The Help Folder can be scrolled, and selections can be made in it, but the only edit command available is Copy since the Folder is read-only.

The Help Document should be ordered so that related operations are near each other to facilitate browsing.

10.4 MENU ITEMS THAT DO NOTHING

Menu items that would have no effect are dimly highlighted. They can be invoked anyway, if the user wishes. Note that when the command is one that changes a state (e.g., Bold or Turn Printer On), the dim highlighting provides feedback to the user about the current state.

10.5 THE FOLDER MENU

The folder menu deals with choices that affect the entire folder, or the entire document. Folder menus are partially dependent on the application.

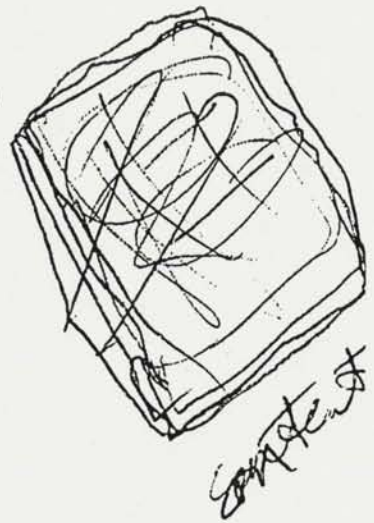
When it appears, "Folder" is the leftmost menu title.

10.6 CONTENTS OF THE MENU BAR AND OF THE MENUS

The list of menu titles in the menu bar of a folder and the contents of those menus are a function of the document and the selection in that folder.

older is asociated with the key, a beep is sounded.

The user learns the keys that invoke menu commands during normal system use because each menu item that can be invoked from the keyboard is tagged with an apple symbol and the legend of the associated key. To find out all the commands accesible from the keyboard, bring up each menu by dragging across the menu bar.



There are eight APPLE key combinations that are universally associated with certain common commands:

APPLE-Z: Cut	APPLE-B: Bold
APPLE-X: Paste	APPLE-I: Italic
APPLE-C: Copy	APPLE-U: Underline
APPLE-V: Undo	APPLE-N: Normal

The other printing keys can be associated with different commands in different folders, but any one key must have only one meaning within one folder. Consistency is encouraged betwen folders of an application, that is, if the same command name appears in two folders of the same application, then the same keystroke should invoke them. Furthermore, applications should avoid assigning the same keystroke to different commands in dfferent folders when a mistake by the user would be dangerous. Or even likely.

The specifications in this section of the ERS are subject to forthcoming investigations of their applicability to data base management applications.

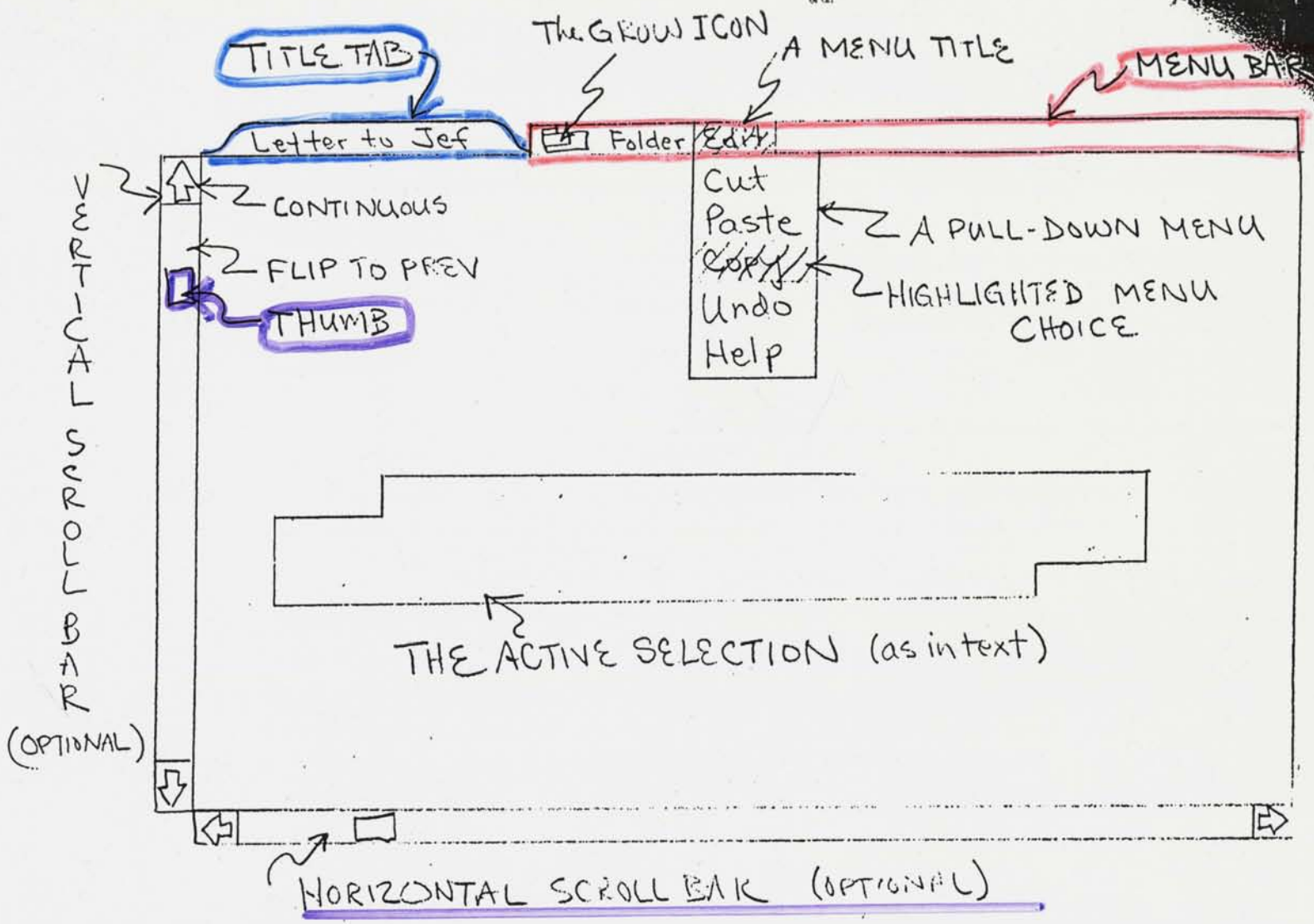


FIGURE 1

THE ANATOMY OF THE ACTIVE FOLDER

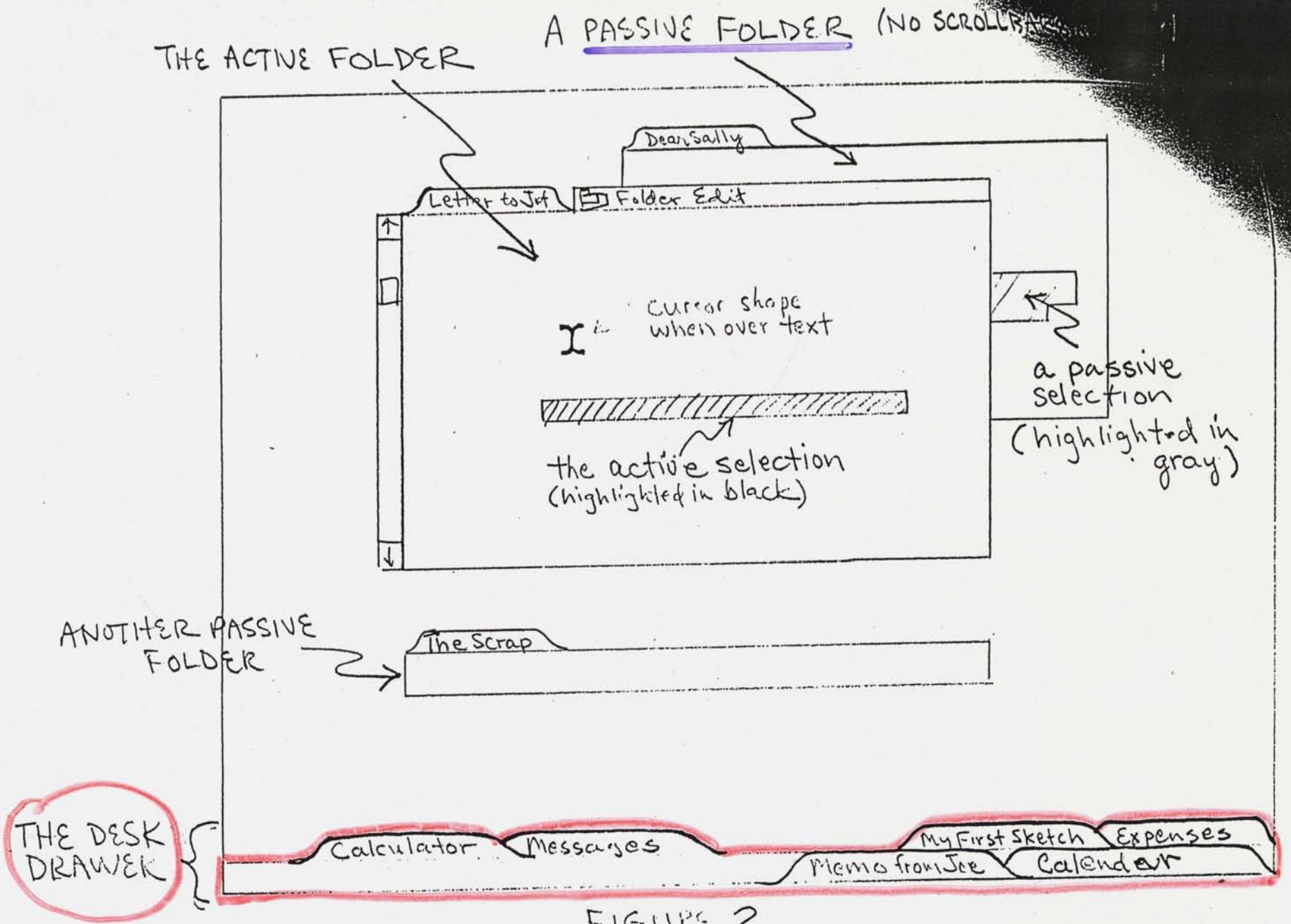


FIGURE 2
THE ANATOMY OF A LISA DISPLAY SCREEN

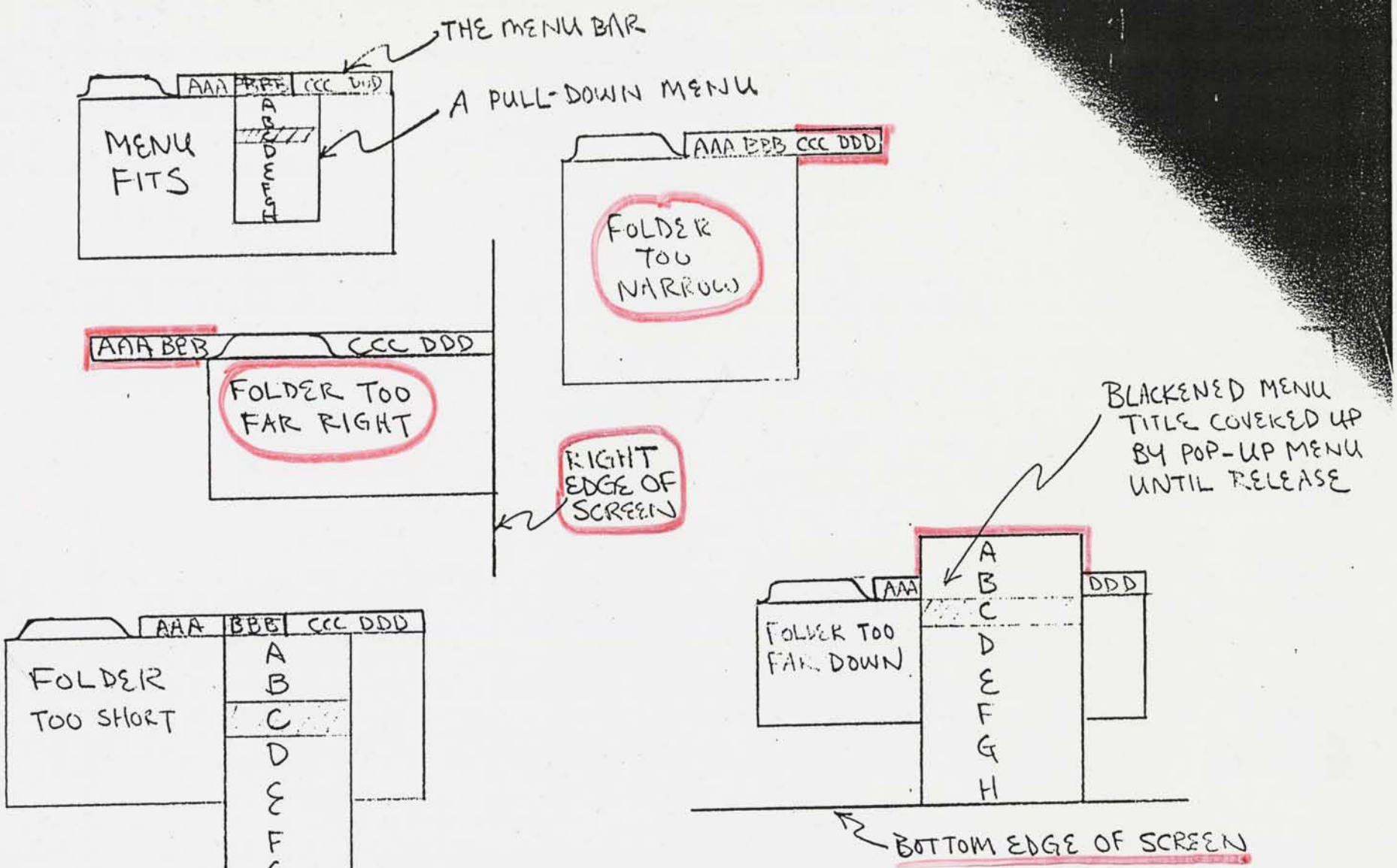


FIGURE 3
BOUNDARY CONDITIONS
FOR MENUS AND THE MENU BAR

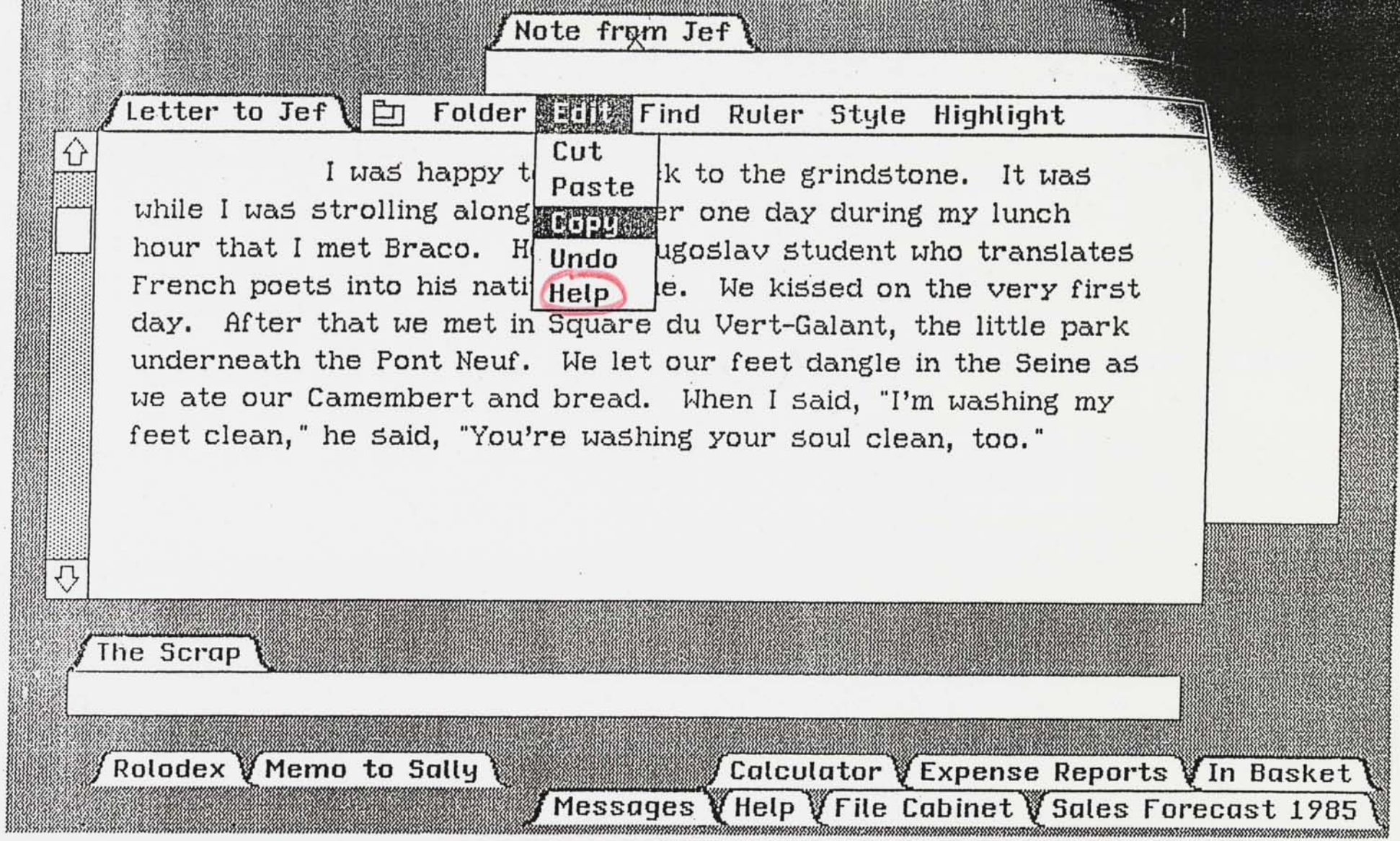


FIGURE 5.
A TYPICAL LISA DISPLAY

Date: August 27, 1980

To: Bill Atkinson, Jef Raskin and Larry Tesler

From: Gail C. Pilkington, Publications

Subject: Comments to the LISA Use Interface ERS, dated August 22

OVERALL COMMENTS:

The latest, August 22, version of the LISA User-Interface ERS contains a more comprehensive technical description of both the hardware and software components. The design appears workable, though a few inconsistencies and several (seemingly) unnecessary restrictions have been noted. Also noted are several compromises o accommodate the one-button mouse. I have commented on the content and design of the user interface rather than making any editorial comments.

Several items are either missing from the document or are inadequately defined.

1. Are there any items needed from the OS or Window Manager, such as process creation, interprocess communication, etc.? Provided, of course, these things apply, they should be included in the ERS.

2. Examples and user scenarios are few and far between.

last size and location on the desk; another click in the title tab returns the folder to its last location in the drawer.

The whole concept behind computers is to free the user from mundane tasks--such as dragging things here, there and everywhere.

esthetics

10.1 USING THE MENU BAR

I object to pull-down menus because they most often obscure the working area--not to mention the fact that they look terrible.

It seems like needless work to require the user to drag the mouse/cursor across the menu bar while watching each menu pop out in succession to view the currently available commands.

10.2 MAKING A MENU CHOICE

I assume that the menu items are only highlighted when the mouse button is pressed down, and are not highlighted when the cursor passes over them with the mouse button up. Regardless of the menu scheme chosen, any command currently operating should remain visible until the operation is completed.

10.3 THE HELP CHOICE

Who creates the help document? Where is the ERS or other document describing the content and details of the help document, or when will one be written?

10.4 MENU ITEMS THAT DO NOTHING

... should not appear on the menu. I strongly feel that menu items that are currently inapplicable should not be displayed. With the present menu scheme, is it possible to suppress currently unavailable or inoperable commands? If the present menu scheme is adopted, what kind of feedback is supplied regarding the current state of the unavailable command--is the "dim highlighting" the only feedback provided? Please provide an example or scenario.

standard for "grayed" commands

bottom of the current folder and a single scroll bar along the left edge.

I believed the only unresolved issue surrounding menus in the August 6 ERS was the use of an ellipsis (...) to specify to the user that there are commands that are hidden (because the menu was too small to display them all). This reorganization of menus and scroll bars seems out of proportion to solve that issue.

10.8 PHYSICAL LOCATION OF THE MENU
I look forward to seeing the written report describing the conclusions of these experiments.

10.9 MAKING MENU CHOICES FROM THE KEYBOARD
Since this is a visual system, I believe a message to the effect that "The command you've chosen is currently unavailable" would be much more informative than a beep. However melodious the beep becomes, it is not terribly informative.

"To find out all commands accessible from the keyboard, bring up each menu by dragging across the menu bar." What a drag, and a waste of valuable time.

I propose the following new keyboard invocations for the unintuitive keyboard characters listed in this section of the ERS.

APPLE-C	= CUT
APPLE-P	= PASTE
APPLE-D	= DUPLICATE (this takes no more room than the word UNDERLINE)
APPLE-U	= UNDO
APPLE-=	= UNDERLINE (using one of the horizontal lines keys on the keyboard for underline)

11.1 TYPING PRINTING CHARACTERS

Larry Tesler

CONFIDENTIAL

Date: 22-Sept-80

To: LISA User Interface Interest

From: Bill Atkinson

Subject: Menu at Top of Screen

Why Move Menu and Dialog Box to Top of Screen ?

Objections:

1. The main objection to the menu at the top is that it accentuates an already existing problem of the physical reach distance to the menu. We should think about ways to make this better; perhaps pressing the apple key should temporarily change the cursor to an apple and jump it up to the menu titles. For full screen folders, the distance isn't much more. Also, you don't have to aim as accurately because the mouse pins at the top.

2. The second objection to the menu at the top is that it isn't as clearly associated with the folder. This may actually be a blessing that solves our problems with too tight coupling of menu and folder, for example when an auxillary folder is used but you don't want to lose the main folder's menus.

   The active folder is well distinguished by its bolder tab outline and the two scrollbars, which will always be present on the active folder (one or both may be empty gray).

The active folder is well disti guished by its bolder tab outline and the two scrollbars, which will always be present on the active folder (one or both may be empty gray).

I feel these objections are more than balanced by the following improvements:

1. Always have full width and height for menu. Always have room for the maximum number of menu titles and each menu has room for the maximum number of items. No awkward boundary conditions for menu titles or menu items. The menus visually stand out better since they hang down into gray.

2. The folder size is independent of the menu. Since the width of a folder is not restricted to the sum of the tab and menu, you can have a narrow folder (i.e. the calculator or a column of numbers) even if it has several menu titles.

3. With the menu at the top, we can also put the dialog box just below it, as a variable sized extension of the menu. This makes it clear that the dialog box is not just another view of the active document, and helps the problem of losing the document selection when the dialog box also has a selection.
With the dialog box global, it's natural to find the same thing in

another folder, etc.

4. With the menu on top, the things it can operate on are not restricted to a single open folder. Some commands might operate on a group of related folders, on the whole desk (Cleanup), or on objects that don't even have a folder. (Some day we may want a round clock that just sits on the desk). The menu at the top allows us to operate on a closed folder tab (i.e. to file etc.) without first opening it up.

5. The title tabs can be wider, more descriptive since they are not competing with the menu bar for space. The folder looks more like a folder.

Date: February 23, 1981

To: User Study Class

From: Larry Tesler

Subject: Guidelines for User Interviews

* If you plan to interview more than 2 or 3 people, please do it with the Project Team, and coordinate the interview schedule with Barry Smith. Barry will want to see objectives, wordings of questions, etc., but only to facilitate the interviews, not to hinder it.

* Interview in teams of 2-6 people; 2-3 is ideal. At least one person should be taking notes at all times. The person asking questions should not be taking notes.

* Start with one person asking questions and the other people inconspicuously observing. After the interviewee is comfortable, others can ask questions, too.

* Never argue with each other in front of the interviewee.

* Don't patronize or show off your knowledge.

* Don't plant the answer in the interviewee's mouth.

* If interviewers have different theories, take turns asking questions of different interviewees.

* Try to get the interviewee to do the talking. Ask brief questions and let them elaborate their answers.

* Don't ask "what do you call this?" if possible, ask "if you wanted

different interviewees.

* Try to get the interviewee to do the talking. Ask brief questions and let them elaborate their answers.

* Don't ask "what do you call this?" if possible, ask "if you wanted someone else to bring you this, what would you tell them?"

* First explore simple, existing systems. Then move on to their knowledge and opinions of alternative manual systems. Only at the end bring up computerized systems they use.

* After the simple answers, delve deeply. What do they do in extenuating circumstances?

To: All POS People
From: Wayne Rosing
Subject: User Interface Council
Date: April 3, 1981

We are setting up a User Interface Council that will make the final decision on any disputes regarding Lisa user interface. Members of the Council were chosen to include some people familiar with the user interface and some totally impartial people. The Council includes:

Jennifer Bestor
Gene Carter
Nellie Connors
Bruce Daniels
Barry Smith

Anyone with a user interface issue that they cannot resolve by discussions with the people involved may present the issue for consideration to the User Interface Council. This is how to do it:

1. Write a memo stating:
   a. what the issue is
   b. what you have done to resolve it
   c. your viewpoint
   d. opposition's viewpoint

2. Send a copy of the memo to me, Nellie, Pat, Larry, and the prime advocate of the opposite viewpoint.

3. If we determine that the issue cannot be resolved at a lower level, the issue will be presented to the User Interface Council.

4. The Council will rule by majority vote.

To: Wallace Judd

From: Chris Doerr

Subject: Filer User Testing

Date: April 24, 1981

I thought it might be worthwhile for me to write down some of my observations and thoughts on the testing we have been doing this week. For what they're worth, here they are:

1. Thoughts on the Filer Software

   a. Group operations are a must. Having to move documents one by one is a real pain in the neck. The managers we have tested have been particularly impatient with this "feature".

   b. Having to bring a document onto the desktop to change the way in which it is filed seems awkward to me. The test subjects had some trouble remembering this, and would try to change the file name on the Bring Me form.

   c. The process of creating a new document is obscure. After having it painstakingly explained and after doing it once, nearly all of the subjects had trouble with it in the List of Tasks. I would like to see a "Create" menu item on the Desktop menu.

   d. Many of the subjects commented on how easy the Filer was. Without exception, they all liked the Waste Basket!

2. Thoughts on the LISA in General

   a. I don't understand why it is just the tip of the arrow that makes a selection. Subjects got used to this, but it did have to be explained.

   b. Almost every subject commented on how much fun it was to use the system.

3. Thoughts on the Way We Ran the Test

   a. I think the one-on-one instruction is a very effective way to test the software. It allowed me to vary the presentation depending on how quickly the subject learned, and I couldn't have done that easily if we were using written materials.

b. I think the time is about right, If the test took any less time, they wouldn't really get involved with the system; if it took any more time, they might get tired of it. I sensed the beginnings of boredom in several test subjects as they neared the end of the List of Tasks.

c. Much as I hate to admit it, tape recording the session is a good idea. It allows you to recapture the exact comments of each subject. Someone should transcribe the pertinent portions of each tape.

d. While I think the test pointed up the weaknesses of the software, I think some of the confusion could have been avoided by making some changes in the way some of the tasks were worded. For example, nearly everyone tried to get a blank document from the Claims file, since on the same card I asked them to file the new memo in the Claims file. If the filing instructions were on a separate card, that particular confusion wouldn't have occurred (though I don't believe they would have been able to create the document even then).

e. The observers need to be more careful to be quiet. Their voices are audible in the testing room, and knowing that people were watching made some of the test subjects uneasy.

f. I think some qualitative description of the test subject should be included with the test data, e.g., "this subject caught on very

are audible in the testing room, and knowing that people were watching made some of the test subjects uneasy.

f. I think some qualitative description of the test subject should be included with the test data, e.g., "this subject caught on very quickly", or "this subject didn't know how to type". I know these are subjective, but they provide a framework for evaluating the data.

g. I still think it is imperative to have non-Apple people tested in order to get really meaningful test data. We learned a lot of things from this test, but there are still questions in my mind about how people from outside the computer industry would react. Specifically, Apple employees have heard about LISA and how "neat" it is, and they have a desire for our new products to be successful. Also, I think people in this industry have a different attitude toward technology than people in other, "softer" industries. From Publications' point of view, seeing outsiders react to the system would be very valuable.

I think you did a really good job of pulling this all together, and I think it went remarkably well for our first try. I enjoyed the interacton with the test subjects, and was pleased to get first-hand experience teaching them how to use the system. If I can help with other tests along the way, I'll be more than happy to do so.

Regards,

Filer User Testing -- Schedule

April 21 — 24

	Tuesday	Wednesday	Thursday	Friday
9:00	David Cramm x2256 M.E.	Cindy Lehmann x2440 S.E.	Paul Chesterman x8494 ?.?.	Nancy Schmitz x2488 S.I.
1:00	Kathy Krueger x2575 S.E.	Jill Stalie x8410 S.I.	Cathy Mellinger x2157 ?.?.	Ada Valcarcel x2238 S.E.
3:00	Mike Rashkin x2627 M.E.	Roy Weaver x2254 ?.?.	Ilene Shamas x2153 S.E.	Joe Shepela x2448 M.E.

Filer User Testing -- Checklist

April 21 — 24

Before each session:

_____ Has the subject been reminded?

_____ Is there coffee available?

_____ Blank Questionnaire ready?

_____ Blank observation checklist ready?

_____ Blank cassette tape in recorder, rewound?

_____ Is the Filer Demo rebooted?

_____ Are the cue cards in the testing room?

After each session:

_____ Cover put on Lisa?

_____ Blinds closed in observation room?

_____ Questionnaire collected and filed?

_____ Observation checklist completed and filed?

_____ Tape catalogued if relevant?

To: Pat Marriott, Larry Tesler

CONFIDENTIAL

From: Wallace Judd

Re: Filer User Testing Results

Date: May 11, 1981

cc: T. Hawkins, B. Smith, N. Connors, C. Doerr, F. Ludolph, A. Oppenheimer, G. Pilkington,

Filed on: USRTST:FilerRes01.text

OVERVIEW

This memo is organized as follows:

Results

Methodology

Tabulated Questionnaire Results

Appendices

I. Copy of request memo

II. Observations by Chris Doerr

III. Schedule of users

METHODOLOGY

The filer user testing was conducted during the week of April 20-24. Twelve subjects were used, half secretarial and half managerial. All had had some experience with computers, and none had wide experience with a range of word proceessors.

The subjects were introduced to the system by a trainer. Introduction followed a detailed outline, and took approximately 20 to 30 minutes. Following the introduction, the subjects were asked to complete fifteen tasks, included in the appendices.

After completing the tasks, each subject was given a questionnaire and asked to fill it out. When it was completed, the trainer asked the subject several follow-up questions about items on the questionnaire.

The entire process took about an hour per subject.

QUESTIONNAIRE RESULTS

Below are the tabulated results of the questionnaire.

1) Functions still unclear

Bring Me	0
Undo last	7
Print a copy	1
Mail a copy to	1

Functions not circled as ones they feel comfortable with.

Bring M	
Undo last	9
Print a copy	4
Mail a copy to	6

TO: Wallace Judd
Allan Oppenheimer
Mark Cutter
Rod Perkins
Larry Tesler
Sandy Miranda
Jeb Eddy

FROM: Dave O'Connor

DATE: May 15, 1981

RE: Graphics editor user testing

CC: Pat Marriott
Bill Atkinson

The following is the list of questions to be addressed by user testing. The issues fall into three categories: global interface issues, features, and the clicking scheme. The latter area will be more thoroughly tested when Bill's demo becomes available in a few weeks.

GLOBAL INTERFACE ISSUES:

1. Can people use a description folder more easily and/or more accurately than a dialog box?

The third option, menu and dialog box in combo, will be tested later if both the description folder and the dialog box cause the user difficulty.

2. Is it an asset or a liability to have two ways to access the description folder? Is it confusing?

3. Can people effectively grow/shrink open folders? (to be observed: no special testing involved).

FEATURES OF THE GRAPHICS EDITOR:

1. Is gridding confusing (e.g. because it's invisible)? Should the default be on or off?

2. Are rulers usefull? Can people line objects up with rulers? Do/can people use them with different tick marks?

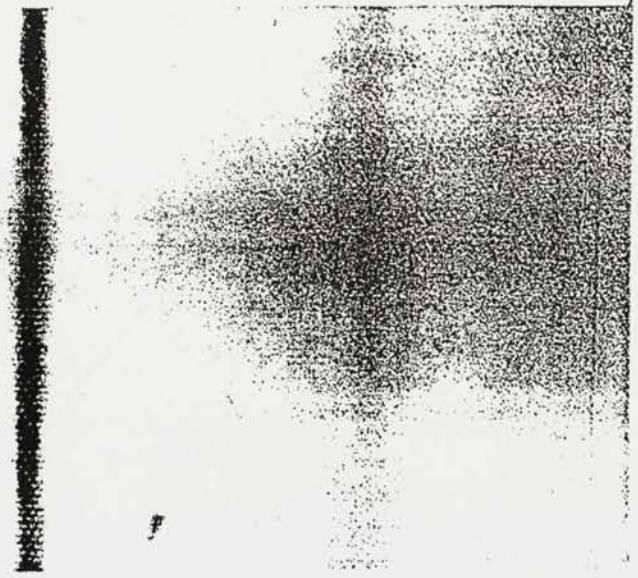
3. Are crosshairs useful and easy to use? In conjuntion with rulers?

4. Is measurement useful? In conjunction with rulers?

5. Is the variety of icon feedback confusing? If yes, is it because there are too many icons, or because the icons are the wrong ones?

6. Do people get into difficulty because an object is left selected after creation?

7. How do people react to extra menus in the menu bar?



8. Which menu terms or symbols are unclear?

9. How quickly can subjects devise and execute a plan for creation of a complex object (e.g. simple org chart)? What parts of the graphics editor features do subjects select to use (e.g. crosshairs vs. rulers, move vs. cut/paste)?

CLICKING SCHEMES:

1. What is the error rate for:

    selecting an object?
    copying an object?
    creating an object?
    moving an object?
    all of the above for multiple objects, and mixed text/graphics

DATE: 6/22/81

TO: Hawkins
O'Connor
Tesler

FROM: Marriott

SUBJECT: Prototype Validation

Larry — Where are we on this stuff (CUT-PASTE-MOVE-etc?), and I'd like to help get moving on any necessary testing or decision-making ASAP. Let's get it over with! Trip

On May 28, Larry, Wallace, and I met to discuss the global interface issues which require user prototype validation. This is a summary of that meeting. I've shown priorities for some items as best I can remember them and indicated which issues require validation (V) of the existing scheme vs what do we do (WDWD) to solve a possible problem.

(Some of these questions may be obsolete based on last week's Graphics Editor testing.)

1. Property Sheets (Dialog Box (2) or Description Folder (3)) vs Menus (1). (V) Rod's demo has all three. To do 3 things the user has to do 3 pull-downs with a menu vs checking 3 boxes in a dialog box or folder, i.e., 1 dialog box or folder can contain the same info as many menus. — Folder is out. Dialog box is feasible, but given schedule I'd change only if menu receives very negative reactions. LOW PRIORITY.

2. Dialog Box vs ~~Folder~~. (V low priority) Find/Change was the first issue and it was decided to go with the dialog box until confirmed or vetoed by user test. The WP probably will not be changed at this point. Right.

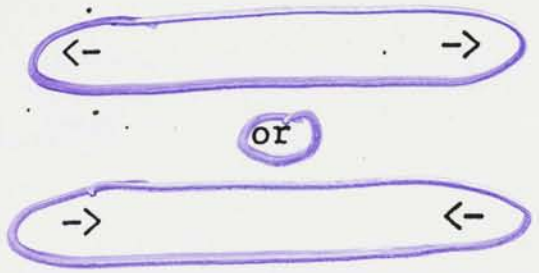
Hot issue: if 2 application folders are on the desk, which folder does the description folder belong to? Right! That's why it's OUT.

Probably can't test this issue with Rod's demo because it doesn't allow multi-folders on the desktop. Right.

If our current design is INvalid, we probably need to do more testing. Right.

ltaneous scrolling in two directions? TEST IN LATE AUGUST w LISACALC & BUS. GRFX.

. What's the correct combination of arrow direction and position for scrolling (V) ,
e.g., MUST TEST - CAN WAIT TIL SEP-OCT.



7. Previous/next page. (V high priority) Star has a previous/next box. Is our page flip mechanism appropriate? MUST TEST AS SOON AS IMPLEMENTED

8. Elevator. (WDWD low priority) Is it ambiguous? If user pulls it to the bottom, where does the last line of the document appear in the folder? What happens if he then continues to scroll? In Lisacalc? In the Word Processor? CAN WAIT

9. Sub menus. (V) Trade-off between too many menu items vs too many steps to accomplish something. Some examples:

Rod's demo:	loading fonts	needs testing in word processor in SEPT-OCT
Lisacalc:	money types	I told them to eliminate the submenu.
WP:	margins/tabs ruler	This submenu is necessary.

10. Activate folder. (V) Should clicking anywhere in a folder activate it? What about the selection in the folder? Choice seems to be MUST TEST IN OCTOBER

officetalk style
User gets a new selection when he clicks in a folder to activate it, except in folder tab.

smalltalk-style, & current style
or
[Tom argues for a change, but his test case is not valid because he doesn't change the cursor shape

Clicking in a folder merely activates it. The last selection is remembered.

LISA USER TEST--OCTOBER, 1981

Background

Twenty four non-Apple employees used Lisa at Ecker Research in Daly City to determine ease of self-installation and ease of learning Business Graphics based on a mini-manual. Sixteen of the users were managers or professionals and eight were secretaries. They were all computer novices.

Results were obtained by observing the users through a one-way mirror and by a self-administered questionnaire describing their feelings about the experience.

Conclusions

1. Only the first sixteen people were needed to conclude that it is easy for the average member of our target audience to self-install a Lisa in 10 minutes or less.

It should be noted that there was no printer in this test, and the system can only be self-installed if all pieces are easy to set up. I have never taken a printer out of the box and set it up so I will leave this issue to POS.

2. The Orientation to Business Graphics is easy to use, and in fact, a number of the users described Lisa as FUN.

Two-thirds of the users say they feel comfortable using the product as a result of this first experience with it. About half of those who did not feel comfortable appeared to have been severely hampered by numerous system

Questionaire

— Detailed Results —

Name _____

Date _____

Please answer the following questions regarding your feelings about the experience you have just completed.

I. Installation/Set-up

1. Before setting up the product, did you think:

I cannot set up a computer by myself	0
This may be difficult, but I'll try it	5
It should not be difficult to do	6
No particular expectations one way or another	4

2. After setting up the product, how do you feel about each of the following:

	Very Difficult	More Difficult Than I'd Like	Fairly Easy	Very Easy
a. Removing the components of the product from the box is:	—	2	5	9

Date: 15 December 1981

To: Barry Smith, David O'Connor

cc: Trip Hawkins, Greg Stikeleather, Larry Tesler, Bruce Blumberg, Pat Marriott, Wayne Rosing, Rick Tompane, Marcia Lindberg, Judy Castanola

From: Ellen Nold

Subj: Responsibility Charting for User Tests

This memorandum confirms our agreement about the responsibility chart for user tests, both in-house and external. In this chart

A stands for "must give approval"
R stands for "is responsible for task"
C stands for "must be consulted"
I stands for "must be informed"

Task	Product Manager	Product Team	Training	Engrg
Deciding to test a question	R	C	C	C
Planning the user test	A	C	R	C
Implementing the test	A	I	R	I
Interpreting & reporting results	A	I	R	I
Deciding what action should be taken on basis of results	A	C	R	R

not always

Raw data will be made available to any person within POS. Under no conditions will User Testing be allowed to affect the software schedule. Marketing will provide Training with help from Judy Castanola and Marcia Lindberg in the implementation of the tests.

Engineering User Test

Date: February 22, 1982

Time: 30 minutes

User: Cindy Mathers, A/C Payable Clerk

Experience: Applewriter, Visicalc, exposure to Pascal

Product: Graphics Editor 1.2

Teacher: Larry Tesler

Observers: Monica Godfrey, Greg Stikeleather (glimpses)

Setup: 1/4" tick marks on, 1/16" grid on, inch ruler on, gravity off

Lessons:

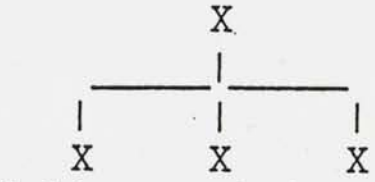
(1) Drawing practice
   (a) Learn mouse using circle exercise
   (b) Draw random rectangles, circles, and lines
   (c) Fillstyle and Linestyle
   (d) Move objects
   (e) Stretch objects
   (f) Multiple selection (never used again)

(f) Multiple selection (never used again)
(g) Cut
(h) Select all
(i) Text

(2) Org chart

(a) On her own, drew four rectangles, odd sizes and locations.
(b) Asked her to line them up. Had to remind her to use arrow.
(c) On her own, drew lines but not in right configuration:

(d) Typed text (I told her to CENTER first).
She guessed the RETURN function herself (but checked with me before trying it).
She lined up the first text (2 lines) too low, the 2d and 3d (1 line) perfectly, and the 4th (1 line) too low.
(e) Widened a box and moved text to correct places. No trouble.
(f) I asked her to put the lines in the right configuration:



She CUT the bad lines and drew the good lines. One stuck out too far. She shrunk it OK.

how. I coached her through it but I'm not sure she understood "Send to bottom". She like the result a lot,

(h) I asked her to CUT it ALL. She used CLEAR which she had never been taught.

(3) Floor plan

(a) I asked her to use the rulers to draw an L-shaped room on inch boundaries. She had no trouble with the rulers. However, I asked her to use polygon rather than lines and she had a lot of trouble with that:

- No help on horizontal and vertical lines.
- She drew one edge from 2" to 3", then accidentally a second edge from 3" back to 2 7/8" (by a mouse slip), then from there down to somewhere else. The xor feedback covered up the error. At polygon closure, the error became apparent. She used "Edit Object" to fix it, but the knobs almost coincided, so I had to coach her through it all and she still had difficulty. Once, she left the Edit Object mode, but the knobs looked almost the same in arrow mode so she did not notice and would have stretched the picture beyond repair if I hadn't intervened.

Her Remarks:

(a) Great!

(b) Could be useful for accounts payable: not herself, but people who prepare flow charts for them.

(c) It was easy - mostly common sense.

(d) The hardest thing was keeping the mouse steady while drawing lines. (I had to reinforce the notion of a visual check just before pressing or releasing the button, and a more carefree attitude at other moments.)

(c) It was easy - mostly common sense.
(d) The hardest thing was keeping the mouse steady while drawing lines. (I had to reinforce the notion of a visual check just before pressing or releasing the button, and a more carefree attitude at other moments.)

Greg's remarks:

The I-beam did not disappear when typing began. Got in the way.

Larry's remarks:

She often missed stretch handles. Feedback was either that the object moved or that a hand appeared for an area selection. This feedback was always too late and of the negative variety. It would be best if a handle "lit up" when you were in its "sphere of influence". (It should have hysteresis, too.) (This would be efficient if we had only 8 stretch handles regardless of selection size.)

The cursor did not change to an arrow in the menu bar. She was confused. (Mark will fix this before alpha.)

She kept looking for "delete" and forgot it was "cut" in the edit menu. (Later that day, I saw Sue Luttner having the same problem.) On the other hand, when asked to move an object ten minutes after learning how, she expected to use the edit menu. She often needed to delete new

CONFIDENTIAL

To: Andy Averill, Jan Calvert, David Casseres, Nellie Connors, Amy Davidson, Sue Luttner, Sandy Miranda, Gail Pilkington, Bill Schottstaedt

cc: Phyllis Cole, Sue Espinosa, Monica Godfrey, Ellen Nold

From: Greg Stikeleather

Date: February 26, 1982

Re: Development Testing Guidelines

Filed: GT5:dvtst.text

Several people in Pubs have expressed an interest in testing their instructional materials on naive users. The intent of this memo is to describe some of the features of development testing, explain how development testing differs from more formal user testing, and provide some guidelines for conducting development tests.

DEVELOPMENT TESTING

Instructional materials are written for a purpose --- to teach something to someone who doesn't know how to do what it is that's being taught. Instructional writers who watch individuals use what they've produced invariably get more constructive feedback for revisions than authors who revise simply as a function of editorial comments (but of course such comments are usually helpful).

Date: May 23, 1982

To: POS Applications Software, Barry Haynes, Dan Venolia, Owen Densmore, Steve Capps, Jeff Parrish, Debbie Willrett, Bruce Daniels, Wayne Rosing, Wendell Henry, Larry Hardiman, David O'Connor, Pat Marriott, Bruce Blumberg, Barry Smith, POS Training, POS Publications, POS NPR, Alan Oakes, Elisabeth Reinhardt, Joanna Hoffman, Andy Hertzfeld

From: Larry Tesler LT

Subject: Lisa User Interface: Development Test Results

Summary:

I have thus far taught Lisa applications to about 30 new Apple employees of various backgrounds. Most liked the system a lot, but had difficulty with certain aspects of it.

The more experience I had teaching a particular application, the easier it was for the user to learn. Variations in teaching approach and in user background made at least as much difference in learning speed, comprehension, and error rate as did user-interface specifications.

I varied the terms in the menu file and found that they made a significant difference in comprehension.

difference in comprehension.

One consistent finding was that people prefer an icon to point at in order to make something happen. Instructions like "anywhere in the tab except that icon", "anywhere except the handles", "anywhere in the window except the tab" were futile; people universally went straight for the forbidden location.

Disseminating ideas for improvement:

I came away with numerous ideas for changes to improve the products. Many of these ideas were suggested by the users themselves; often more than one user made the same suggestion.

This memo lists many of the ideas that came up. I expect only a few to be incorporated in First Release. Many will probably never be incorporated. However, I am including them in this memo anyway.

I also came away with ideas about how to teach certain aspects of the product. These ideas may or may not be applicable to Lisa manuals and training materials. I have included them in this memo, but will not do anything else about them.

I noticed several deviations from the user-interface specification. Some of the deviations were probably due to incompleteness of the code, some to bugs, some to poor documentation of the user interface, some from

differing interpretations, some from refusal to conform, some from lack of time, and some from accidental omission. The deviations I recorded are lumped in with specification changes in this memo.

If you have other ideas for improvement, let me know right away.

Turning Ideas into Proposals:

This memo does not contain Lisa User Interface Change Proposals. Some of the ideas discussed may turn into proposals during the coming days and weeks. I am distributing this memo to share what I learned about our user interface, and to request feedback. I would like feedback about both the user-interface impact and the implementation impact of the ideas.

After I receive feedback, I will meet with David O'Connor and Bill Atkinson to screen, amend, and prioritize the ideas and select some as Change Proposals.

I would personally assign highest priority to solving problems that confused many users, solving problems that could lead to loss of data, and correcting deviations from the standard.

Next I will meet with the affected project teams to refine the proposals that survived and determine their schedule impact. After checking with O'Connor and Atkinson again, I will release an official user interface addendum.

This process may take place in several stages so that urgent changes can

Problem: Cursor changes were not consistent. (I-beams in menu bars! Squares in some resize icons but not others, in the same application!)

Software change: Arrow cursor everywhere outside the body of the window.

Problem: Double (triple) clicks were difficult when the allowable up-time was too short.

Software change: The multi-click up-time should be a shared variable in the Window Manager. Its value should default to about 700 ms. (Maybe the user could change that value through the Preferences Tool.)

Teaching approach: Users told to "click twice rapidly" almost always pushed the button twice as hard, which actually made it take longer to release and re-push, and thus, the double click failed. Tell them to press lightly. When there is still difficulty, the rhythm dowwwwwwwwwwn-up-dowwwwwwwwwwwwwwn (long downs, short ups) can be taught to good advantage. It also makes double-click-drag and triple-click-dcrag easier to do. However, this rhythm slows down experts, so I always reverted to the click-click technique later in the lesson.

Problem: Users often moved the mouse during the double (triple) click and selected across lines or cells unintentionally. This happened more often when they were pushing very hard (as mentioned above).

Problem: The I-beam covered the selection after it was made. Almost all users had trouble with this.

Software change: When a selection is begun, or when text is typed, hide the cursor with a special routine that Rick Meyers will provide us. The drivers will make the cursor reappear if the mouse moves.

Teaching approach: Tell the user to move the mouse a little if the cursor is covering what he is trying to see.

Problem: There is a lot of nomenclature to learn: "menus", "desktop", "documents", "scroll bar", "menu bar", "selection" and so on. Some users would forget some of the terms.

Teaching approach: Manuals should have clearly labelled anatomies of the display not just the first time a term is introduced but also the first time it is reused after a lengthy period of disuse.

Software change: A second-release Help feature could label all the parts of the display (menu bar, menu title, scroll bar, active window, etc.).

Problem: A couple of people tried to move the insertion point from one string to another by dragging it. Many asked how to get rid of a selection.

Problem: People would mis-select and then try to reselect without releasing the button first.

Teaching approach: Tell and remind people several times to let go of the button and start over when they are having trouble making a selection.

Problem: People often moved the mouse during a press or release.

Teaching approach: Reinforce the notion of a visual check just before pressing or releasing the button. The rest of the time (button staying up or button staying down), one can be carefree about the location of the mouse. Look-press-wander-look-release.

Problem: Wait alerts came up too late. The operation was usually about over. Some long operations had no feedback at all. This confused users a bunch. (Unlike us, they didn't know how long to expect things to take.)

Software change: Call WaitAlert & HideFolder for operations that almost always take a long time. Call them in the main case statement. Keep that code resident. The drivers should put up the hourglass automatically if any operation is taking a long time; see my recent memo.

Problem: Some users were discouraged with their use of the mouse.

Filer:

All users preferred the Picture Filer to the Thousand-words Filer overall. "More intuitively obvious", "less confusing", "less to read", "I like pictures", "visual aids are great if you're not used to computers", "you can immediately relate to it", "you don't have to get used to prompts", "the graphic orientation makes it simpler", "you know what you are doing", "the operations are right in front of you", "omitted many steps", "more fascinating", "more fun".

The first users I taught found certain tasks slightly easier in the Thousand-words Filer, namely, "Pull" and "Put back". "Everything's right there in front of you", "buttons are easier to use than menus", "every time you hit it, it gives you the next choice" (i.e., it prompts you), "it seems to have fewer steps". But even these users liked the Picture Filer better for those tasks. And for other tasks, they found the Picture Filer to be easier.

The Thousand-words Filer had a lot of problems, mainly when secondary dialogs were up. Since that Filer has been abandoned, I won't bother to enumerate its problems in this memo.

Terms:

spatial => pictorial

"Sheet" and "Document" worked as alternatives to "window" and "viewer", but they are inaccurate. I am leaning towards "window" again, for advertising reasons; second choice is "viewer", which is the most applicable term.

To: POS Market Support, POS Pubs, POS Marketing, John Couch, Wayne Rosing, Marian Catelain (please route), Larry Tesler, Sue Espinosa, Chris Espinos

From: Greg Stikeleather (MS 2-0 x2780) and Mary Dieli (MS 2-0 x2808)

Date: September 30, 1982

Re: User Test Results for Getting Started (Orientation) Materials

Filed: SEP82.1:utgs.text

Action Item: None

In designing and writing the Getting Started materials for Lisa applications, we have been aiming to achieve two related goals. First, we want the new Lisa user to be able to use the Getting Started materials to produce useful work (achieve "minimal competence") with an application in less than 30 minutes. Second, we want the user to feel satisfied with their learning experience. To insure that we achieve these goals, we have been testing the Getting Started materials with fairly naive users, and revising based on our test results. Consequently, users are now going through the materials quickly and smoothly, and reporting a positive learning experience. With this report we summarize our most recent test results for the Getting Started materials for three of the applications: LisaGraph, LisaWrite, and LisaList.

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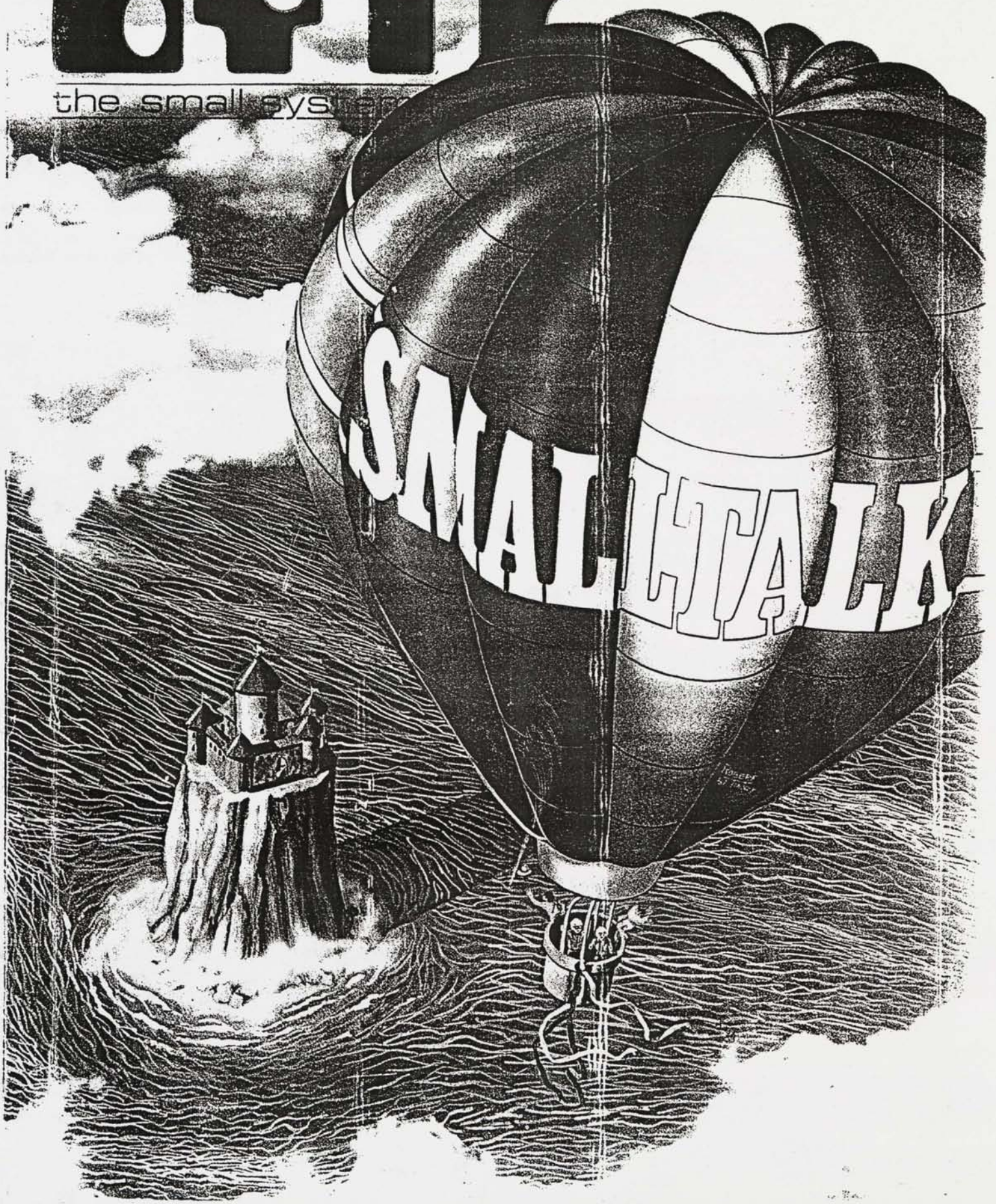

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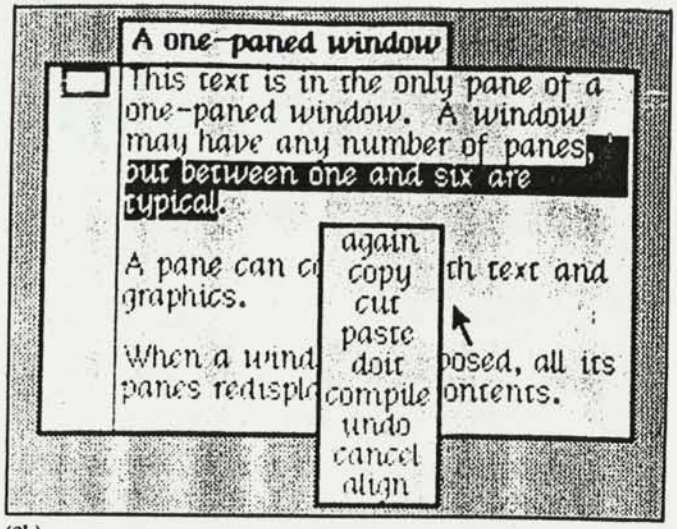

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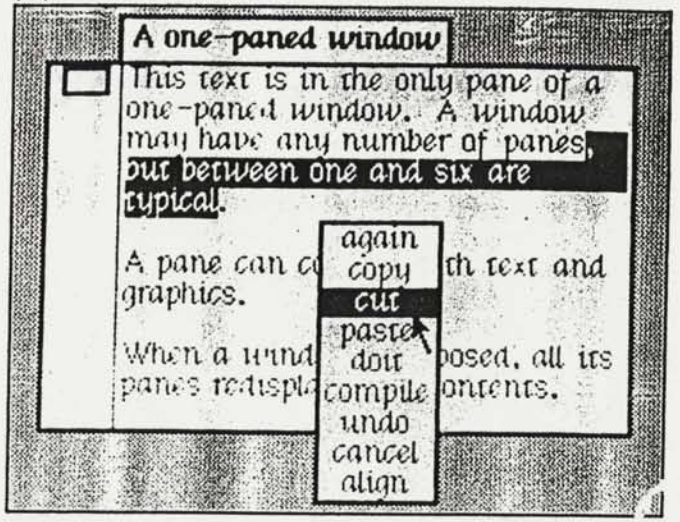

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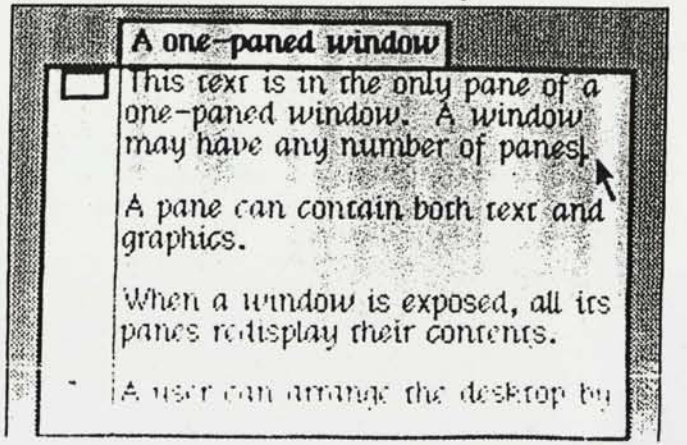


The Smalltalk Environment

Larry Tesler
Apple Computer Inc
10260 Bandley Dr
Cupertino CA 95014

As I write this article, I am wearing a T-shirt (photo 1) given to me by a friend. Emblazoned across the chest is the loud plea:

DON'T
MODE
ME IN

Surrounding the caption is a ring of barbed wire that symbolizes the trapped feeling I often experience when my computer is "in a mode."

In small print around the shirt are the names of some modes I have known and deplored since the early 1960s when I came out of the darkness of punched cards into the dawn of interactive terminals. My rogues' gallery of inhuman factors includes command modes like INSERT, REPLACE, DELETE, and SEARCH, as well as that inescapable prompt, "FILE NAME?" The color of the silk screen is, appropriately enough, very blue.

My friend gave me the shirt to make fun of a near-fanatical campaign I have waged for several years, a campaign to eliminate modes from the face of the earth—or at least from the face of my computer's display screen. It started in 1973 when I began work at the Xerox Palo Alto

at least as often as "How do I do this?," was "How do I get out of this mode?" Other researchers have also condemned the prevalence of modes in interactive systems for novice users (reference 1).

Novices are not the only victims of modes. Experts often type commands used in one mode when they are in another, leading to undesired and distressing consequences. In many systems, typing the letter "D" can have meanings as diverse as "replace the selected character by D," "insert a D before the selected character," or "delete the selected character." How many times have you heard or said, "Oops, I was in the wrong mode"?

Preemption

Even when you remember what mode you are in, you can still fall into a trap. If you are running a data-plotting program, the only commands you can use are the ones provided in that program. You can't use any of the useful capabilities of your computer that the author of the program didn't consider, such as obtaining a list of the files on the disk. On the other hand, if you're using a program that lets you list files, you probably can't use the text editor to change their names. Also, if you are using a text

editor, you probably can't

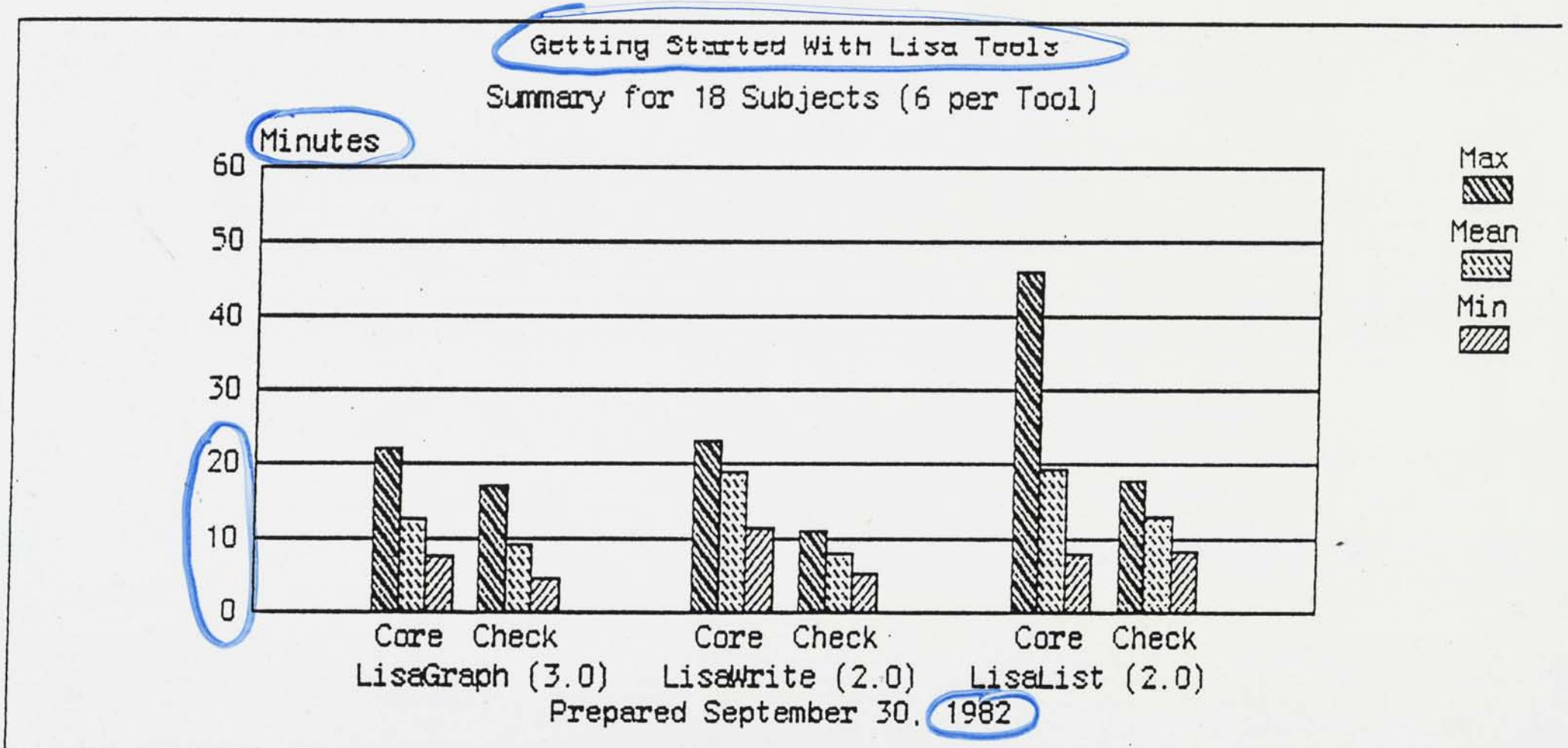
As far as future hardware hopes are concerned, it is interesting to note that four of the speakers at the recent NCC Smalltalk-80 symposium were from Digital Equipment Corporation, Apple Computer Company, Tektronix, and Hewlett-Packard. All four research representatives were quick to point out that their companies are not necessarily working on Smalltalk products, but are rather exploring the language's potential. Despite the disclaimers, though, I would be very surprised if we do not see a computer with the Smalltalk-80 system built in sometime in the next few years—perhaps sooner. I hope this issue brings that dream closer. ■

Acknowledgments

I wish to express my appreciation to Adele Goldberg and Dave Robson at Xerox PARC for their invaluable help in preparing this special issue—and especially to Adele for coordinating the many authors who contributed their expertise. I'd also like to thank Gregg Williams for his editorial skills in preparing this issue . . . . CM

3> User test results for Getting Started with LisaGraph (Business Graphics), LisaWrite (Word Processor), and LisaList (List Manager).

We tested the latest Getting Started materials for LisaGraph, LisaWrite, and LisaList with 18 different subjects: 6 subjects per tool (application). The graph below summarizes the maximum, mean, and minimum times it took to work through the Core section and Final Check for each tool. Only four of the six LisaList subjects received the Final Check.



Inter Office Memo

Larry
Pls copy myself and Bruce or Lisa
Thx

Date: July 18, 1980

To: Distribution

From: Larry Tesler

Subject: LISA User Interface Finalization

Several important details of the LISA User Interface are to be decided by Wednesday, July 23, and the ERS is to be completed by Thursday, July 31. To meet these deadlines without compromising the quality of the design, intensive design and evaluation sessions have been scheduled for the first three days of next week:

MONDAY, JULY 21

10:00 - 12:00 a.m. All try Bill Atkinson's prototype and discuss text editing details:

How source of move/copy is specified.
Meaning of drag with select button down in text.

the design, intensive design and evaluation sessions have been scheduled for the first three days of next week:

MONDAY, JULY 21

10:00 - 12:00 a.m.	All try Bill Atkinson's prototype and discuss text editing details: How source of move/copy is specified. Meaning of drag with select button down in text. Do typing/copying/moving append, insert, or replace? Apple key and menus. Scrolling.
1:00 - 2:00 p.m.	Test alternatives on Sue Espinosa.
2:00 - 3:00 p.m.	Discuss graphics and windows interface(s).
3:00 - 5:00 p.m.	Present to Steve Jobs and select viable alternatives.

TUESDAY, JULY 22

9:00 - 10:00 a.m.	Test viable alternatives on two subjects.
10:00 - 12:00 a.m.	Repeat on two more subjects
1:00 - 3:00 p.m.	Evaluate test results.

Date: August 6, 1980

To: Distribution

From: Bill Atkinson

Subject: External Reference Specification for the LISA User Interface

Attached is your review copy of the External Reference Specification for the LISA user interface. THIS DOCUMENT IS CONFIDENTIAL.

Please read and return comments in writing by Wednesday, August 13. An ERS review meeting is scheduled for Wednesday, August 13, at 10AM in the Calaveras room.

Thanks for all the good inputs !

DISTRIBUTION:

Tom Whitney
John Couch
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Tom Hong
Mike Markkula
Steve Jobs
Trip Hawkins
Barry Margerum
Barry Smith
Jef Raskin
Tim O'Konski
Lisa Software
Lisa Hardware (route one copy)

cc:
Mike Scott
Gene Carter
Ken Zerbe
Andre Sousan - Eurapple
Carl Carlson
Rod Holt
Woz
John Vennard

1. PRODUCT DESCRIPTION

LISA is a single-user workstation designed to enrich the productivity of the office worker. It includes a bitmapped display, two built-in high-density floppy disks, a detachable keyboard, a pointing device and connection to a local communication network. The system is designed to operate without any special environmental preparation--LISA will be ready to plug in and use as soon as it is unpacked.

LISA is more than a piece of hardware; it includes major software for word processing, graphics, data management and communications. The software is integrated through a powerful and simple user interface. The user interface provides and defines the integrated view under which the software operates.

USER DEFINITION

LISA's audience is primarily the non-technical, non-analytical, first-time user--the administrative assistant or secretary. Managers, accountants and executives are seen as the secondary audience.

In either case, we are dealing with a busy professional in a highly interrupt driven environment, requiring a user interface that is

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In either case, we are dealing with a busy professional in a highly interrupt driven environment, requiring a user interface that is straightforward, easy to learn and easy to use.

DESIGN PHILOSOPHY AND KEY FEATURES

LISA's user interface design is directed by the philosophy that LISA is friendly, unintimidating and simple to learn and use--presenting a consistent image regardless of the application. In addition, it provides a completely integrated environment in a powerful office tool. The following key features implement the goals outlined by the design philosophy.

* Graphic images are used to create the familiar environmental model of papers on a desk while enabling you to view and edit multiple documents concurrently.

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* Graphic images are used to create the familiar environmental model of papers on a desk while enabling you to view and edit multiple documents concurrently.

* Menus display the global editing commands and applications specific commands.

* A unique pointing device enables freehand cursor control and invocation of menu commands.

* Commands may be invoked from the keyboard to speed the routine operations of the experienced user.

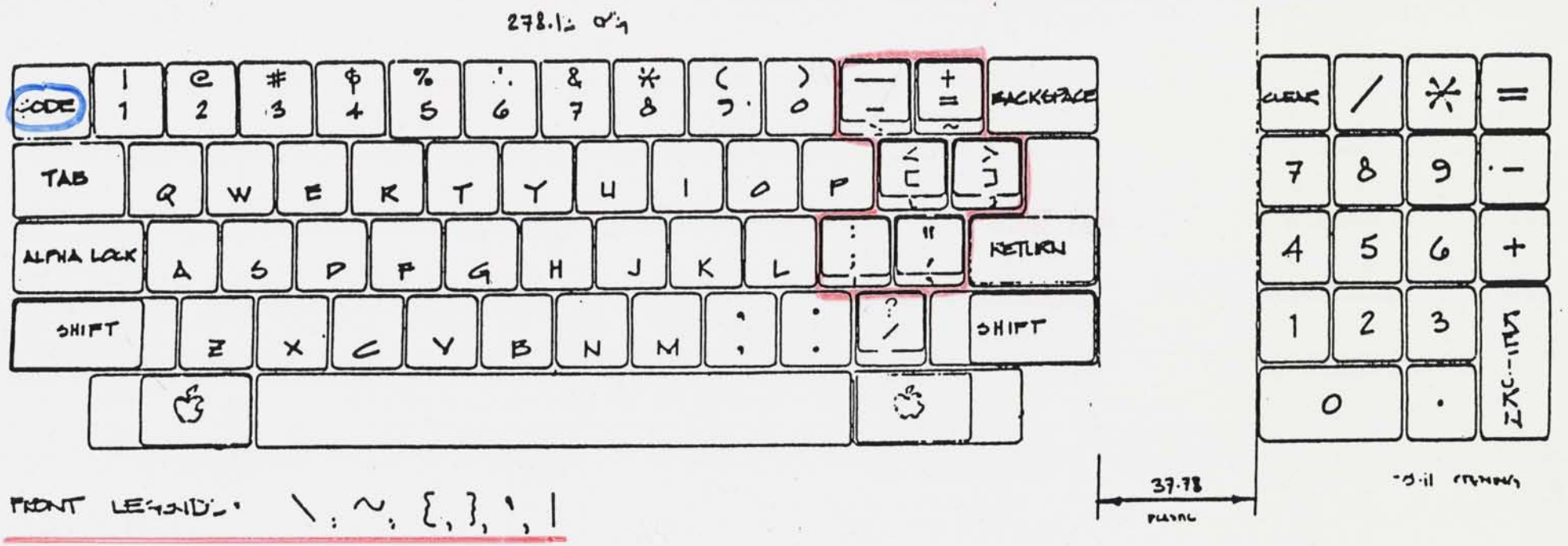

Figure 1: The Keyboard

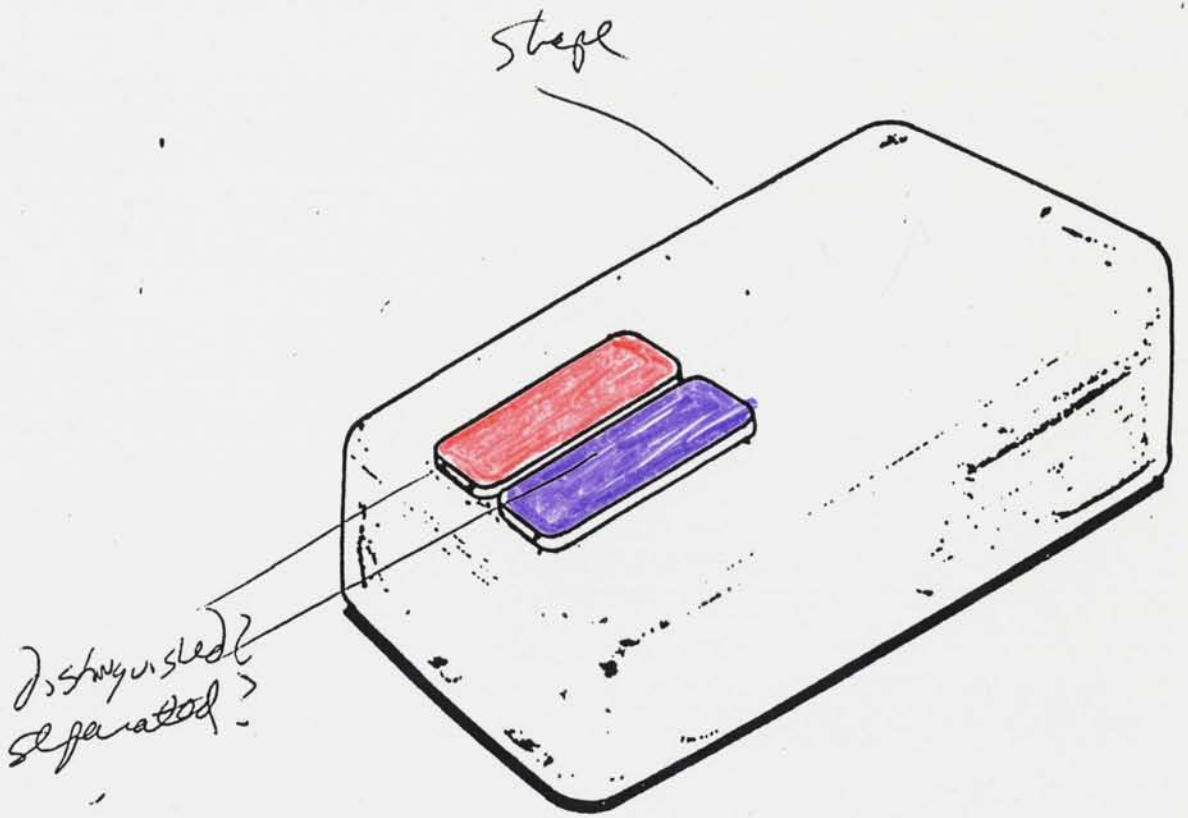

FIG. 2: THE POINTING DEVICE

	CLICK	HOLD DOWN AND MOVE (drag)
POINT BUTTON	~~IN TITLE TAB~~ Defines the window as the target and displays window menu	IN TITLE TAB Moves the window to the new cursor location
GROW BUTTON	IN TITLE TAB Opens and/or closes a window	IN TITLE TAB Redefines the size of the window to match the new cursor location

4 MENUS:

A key feature of LISA's user interface is the use of menus, offering a list of commands that operate on the target. With menus, a user doesn't have to remember a lot of commands; instead, the options that currently make sense are presented for the user's choice.

At the bottom of the current window is a one line menu, as shown in figure 3. The first word appearing in the menu is the menu's title, displayed in capital letters followed by a colon. The other menu items are commands delimited by spaces. All text in the menu is

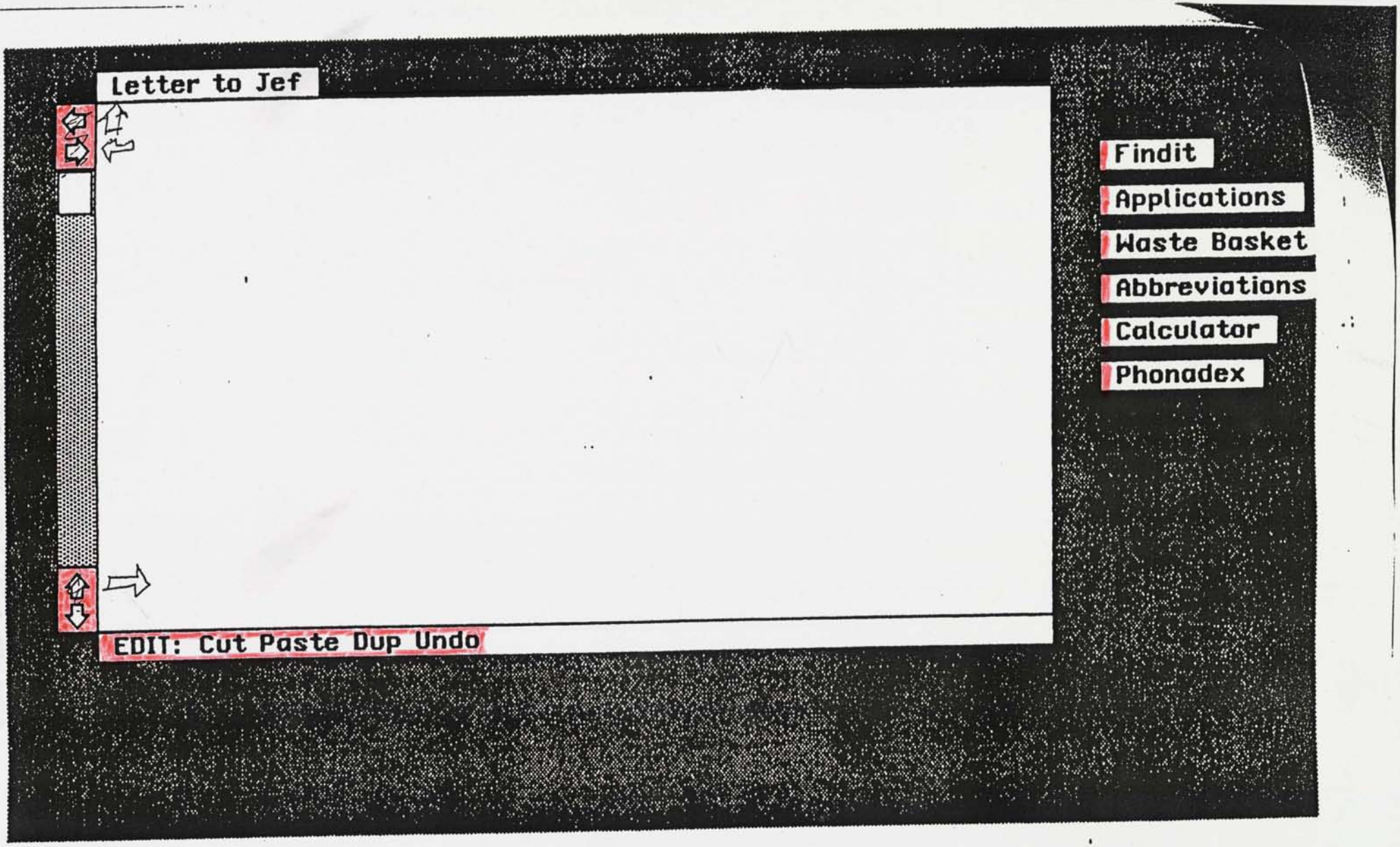

FIG. 4: The Structure of the Current Window

the menu's title.

FILL-IN MENUS (MINI FORMS):

Some commands require one or more textual parameters; for example, before invoking the FIND command, you must specify the text passage you want found. When invoked, these commands open a submenu containing one or more fields for you to fill in. The first field automatically becomes the target. There may be default values in the fields when the submenu opens. To accept a default value, type the RETURN key. To replace a default value with a new value, type the new value and then type the RETURN key.

can't search for it -- OK?

FORMS:

Commands that require more than a few parameters may bring up a complete form offering a number of options. The form also provides feedback on the current value of each parameter. To change a value in the form, position the target in the appropriate field and replace the target with a new value--entered from the keyboard.

INVOKING A COMMAND FROM THE KEYBOARD:

Menu commands can be invoked from the keyboard to speed the routine operations of an experienced user. Menu commands that can be invoked from the keyboard contain a character that is distinguished from the other characters: by an underline, APPLE outline, or a special font, for example. All distinguished characters in a given menu must be unique.

Disagree somewhat

There is no way to scroll beyond the beginning or end of a document.

You can specify flipping to the next page, rather than scrolling continuously, by clicking the mouse button twice in rapid succession--called "double clicking." Each directional arrow in the scroll bar behaves similarly: holding the button down scrolls continuously while double click is used to flip to the next page.

The center section of the scroll bar contains a white rectangle, representing your current vertical position in relation to the beginning and end of the document. This is shown in Figure 4. The rectangle is called "the elevator" and the column it moves in "the elevator shaft." The elevator moves up and down as you scroll. When the beginning of the document is displayed in the window, the elevator is at the top of the shaft; when the end of the document is displayed, the elevator is at the bottom of the shaft.

Repositioning the elevator enables you to jump to a relative position in the document. Position the cursor inside the elevator shaft and click either mouse button. The elevator moves to the new location and that portion of the document is displayed in the window.

... an extensive set of text-editing

characters, the PASTE command inserts the top item from the waste basket before the blinking vertical bar.

The PASTED item may be formatted text or graphics, however, you cannot paste graphics into the Calculator window or other text-only windows. In cases like this, LISA beeps and provides an explanation of the problem in the dialog box of the current window.

THE UNDO COMMAND:

The UNDO command is used to undo the last thing you did. For example, when you cut something from a document, you can restore it by invoking the UNDO command on the current menu. You can even undo the UNDO command because the command operates like a switch.

ABBREVIATIONS:

The Abbreviations window provides long-term storage and random access to many items because the content of the Abbreviations window is global to all applications. To create an abbreviation, open the Abbreviations window. There you'll see a list of all currently defined abbreviations, across from the character by which each is invoked.

When creating a new abbreviation, or editing an existing one, you can use all the basic editing operations including type-in and the PASTE

the top thing on the bottom leaving the second on the top ready to paste.

THE SYSTEM-ERROR WINDOW:

When a global system error occurs, when the printer runs out of paper for example, a System-Error window appears in the middle of the screen accompanied by a beep. The System-Error window describes the problem and what you should do to correct it. After correcting the problem, point inside the menu command that tells LISA the problem is corrected and press either mouse button. The state of the world prior to this interruption is restored.

8 PROJECT SPECIFICATIONS

TESTING:

This design of the LISA user interface is based on studies of users' reactions to various models. Testing continues as needed, to avoid any glaring design flaws or training problems and to ensure ease of use.

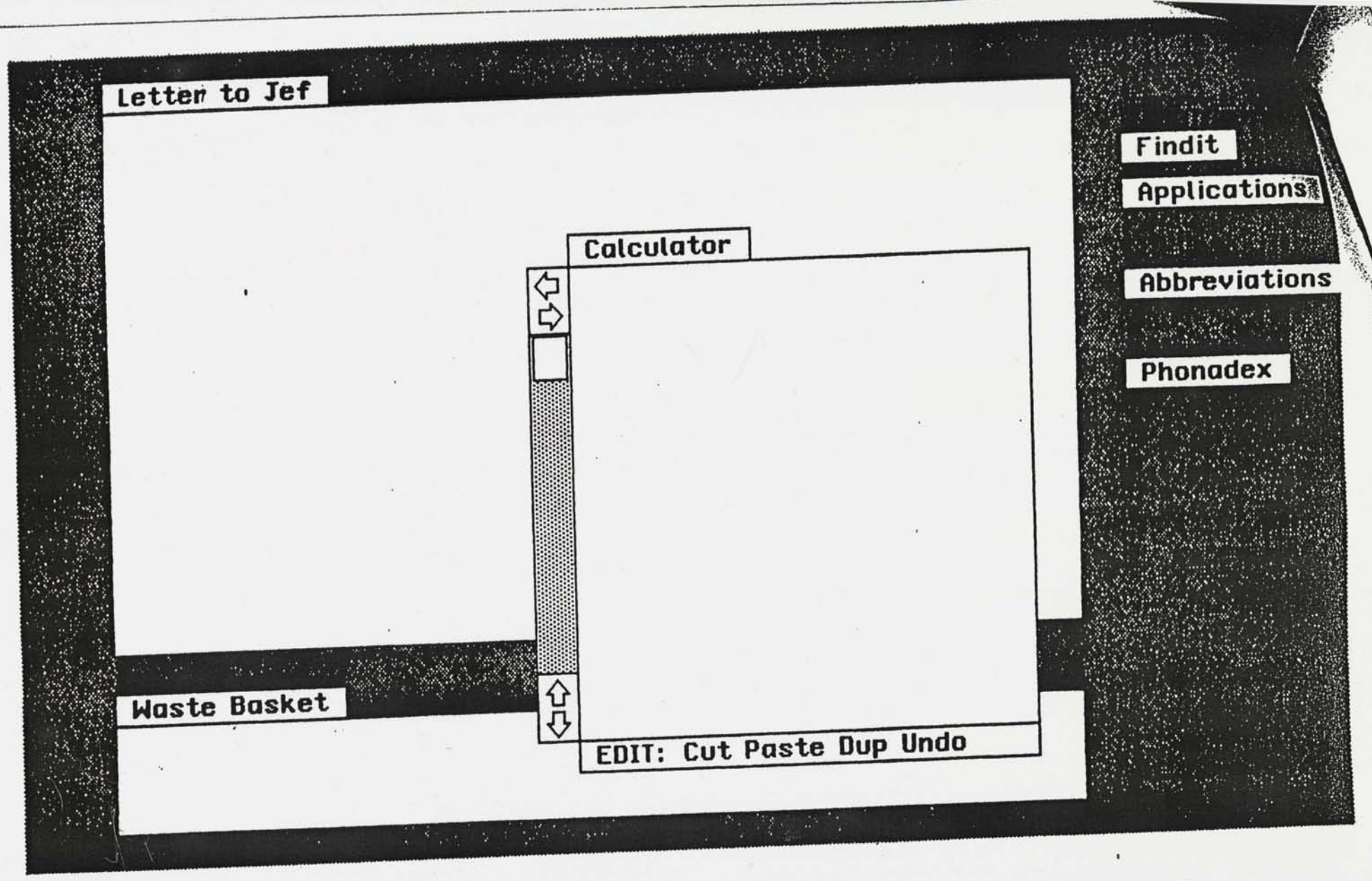

FIG. 5: Overlapping Windows

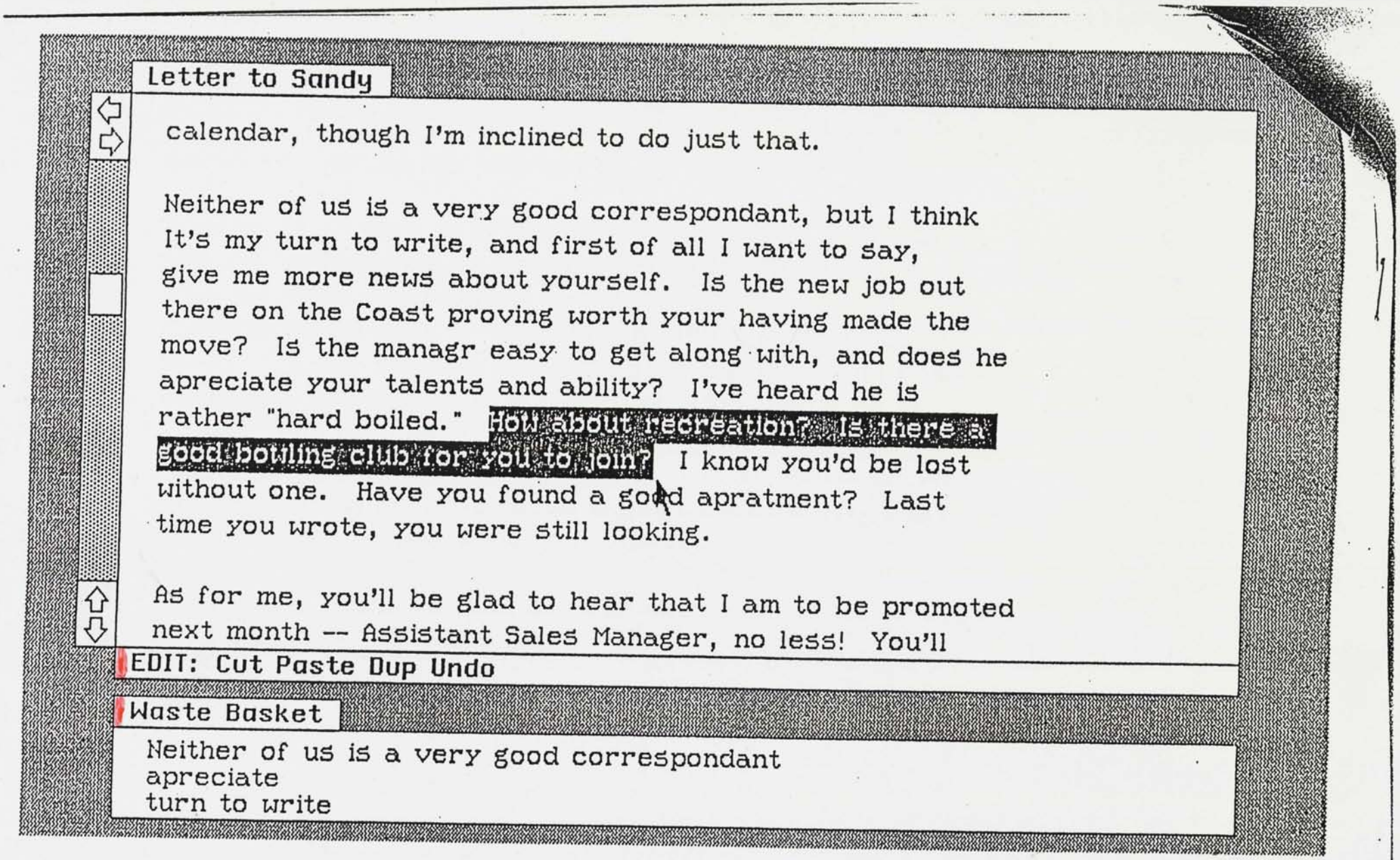

FIG. 6: Cut and Paste

August 12, 1980

To: Bill Atkinson

Cc: John Couch, Lou Infeld, Bruce Daniels, Trip Hawkins, Lisa User Interface Team

From: Ken Victor

Subject: Comments on 8/6/80 Lisa User Interface ERS

Overall Comment

While we have provided a mechanism for the experience user to specify menu items from the keyboard, I believe we have left out two capabilities along the same line (or if they are there, I couldn't find them in the ERS). We have not provided a way for the experienced user to specify targets from the keyboard (e.g., either contextually or syntactically, as the second word in the third paragraph, or the 4th occurrence of the word "LISA"). And more importantly, we have not provided a way for the user to replace a target (0 or more characters) with a "target" selected from the screen.

FIND

page 9 -- Changing the Size of a Window

I would prefer to be able to grow a window from any corner, not just the lower right. I suspect that by only allowing growth at the lower right we may be forcing the user to grow and then move windows as the most common operation.

page 11 -- Fill-in Menus; and Forms

see comments above about selecting "targets" with the mouse from the screen.

page 12 - Moving a Document within a Window

Suggestion (if its not too expensive): after positioning the cursor in the elavator shaft, have the down part of the "click" indicate that the user wishes to move the document and while the button is in the down position, have the document (and the elavator) scroll through the window (and shaft) appropriately; when the user lets the button up (and thus completes the "click"), then freeze the document and the elavator. This will let the user position the document accurately.

page 13 - Defining the Width of a Target; Double Clicking for Words; Triple Clicking for Paragraphs

If selecting a word really is the most common operation, then I believe a single click should select a word...

page 14 - The Global Editing Commands

I would prefer to see a model of Move, Copy, Delete, and Transpose (MCDT) as opposed to Cut, Dup, and Paste (CDP). Although the CDP model can accomplish everything the MCDT model can, it forces the user to perform 2 steps for the single conceptual items of copying or moving; it forces the user to perform 4 steps for the single conceptual item of transposing.

page 17 - The Wastebasket Window

I very much like the idea of a wastebasket. Given the ERS as it stands, I have no problem with the necessity of rotating items in the wastebasket to attain access to items not on the top of the stack. If the user were able to select replacement "targets" with the mouse from the screen, then this would not be necessary. If we were to adopt a MCDT model, then perhaps the wastebasket manipulations should be reconsidered (but retained).

page 17 - The System-Error Window

I assume type-ahead is discarded upon encountering an error. Is this a correct assumption?

Date: August 13, 1980

To: Bill Atkinson

From: Larry Tesler

Subject: Comments on 8/6 LISA User Interface ERS

1. GENERAL COMMENTS

I found the ERS well-written and fairly comprehensive.

I think that some mention of response time must be made. Response time is one of the most conspicuous and important aspects of a user interface. For example, how long will/should it take for a window to wake up?

Although most parts of the user interface seem good to me, I think some don't combine well. In particular, the desire for hierarchical menus and the desire for keyboard-accessible commands, each of which is rather benign, combine to yield a complicated and error-prone keyboard-command structure (cf. UCSD Pascal).

2. TWO-BUTTON MOUSE

Very few features of the user interface require the use of the second mouse button, and those that do are ones for which button confusion is likely: starting vs. extending a selection and moving vs. growing a window. The window-manipulation command summary on page 10 illustrates the problem: to perform an action, the user must consider (1) where to position the cursor, (2) which button to use, and (3) whether to click or drag. The problem is similar to that of the place-thing model, where the difference between insert

(sec 3 - pages 8-10)

OPERATIONS ON WINDOWS

This section would be changed as follows (in summary):

* Open closed window or close opened window -- click title tab.

* Move window -- draw title tab to new location.

* Resize window -- draw corner tab (lower right hand corner) to new location.

* Window menu -- either: (a) always displayed next to title tab when window is awake or (b) draw corner tab to new location.

Actually, it might be better to have a move-tab in the outer upper-left corner and a grow-tab in the outer lower-right corner, and reserve the title tab itself for letting the user edit the title using standard editing.

There must be a way to split a window. Here is a suggestion I worked out with Ron:

There are three icons in the window menu representing horizontal split, vertical split, and clone. The first two yield synchronized windows in the Visicalc sense -- they scroll together in the direction parallel to the split line but scroll separately in the direction perpendicular to the split line. Also, when one of the two split windows is closed, it is entirely deleted and the other one grows to the size (and maybe location) of the original unsplit window. Cloned windows start out identical to the original window (except for a small offset in location) and are independent with respect to scrolling and closing.

(sec 4 - page 11)

MOVING A DOCUMENT INSIDE A WINDOW:

It should be possible to scroll during a selection. The most natural way would be to move the pointer beyond the end of the window while the button is held down. However, this has two problems: (1) if the window is split, the user's intention may be to continue moving the pointer into the brother window to complete the selection; (2) the user may expect all scrolling to work that way. Instead, the pointer could be allowed to enter the scroll bar during the act of selection, and point at the appropriate arrow while the text scrolls, then return to the document area to complete the selection. I have prototyped half of this interface here; the other half has been used for 5 years in a successful system; it seems to work well for selections that are not too long. For long selections, the user should split the window, get both ends in view, and then draw from one end to the other.

In order for the scroll-while-selecting to work, the scroll arrows must be positioned differently. The ERS version is identical to the arrangement on a SOROC terminal; no wonder it looked right to all the Apple users here.

I have prototyped and tested the following scheme and it worked better than the ERS version. The up arrow is at the top of the scroll bar and causes the window and elevator to move up (and the text to move down); the down arrow is at the bottom of the scroll bar and causes the window and elevator to move down (and the text to move up). I omitted the horizontal arrows because no arrow should be present when the document can't be scrolled. I suggest that the left arrow be just below the up arrow when it is present, and should move the window and (narrowed) elevator to the left (text to the right). The right arrow should be in the corresponding position on the right edge of the window (yes, ugly, but only there for wide documents and narrow windows) and do the opposite.

ment and faster to execute because overlap clipping could be limited.

(sec 2 - page 8)

THE CURSOR:

I have had much better success with an "I" shaped cursor than with an arrow within text. People don't go too high or low any more. The diagonalness of the arrow is particularly a problem because users associate it with the orientation of the mouse on the table.

I wish the cursor could be bigger than 16 by 16. How about 32 by 32?

THE TARGET:

You should say something about how graphical targets are highlighted (creeping outline).

"the moment the target is replaced" maybe should say "if an operation is about to change the target".

(sec 3 - page 8)

OPENING AND CLOSING WINDOWS:

"When LISA is first turned on a vertical column of title tabs appears..." Is this right? For a beginning user, at least the tutorial window should be already present and open. For an experienced user, the state should be restored to what it was when LISA was last stopped.

(sec 3 - page 9)

MOVING A WINDOW:

Are there no limits on the movement of a window, as long as the title tab is still accessible? Can the scroll bar become inaccessible? The menu?

CHANGING THE SIZE OF A WINDOW:

this right? For a beginning user, at least the tutorial window should be already present and open. For an experienced user, the state should be restored to what it was when LISA was last stopped.

(sec 3 - page 9)

MOVING A WINDOW:

Are there no limits on the movement of a window, as long as the title tab is still accessible? Can the scroll bar become inaccessible? The menu?

CHANGING THE SIZE OF A WINDOW:

Not only the current size, but also the maximum size (mainly width) of a window should be shown while it is being grown, so the user has a reference, rather than forcing him to iterate to get a full width window.

(sec 4 - page 10)

MENUS:

I think we should experiment with menus at the top or right of the window, or even totally detached, as at the top of the screen, full width. I don't see any reason to perpetuate UCSD style menus (horizontally arrayed, menuname on the left followed by a colon, first letter unique, a ? or . to get at the unseen part, some menu items just get a submenu). These of course seem natural to our UCSD PASCAL users but I've seen no evidence of suitability for our marketplace.

Hierarchical menus are useful, when unavoidable, as long as they are mouse-accessed. When they are keyboard accessed, they cause heavy mode poisoning; what is our goal in this product, to out-mode WANG or to make WANG outmoded?

Date: August 16, 1980

To: Bill Atkinson cc. T. Malloy, B. Daniels, J. Couch

From: Barry Smith BHS

Subject: Comments on User Interface ERS

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1. General Comments

I think you have continued to greatly improved the UI. My major concern is that we do not forget the spirit of the Lisa PMRD which emphasizes not only function, but SIMPLICITY and CONSISTENCY of use. Although we don't wish to limit the sophisticated user, neither do we want to make the system difficult to begin on. We must remember that our major competitive advantage in the marketplace is EASE OF USE.

2. Windows

I find the stated window mechanism obscure and implicit rather than clean and explicit. I think we need to avoid using the title tab plus various button combinations to invoke a command. It starts to resemble the shift control Q Escape Z approach of some vendors. Instead, we should strive for something more explicit. For example, to close a window, we have a command (denoted by either text or an icon--Tom's open eye?) which a person selects like any other command. Likewise, any closed window might have a minimenu with the commands "open" and

4. New Menus near the top

I like them a lot better than earlier menus--nice mock up!!

Can we scroll these vertical lists to allows for greater than 24 commands per root? Could we consider visually demarking logical subgroups--perhaps be a bar so that commands are easier to find?

This might also solve my reservations have double keystrokes for "bold" in lotus. Since the menu is a single-level tree for FINDING the command, but a linear list for invoking, we can consider using a single keystroke and still be consistent--perhaps.

5. Mouse--how many buttons

I am afraid that we are again forgetting simplicity of use and learning when we argue for the two button mouse. After watching demos with both, I can see that two buttons can often present confusion. If it is functionally necessary to use two buttons, then they should always have the same meaning--i.e. select and grow--and not be used as convenient "soft" buttons in which meaning changes contextually and without the advantage of at least reading the current semantic on the screen, as you can do with soft keys.

Date: August 18, 1980

To: Distribution

From: Larry Tesler and Bill Atkinson

Subject: One Button Mouse

Here we review the one vs. two button mouse issue from the points of view of both human factors and function, and recommend a change to a one-button mouse.

DISTRIBUTION

Tom Whitney
John Couch
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Steve Jobs
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Jude Costello
Gail Pilkington
Ken Victor
Dave Sheppard
Bill Lapson
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Rick Geiger
Jack MacDonald
Jef Raskin

Larry,
The one button scheme sounds ok except for target selection. I think to commit to ... point of ... the

automatically scroll in the obvious direction. When the user sees the endpoint come into view, he returns the pointer to the interior, scrolling stops, and he completes the selection. We mocked this up and it is lovely. The former objection was that the user might be headed for another window; we have made such an operation meaningless.

This operation seems a little strange!

For extremely long selections, and for adjusting the endpoints of erroneous selections, we will allow SHIFT-BUTTON (holding down a SHIFT key while pressing the mouse button) to mean "adjust selection". Its definition is exactly the same as the old "grow" button. Although the shifting may be slightly too much for a rank beginner, and awkward for a one-handed user, it is rarely needed, especially during early use of the system. Many programs with which we have experience do use shifted mouse buttons, and we expect minimal problems with it here because there is only ONE button to shift; we have doubled the user's options from 1 to 2, not from 2 to 4 or from 3 to 6.

CONCLUSION

We have shown that the one-button mouse is superior in human factors and equal in function to the two-button mouse. Furthermore, if we have only one button on the mouse, we do not have to think of a name for each button that has a meaning consistent with their uses in every context. The mouse will be cheaper to manufacture, can have as large a button as human factors studies show is necessary, will appear simpler to prospective users skeptical of the strange device, and will be compatible with other pointing devices such as touch-screens, tablets, and joysticks.

We welcome your comments.

what is a ruler?

what is a word

all 5.9 -- write memo

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Date: 22 August 1980

To: All those people listed below

From: Bill Atkinson, Jef Raskin, and Larry Tesler

Re: Eternal Reference Specification for the LISA User Interface

click = sound on pressing

Here is our best shot, or final draft, of the User Interface. Please read it. If you wish to make any comments, please read it a second time before doing so. There's a lot of interacting elements, and a single pass doesn't suffice for commenting.

Please return comments in writing to Bill Atkinson by Monday, August 25th before 2:00 PM in the afternoon. If there are enough comments a memo will be issued responding to them.

We wish to thank the very many people who have provided suggestions, aid, help, comfort and brickbats.