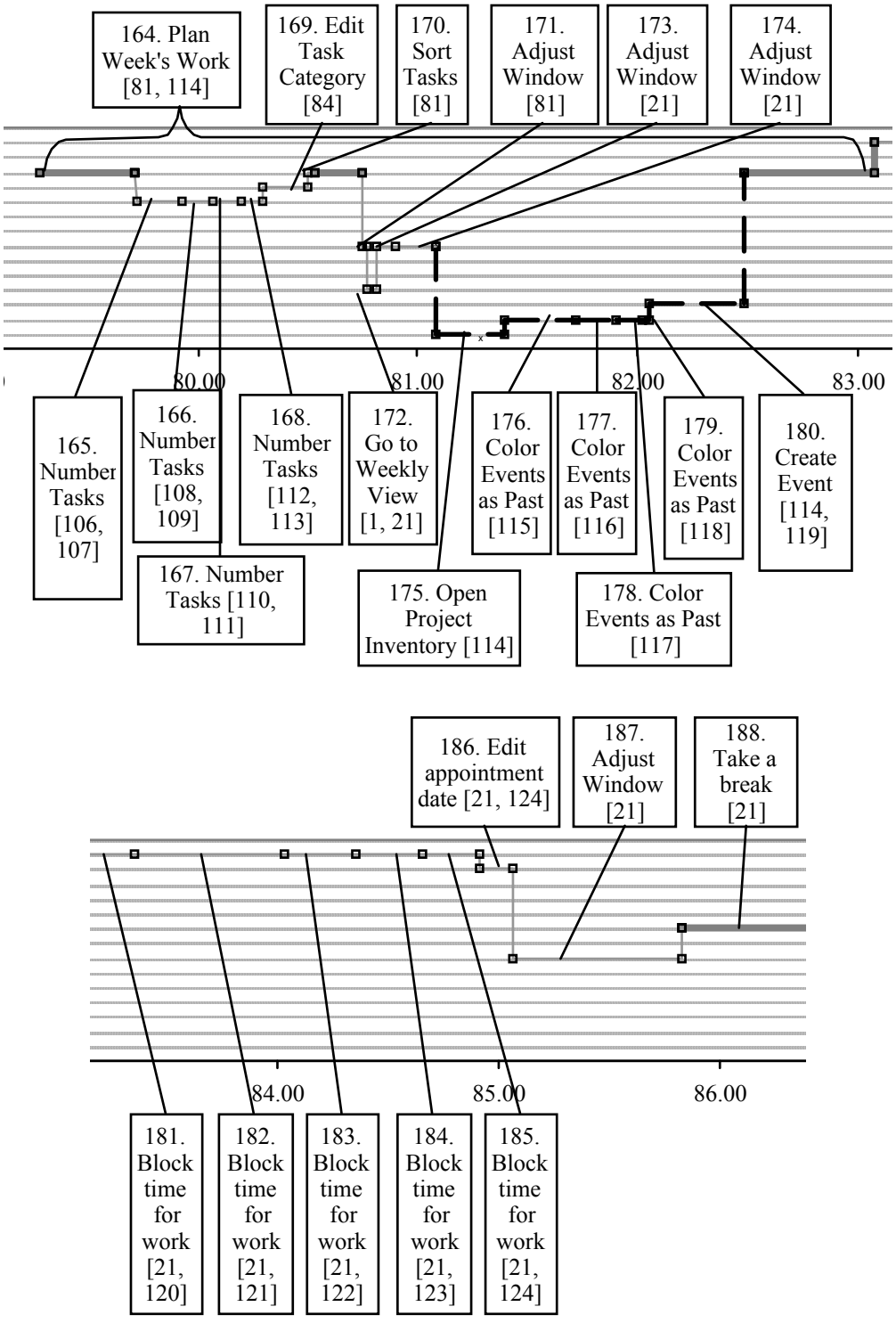


Figure 14. Activity graph of action sequences 164-188, lasting 6.55 minutes not including the break at action sequence 188.

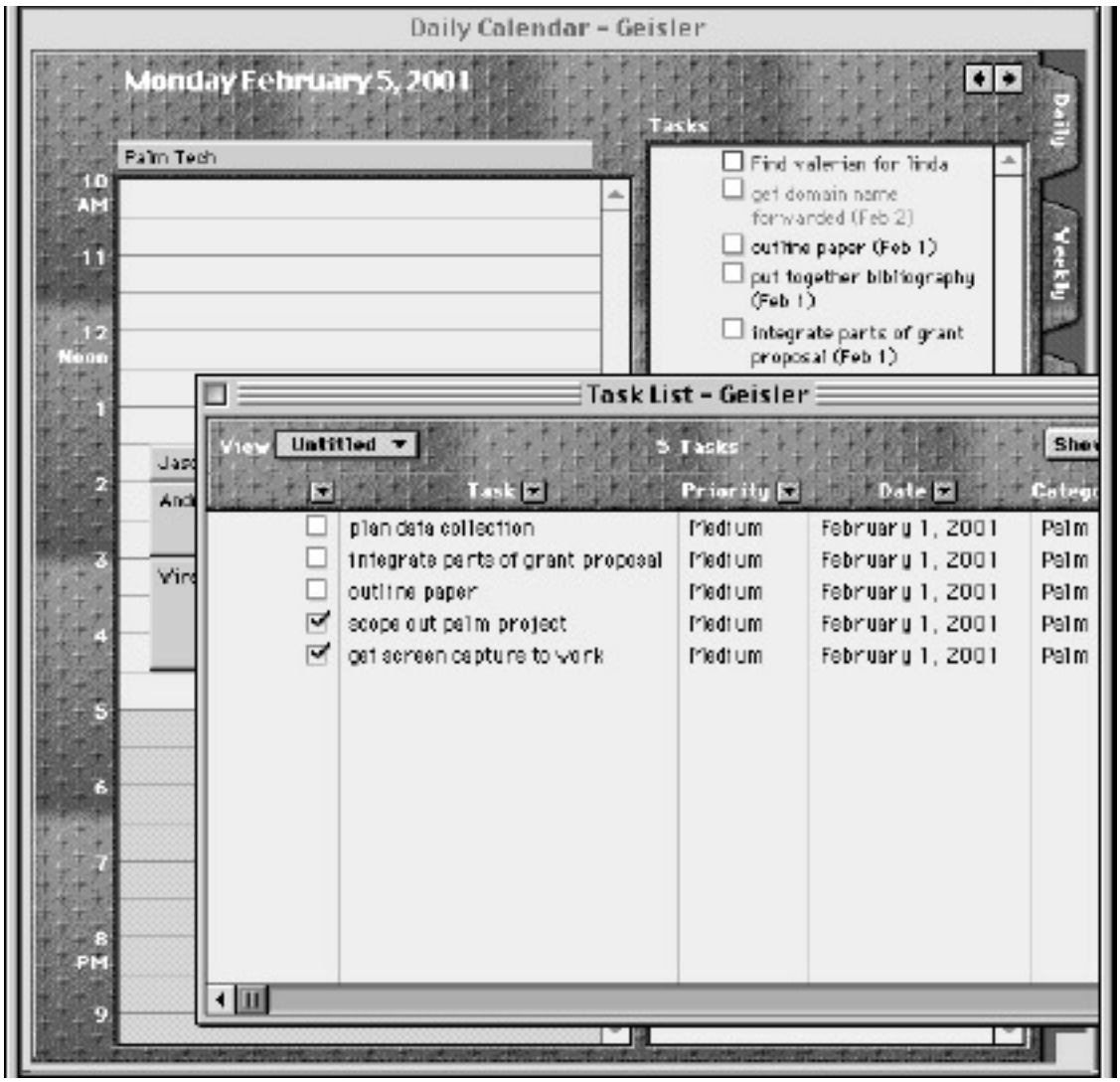


Figure 15: Project task list. Eventually, a fourth task was added, and all were numbered and sorted according to number.

- In the Palm calendar, shown in Figure 16, I blocked out work time for a simplified version of the tasks numbered on the Palm Task List, distributing them over the days of the week and around other commitments (action sequences 181-185).

Overall, the Project Inventory served as a mediational means for the long-range planning that began in the Palm Task List and ended with my setting aside blocks of research time on the Palm calendar. Taking this third step of blocking out such work time is a rarity for me, representing an assessment of a real time crunch in meeting a deadline. Normally, I stop at step 2, simply assigning each work day in the Project Inventory to a specific research project as its routine work. I then use the Palm calendar to record only those events that break into this routine. When time is short, however, even routine work can become textualized as a series of events as it has done in this case.

Palm in "Taking a Break"

The final kind of activity which occurred in this session was one that showed relatively little action on activity graphs like those in Figures 10-14: "taking a break." I took two breaks the morning of February 5, one more than 26 minutes shortly after completing my e-mail and the other lasting nearly 6 minutes taken after blocking out my work for the week. During both, my attention was given to my children and to various aspects of home and personal management — what we might call the domestic sphere.

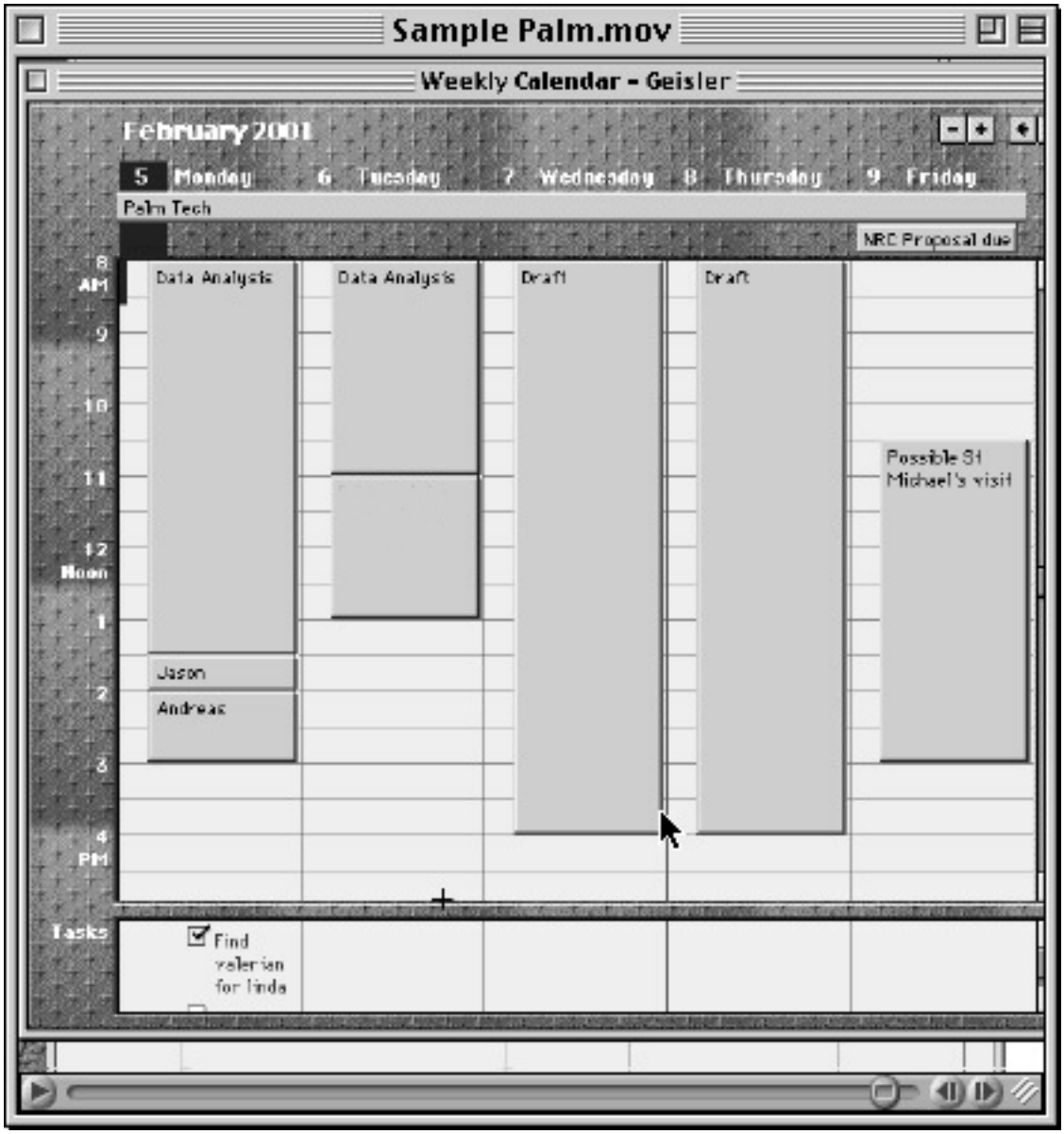


Figure 16. Palm-based calendar with tasks arrayed across a week of work. The label for a doctor's appointment on Tuesday afternoon has been removed for reasons of privacy.

Palm was noticeably quiet about this sphere. My breaks were not blocked out on my calendar; my domestic tasks were not recorded in my Task Lists; the only domestic events and appointments that appeared were those that intruded upon the 8-5 workday like the unlabelled appointment on Tuesday afternoon shown in Figure 16.

Nevertheless, taking a break can be viewed as a third multi-tasking environment in which the Palm was embedded rather than as a activity entirely separated from the spheres of work. Palm framed both breaks: I both left and returned to work via the Palm calendar for Today, once the daily view (Text 1) and once the weekly view (Text 21). Thus the Palm calendar served as a kind of bookmark by which I could mark my place in work and hold it until I returned.

Palm-Embedded Activity

In general, this analysis of patterns of one user's activity involving Palm suggests that, as a tool, the Palm was not used in isolation but was part of multi-application environment associated with distinct spheres of activity with distinct characteristics.

The embedding of Palm into "doing e-mail" created a multi-application task management system that supported the coordination of project work within a multi-tasking framework. The sequences of e-mail texts waiting in my in-box creating a kind of *de facto* cueing system for projects. This cueing system channeled requests for decisions, consideration, and attention through the activity system I called "doing e-mail," affording more than a simple mechanism to communicate. It also provided a mechanism for moving individual projects forward as well as a coordination mechanism with which to weave multiple projects into the near-term planning horizon to which the Palm was key. "Doing e-mail" was intensely social; it involved other interlocutors: both those who sent and received e-mail messages, and those involved in the meetings and events recorded on my Palm calendar.

This second multi-application environment, "planning work," was designed to provide a representation space that counteracted the kind of event-driven multi-tasking supported by "doing e-mail." Although I planned work on a spatial array of days, weeks, and months in the Project Inventory, and occasionally (though not usually) blocked out time for them on my calendar, my work plans were not associated with specific times and places. Instead, they were meant to serve as the backdrop against which such events and appointments would occur. Indeed, they were meant to remind me that I should be doing something other than responding to external requests; that I had my own research agenda. Unlike the interwoven texture of events and appointments created by e-mail to support multi-tasking, my work plans were more or less serial: I usually scheduled work for a week or more and, if a project was not completed according to schedule, I stayed with it rather than switching to what had been scheduled. "Planning work" was also intensely private; ostensibly, the only one involved was myself, although such plans did, occasionally, impinge upon my family when project deadlines required more than the usual allocation of time.

The third multi-application environment, "taking a break," provided a mechanism by which the domestic sphere was linked to the spheres of work. The routine work of the domestic sphere — time spent dressing, looking at the turkeys on the front porch, talking with my daughter — was not scheduled in the sense that the events and appointments of "doing e-mail" were scheduled; was not planned in the sense that the projects of "planning work" were planned. Indeed, such routine domestic activities were not written down, were not textualized at all. Aside from a doctor's appointment, activities in the domestic sphere, activities with family or self, were not regulated or managed through the objectification of Palm texts, but instead were silently inserted into the sphere of work via Palm's textual representations for the day.

Discussion and Conclusion

From an activity theoretic perspective, these analysis suggest the way the rapid emergence of Palm Technologies was built on a host of both antecedent cultural tools and personal activity systems. Not only is this new tool built on the material base of prior technological advances such as handheld calculators and portable computers, but it is also built upon the cultural base of large scale social movements like professionalization and systematic management. Both professionalization and systematic management seem important backdrops for my movement to Palm Technologies which, not coincidentally, coincided with movement into a managerial role.

Activity theory also calls attention to the trajectory of personal motives that lead to technological adoption. The balancing of the competing demands of work and family shaped, almost from the beginning, my choices in time management technologies from the Day-Timer through Hypercard to the Palm. On this balancing act of work and home, the cultural history of Palm is silent however. On the public pages of Palm's history, written in tech reviews, advertisements, and other cultural representations, Palm was not represented as a tool for work-life balance. Only by examining the relationship between cultural history and personal motive — as called for by activity theory — can we uncover hidden cultural patterns associated with issues such as work-life balance which, for most of the twentieth-century, were not part of public discourse and certainly were not seen as relevant to the technological development of Palm.

With respect to activity theory, these analyses also suggest that a simple model of the relationship between motive and activity may need to be revised to account for the patterns of Palm-embedded activity. According to activity theory, each activity is directly linked to the motive which shapes it, as shown in Diagram A in Figure 17: One motive, one activity. Systematic management in organizations made the first change to this simple model: The management of a task was separated from the doing of the task. As a result, an organization's motive for task management were split apart from workers' motives for the task itself as shown in the Diagram B in Figure 17. Such a split can result in the kinds of organizational conflicts within and across activity systems noted by Engeström (Engeström, 1993).

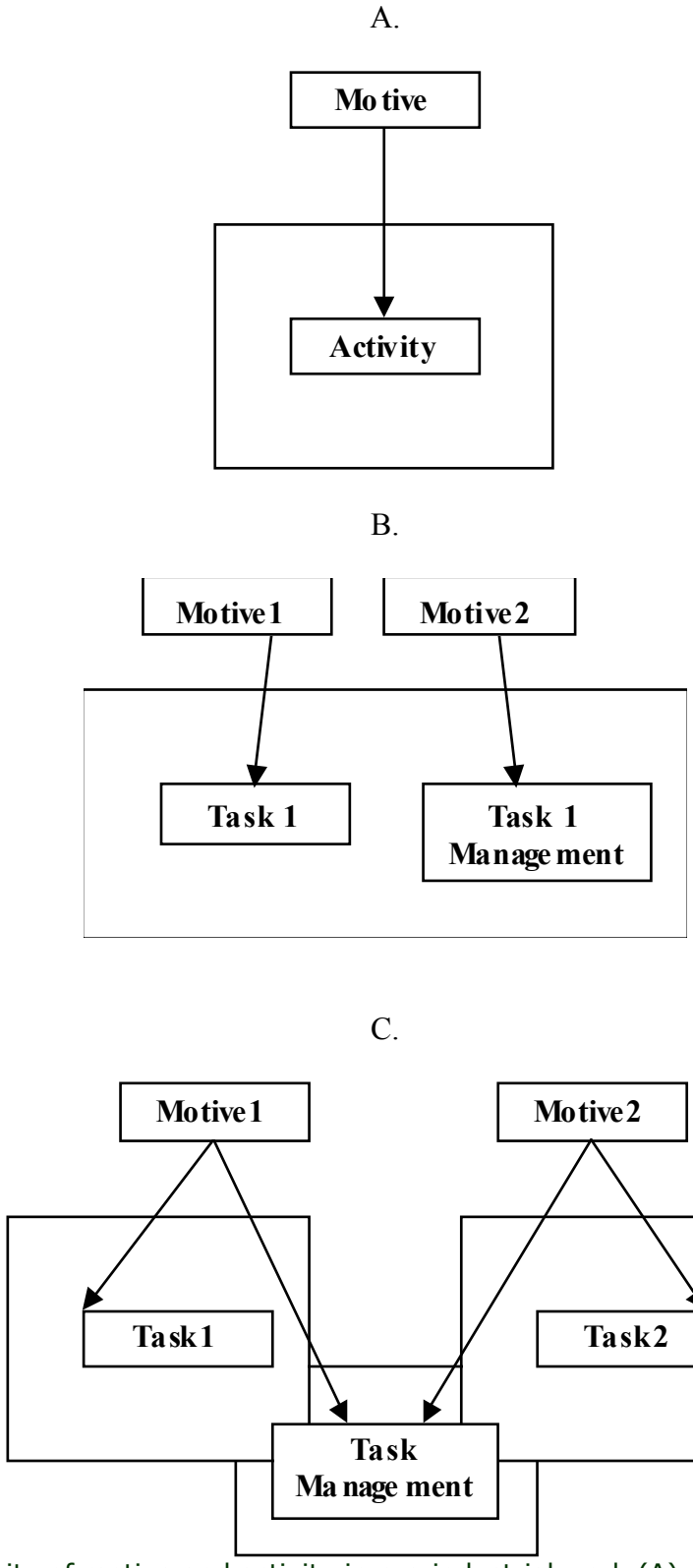


Figure 17. The unity of motive and activity in pre-industrial work (A), its fragmentation after systematic management (B), and in personal management (C).

When systematic management becomes personal, as it now appears to have done with Palm Technologies, the simple model may require even further revision. The separation of task management from the task itself does not split motive across organizational roles as in Diagram B of Figure 16, but fragments it psychologically as in Diagram C. As a result, a task management activity like "doing e-mail" can be understood both as a coherent activity in itself and as components of separate project-based activities associated with different motives. In this chapter, we have looked at "doing e-mail" as a single activity system with its own routine action sequences such as "Read Reply Archive" and "Check Date" as well as routine mediational means. This analysis has ignored, however, the way that selected action sequences within "doing e-mail" should also been seen as embedded in specific projects like those associated with the two workgroups we saw interacting with me. Each of these project might well be understood as associated with their own activities, their own sets of goals, and characteristic mediational means. Thus, as indicated in Figure 17, Diagram C, when task management and the task itself are separated, any action sequence associated with task management needs to be understood *both* as part of the motive-driven activity we might call "the project" and as part of the motive-driven activity we might call "getting organized." The marketplace success of Palm Technologies testifies to the compelling reality of "getting organized" as a activity in itself independent of any specific projects.

Recognizing the fragmentation of motive between task and task management will also compel a more complex analysis of the role of writing in the age of information technology. Many studies of writing, including those conducted from an activity theoretic perspective, have been limited to project-based analyses. It is as if we have focused on the contents of a single project file without noticing the larger filing system to which Yates (1993) has called to our attention. Instead, we need to pay special attention to the kind of multi-tasking textual phenomenon we have seen associated with Palm. Indeed, the use of texts for the multi-tasking of task management may be one of the most significant uses of writing in the information age.

Turning from activity theory to the phenomenon of Palm itself, we see an overall picture of Palm Technologies as a technology of self, a technology for "getting organized" rooted in the philosophy of systematic management. Its events and appointments appear to be well suited for the coordination of work that has been critical to the modern organization. Palm, embedded in e-mail, provides a mediational means for getting the right people to the right places at the right time.

Palm appears to do less well as a mediational means for more routine work, whether it is the routine work of individual scholarship that was the subject of "planning work" or the routine domestic work to which I turned in "taking a break." Routine work is the background for which events and appointments serve as punctuation; it is the default activity for the day. In the sphere of work, the routine work of individual scholarship only became represented as events when the press of impending deadlines and constraints of other obligations pushed me, as in Figure 14, to make an appointment with myself. That is to say, it was pressures toward multi-tasking that encouraged me to transform work from the form of default routine work, planned in the Project Inventory, to the form of articulated and scheduled events, arrayed in the Palm calendar.

In the sphere of work, both routine and punctuated work was mediated by texts. In the domestic sphere, however, I not only resisted pressures toward domestic multi-tasking that have been noted elsewhere (Hochschild, 1997; Darah, et. al, 2000); I even resisted textualization. Unlike the routine work of scholarship, I did not use any text-based system to array domestic plans across the weeks and months. My informal discussions with colleagues and strangers suggests that many of us are strongly aware, albeit in an unarticulated way, of the issues at stake in bringing or refusing to bring, the socio-technical systems of time management across the border into the home through Palm Technologies. Once textualized, domestic time and space may become subject to surveillance and manipulation — by ourselves if not by others. At this point in my personal history anyway, the domestic border was the place where this kind of textualization — and its attendant technologies — halted.[3]

The potential movement of Palm Technologies into mass culture over the next few years presents a number of possibilities that bear watching. Is an individual's adoption of Palm Technologies associated with increasing patterns of textualization with increased multi-tasking? Will users embed Palm into multiple activity systems shaped by distinctions between routine and punctuated work, between the domestic sphere and the sphere of work? Can we develop a new set of design considerations for the next generation of information technologies, considerations better suited to representing the routines of everyday life, better able to balance rather than merge work-life relationships?

The analyses presented in this chapter can only begin to suggest some of the questions that researchers taking activity theory as a base, whether for the study of writing or for the study of human-computer interaction, may find worth asking. The need for more work on the impact of new writing technologies like Palm is clear. Such research can become an important source of reflection for a society undergoing technological transformation. Linking the critical tradition of humanism with the empirical attention of the social sciences, activity theory can serve as a mirror on ourselves, providing us with images through which we can shape ourselves and our future.

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Notes

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[2] Palm and Palm Desktop are trademarks of Palm, Inc. or its subsidiaries.

[3] Since this analysis, however, the need to coordinate the preparations for my daughter's Bat Mitzvah caused me to create a second spreadsheet similar to the Project Inventory. I have not (as yet) moved to block time for those tasks on the Palm calendar!