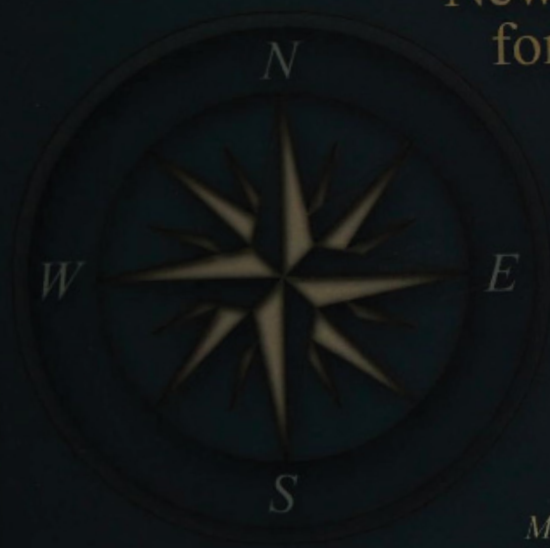


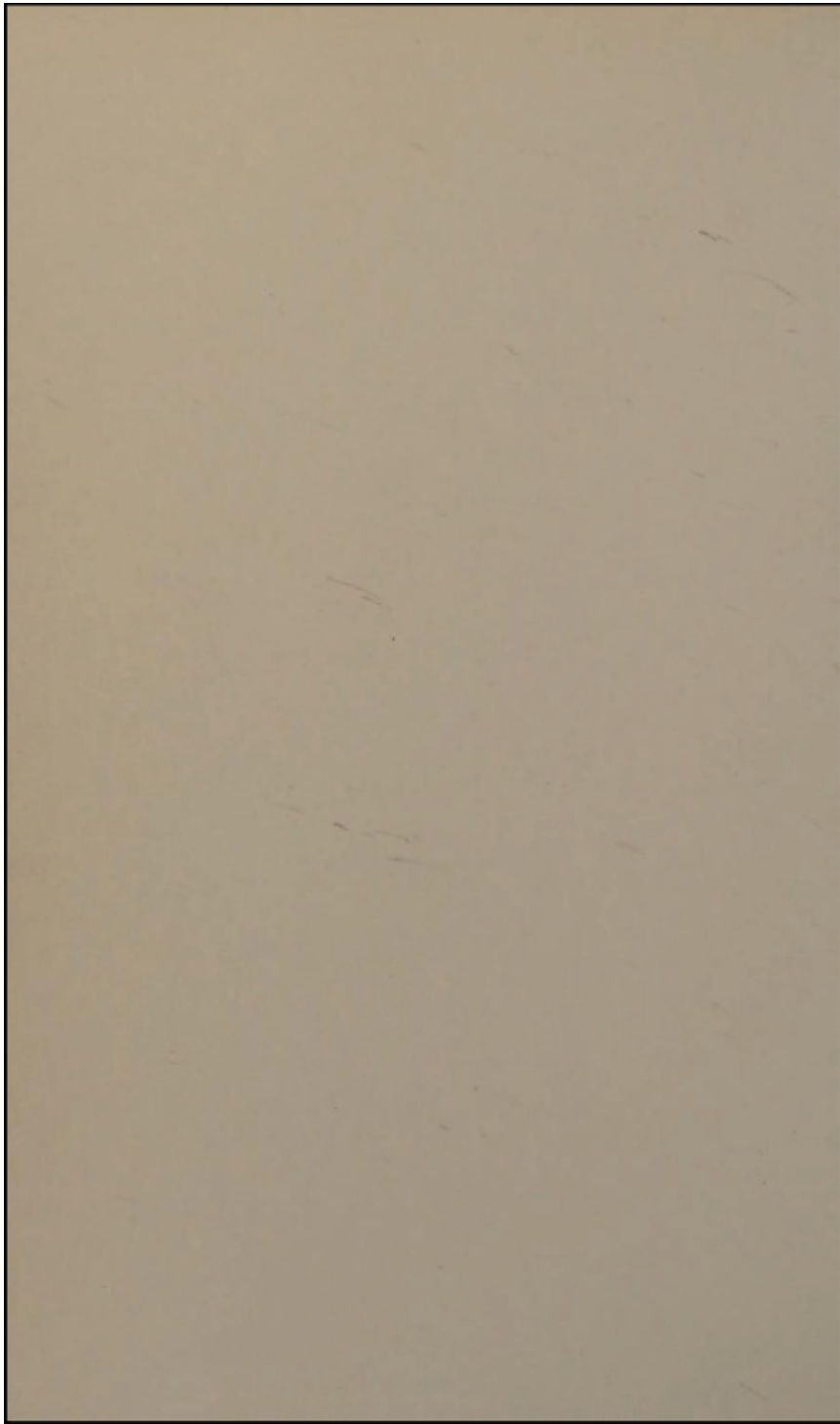
THE HUMANE INTERFACE

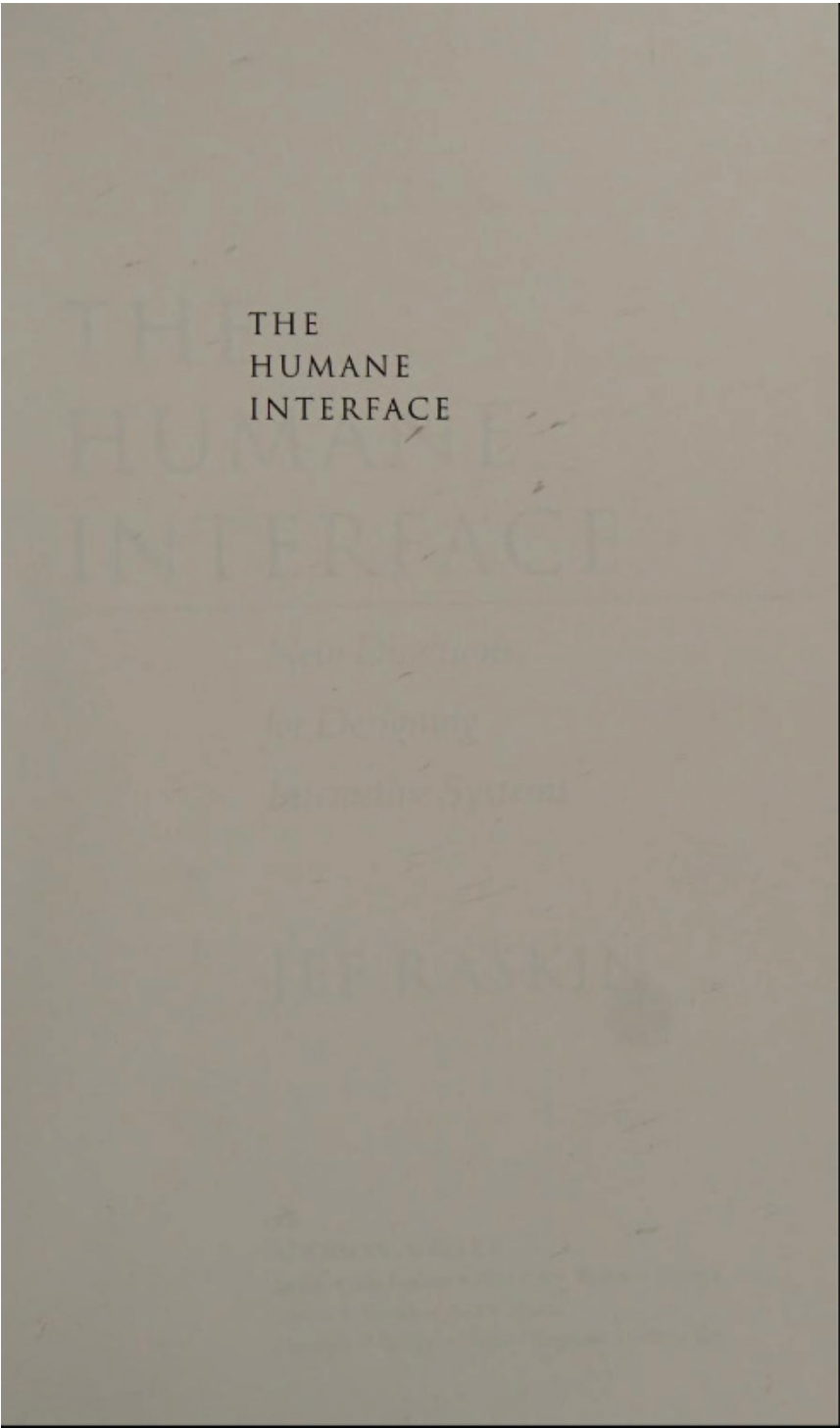
New Directions
for Designing
Interactive
Systems

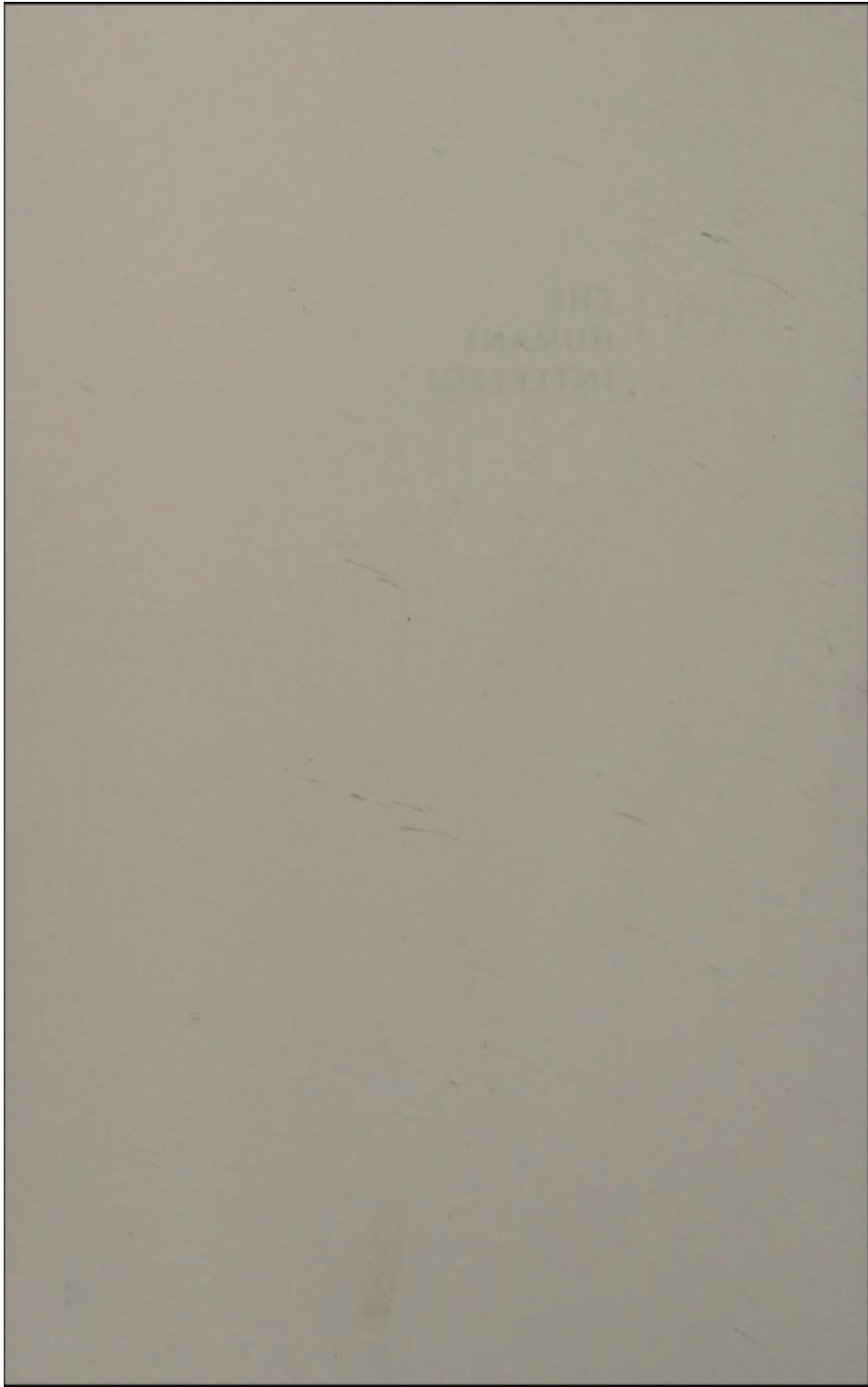


*The creator of the
Macintosh goes beyond
today's graphic user
interfaces to show how
the Web, computers, and
information appliances
can be made easier to
learn and use.*

Jef Raskin







THE HUMANE INTERFACE

*New Directions
for Designing
Interactive Systems*

JEF RASKIN



ADDISON-WESLEY

Boston • San Francisco • New York • Toronto • Montreal

London • Munich • Paris • Madrid

Capetown • Sydney • Tokyo • Singapore • Mexico City

Many of the designations used by manufacturers and sellers to distinguish their products are claimed as trademarks. Where those designations appear in this book and we were aware of a trademark claim, the designations have been printed in initial capital letters or all capitals.

The authors and publisher have taken care in the preparation of this book, but make no expressed or implied warranty of any kind and assume no responsibility for errors or omissions. No liability is assumed for incidental or consequential damages in connection with or arising out of the use of the information or programs contained herein.

The publisher offers discounts on this book when ordered in quantity for special sales. For more information please contact:

Pearson Education Corporate Sales Division
One Lake Street
Upper Saddle River, NJ 07458
(800) 382-3419

corpsales@pearsontechgroup.com

Visit AW on the Web at www.awl.com/cseng/

Library of Congress Cataloging-in Publication Data

Raskin, Jef.

The humane interface: new directions for designing interactive systems / Jef Raskin.
p. cm.

Includes bibliographical references and index.

ISBN 0-2-1-37937-6

1. Human-computer interaction. 2. User interfaces (Computer systems) I. Title.

QA76.9.H85 R37 2000

004'.01'9—dc21

00-021300

Copyright © 2000 by ACM Press, A Division of the Association for Computing Machinery, Inc. (ACM).

All rights reserved. No part of the publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, otherwise, without the prior consent of the publisher. Printed in the United States of America. Published simultaneously in Canada.

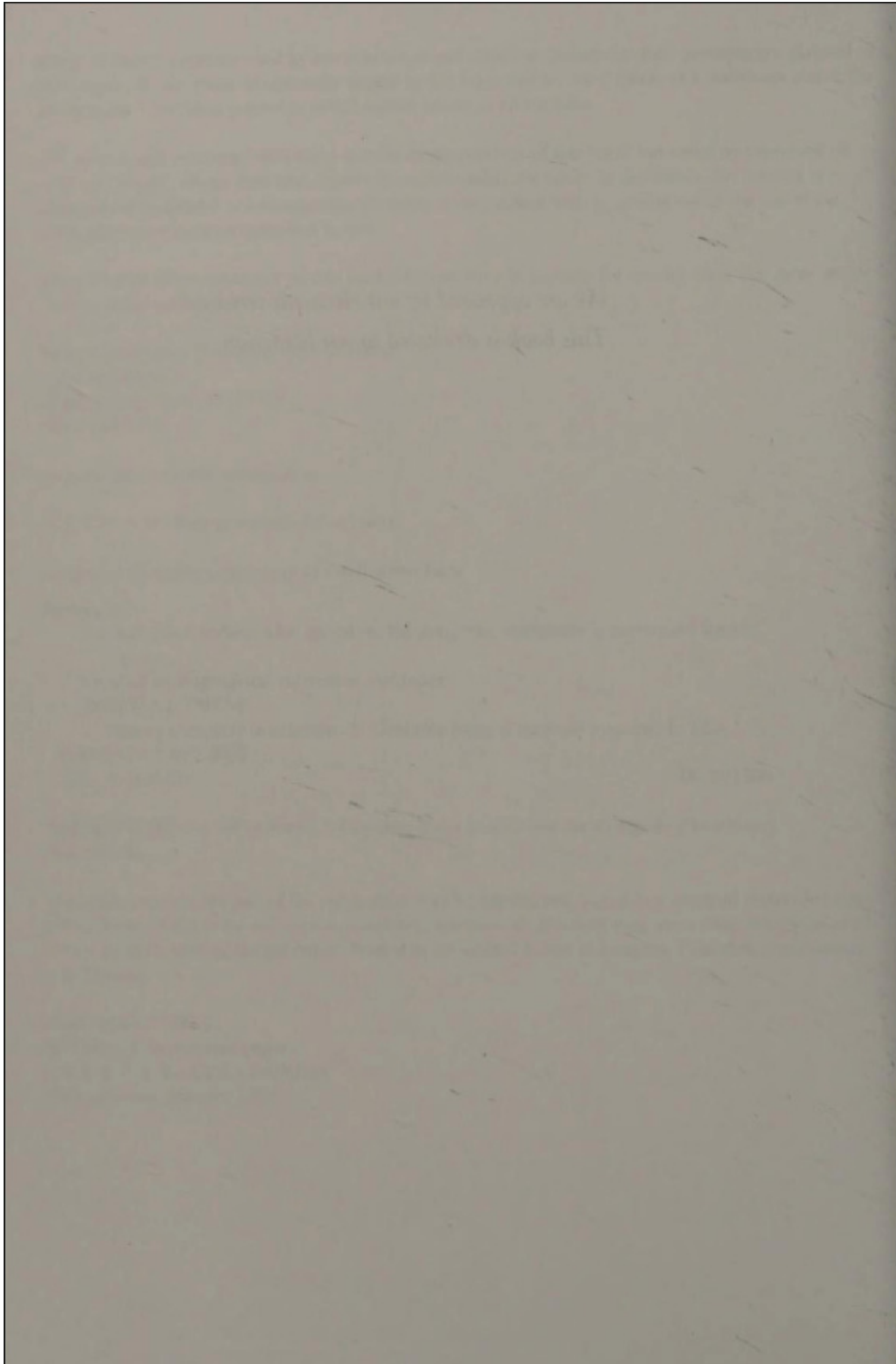
ISBN 0-201-37937-6

Text printed on recycled paper.

3 4 5 6 7 8 9—CRS—04030201

Third printing, January 2001

*We are oppressed by our electronic servants.
This book is dedicated to our liberation.*



CONTENTS

PREFACE	xi
ACKNOWLEDGMENTS	xiii
INTRODUCTION: <i>The Importance of Fundamentals</i>	xvii
ONE Background	1
1-1 Interface Definition	2
1-2 Keep the Simple Simple	2
1-3 Human-Centered Design and User-Centered Design	3
1-4 Tools That Do Not Facilitate Design Innovation	4
1-5 Interface Design in the Design Cycle	5
1-6 Definition of a Humane Interface	6
TWO Cognetics and the Locus of Attention	9
2-1 Ergonomics and Cognetics: What We Can and Cannot Do	9
2-2 Cognitive Conscious and Cognitive Unconscious	11
2-3 Locus of Attention	17
2-3-1 Formation of Habits	18
2-3-2 Execution of Simultaneous Tasks	20
2-3-3 Singularity of the Locus of Attention	24
2-3-4 Origins of the Locus of Attention	27
2-3-5 Exploitation of the Single Locus of Attention	29
2-3-6 Resumption of Interrupted Work	31

THREE	<i>Meanings, Modes, Monotony, and Myths</i>	33
3-1	Nomenclature and Notations	33
3-2	Modes	37
3-2-1	Definition of Modes	42
3-2-2	Modes, User-Preference Settings, and Temporary Modes	47
3-2-3	Modes and Quasimodes	55
3-3	Noun-Verb versus Verb-Noun Constructions	59
3-4	Visibility and Affordances	62
3-5	Monotony	66
3-6	Myth of the Beginner-Expert Dichotomy	68
FOUR	<i>Quantification</i>	71
4-1	Quantitative Analyses of Interfaces	71
4-2	GOMS Keystroke-Level Model	72
4-2-1	Interface Timings	73
4-2-2	GOMS Calculations	76
4-2-3	GOMS Calculation Examples	77
4-2-3-1	Hal's Interface: Solution 1, Dialog Box	78
4-2-3-2	Hal's Interface: Solution 2, GUI	80
4-3	Measurement of Interface Efficiency	83
4-3-1	Efficiency of Hal's Interfaces	87
4-3-2	Other Solutions for Hal's Interface	90
4-4	Fitts' Law and Hick's Law	93
4-4-1	Fitts' Law	93
4-4-2	Hick's Law	96
FIVE	<i>Unification</i>	99
5-1	Uniformity and Elementary Actions	101
5-2	Elementary Actions Cataloged	103
5-2-1	Highlighting, Indication, and Selection	105
5-2-2	Commands	109
5-2-3	Display States of Objects	115
5-3	File Names and Structures	117
5-4	String Searches and Find Mechanisms	124

5-4-1 Search-Pattern Delimiters	127
5-4-2 Units of Interaction	129
5-5 Cursor Design and a Strategy for Making Selections	133
5-6 Cursor Position and LEAP	136
5-7 Applications Abolished	139
5-8 Commands and Transformers	143
SIX Navigation and Other Aspects of Humane Interfaces	149
6-1 Intuitive and Natural Interfaces	150
6-2 Better Navigation: ZoomWorld	152
6-3 Icons	168
6-4 Techniques and Help Facilities in Humane Interfaces	174
6-4-1 Cut and Paste	177
6-4-2 Messages to the User	178
6-4-3 Simplified Sign-Ons	183
6-4-4 Time Delays and Keyboard Tricks	184
6-5 Letter from a User	187
SEVEN Interface Issues Outside the User Interface	191
7-1 More Humane Programming Language Environments	192
7-1-1 System and Development Environment	192
7-1-2 Importance of Documentation in Program Creation	194
7-2 Modes and Cables	195
7-3 Ethics and Management of Interface Design	198
EIGHT Conclusion	205
APPENDIX A: <i>The One-Button Mouse History</i>	207
APPENDIX B: <i>SwyftCard Interface Theory of Operation</i>	211
REFERENCES	215
INDEX	221

APPENDIX A

The One-Button Mouse: History and Future

Men loven of propre kynde newefangelnesse.

—Chaucer, “The Squire’s Tale”

I have been variously castigated and applauded for creating the one-button mouse and some of the basic methods for using it. Questions from readers of drafts of this book indicated that they thought that the way the Macintosh worked was the way that earlier mouse-driven systems from Xerox PARC worked and were curious as to the differences. This appendix describes the mouse-based systems that I saw at Xerox Palo Alto Research Center (PARC) when I was a visitor there. The even earlier use of the mouse at Douglas Englebart’s group at the Stanford Research Institute (SRI) was embedded in a system that was decades ahead of its time in many ways and contained valuable ideas that have not yet been widely applied. Englebart’s software, however, was often modal and was sometimes inefficient at the keystroke level.

Few users of modern personal computers remember what you had to go through to make a selection with the PARC system, as exemplified by its most popular text editor, BRAVO. Tapping each of the three mouse buttons on the PARC mice will be denoted by *L*, *M*, and *R* (for left, middle, and right). BRAVO did not use mouse button quasimodes.

To select a character: point to the character, L .

To select a word: point to word, M .

To select an arbitrary string of characters: point to first character, L ; point to last character, R .

To select a string of words: point to first word, M ; point to last word, R .

A typical mistake was using L and then M , which merely restarted the selection at what you thought was going to be the end of the desired selection. This was very frustrating, especially when the selection was large. Notice, however, that you never had to "back out" of a selection; you could always just start a new one without penalty. This was a true advance over most contemporaneous systems, which required that you use ESC or some such to cancel a selection-in-progress before you could start another.

There was an earlier editor developed, but not used much, at PARC (and of which I was unaware at the time) that used click and drag to select text. Using the notation presented in Section 3-1: To select some text, point to the top of the text, $L\downarrow$, point to a lower point in the text, $L\uparrow$. But this idea was not extended to other kinds of selection.

At Apple, I demonstrated how we could use one button for selections more broadly: To select any contiguous area on the screen, whether text or not, point to one corner of the region, $L\downarrow$, and point to the other end, $L\uparrow$. This technique came to be called "click and drag."

Other BRAVO methods were also more complex than the Mac's.

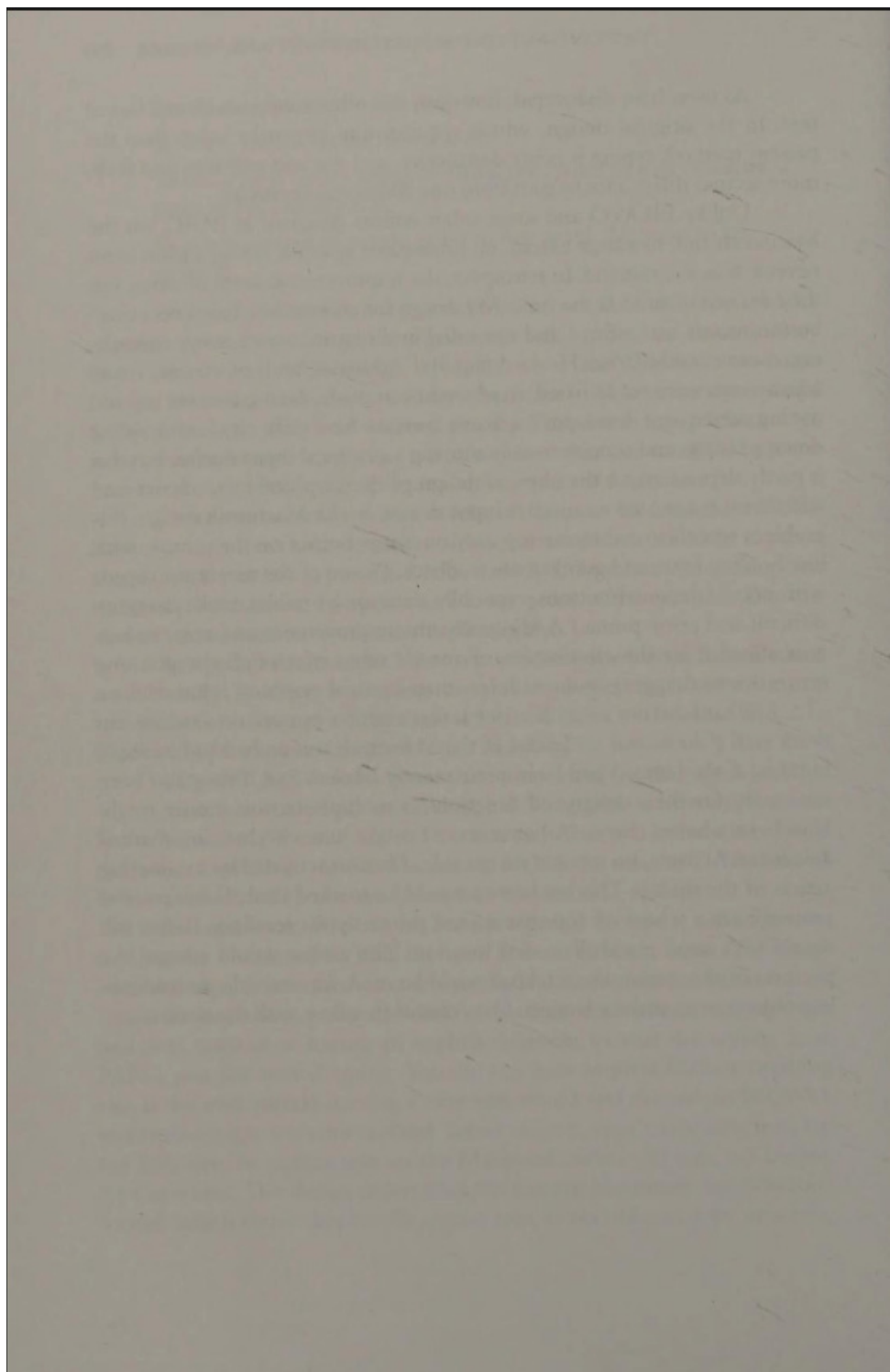
To delete text: Select text and type d . The problem here was that you had to be aware of the existence of a selection before you knew what typing the letter d would do. In the Macintosh, I chose to use the Delete key to delete text both when you are typing and when you are editing.

To insert text: Point to an insertion point, L ; type i ; type the new text, tap the ESC key. The ESC key took you out of insert mode. The Macintosh's design did not have an insert mode, and its method has become universal: To insert text, point and click at the desired insertion point, L ; type new text. Instead of having an explicit delimiter to start the typing, as at PARC, you just started typing. You did not have to press ESC or anything else at the end; merely starting a new task would end the old. In BRAVO, you replaced text with this method: Select old text, type r , type new text, tap the ESC key. To replace text on the Macintosh: select old text, tap Delete, type new text. This design differs from the current Macintosh and Windows model, which seems simpler: To replace text, select old text, type new text.

As users have discovered, however, this often causes accidental loss of text. In the original design, which requires one keystroke more than the present method, typing is never destructive, and the text editor is, and feels, more secure; this is a lot to gain from one additional keystroke.

Unlike BRAVO and some other editors designed at PARC, on the Macintosh and, to a large extent, on subsequent systems, typing a plain letter never acts as a command. In retrospect, the improvements seem obvious, but they did not seem so at the time. My design for an interface based on a one-button mouse was refined and extended in discussions with many coworkers, most notably Brian Howard and Bill Atkinson, and, of course, many adjustments were made based on observations made during user testing and during subsequent development. Some users do have difficulty both holding down a button and simultaneously moving a graphical input device, but this is partly dependent on the physical design of the graphical input device and whether it is a mouse or another input device. In the Macintosh design, this problem was alleviated by having only one large button on the mouse, with low holding force and good tactile feedback. (Some of the recent touchpads with poorly designed buttons, especially those on portables, make dragging difficult and error-prone.) Additionally, the improvement and error reduction afforded by the elimination of modes often outweigh the pointing errors due to dragging, even with less-than-optimal graphical input devices.

What I did not see at the time is that multiple buttons on a mouse can work well *if the buttons are labeled*. If the Macintosh mouse had had multiple buttons, if the buttons had been permanently labeled, and if they had been used only for their designated functions, a multiple-button mouse might have been a better choice. A better mouse might have two buttons, marked Select and Activate, on top and on the side, a button activated by a squeezing action of the thumb. This last button would be marked Grab. Some mice at present have a wheel on top that is used primarily for scrolling. Better still would be a small trackball in that location. The mouse would control the position of the cursor; the trackball could be used, for example, to manipulate objects or to make selections from menus that float with the cursor.



THE HUMANE INTERFACE

"Deep thinking is rare in this field where most companies are glad to copy designs that were great back in the 1970s. *The Humane Interface* is a gourmet dish from a master chef. Five mice!"

—Jakob Nielsen, Nielsen Norman Group
Author of *Designing Web Usability: The Practice of Simplicity*

This unique guide to interactive system design reflects the experience and vision of Jef Raskin, the creator of the Apple Macintosh project. Other books may show how to use today's widgets and interface ideas effectively. Raskin, however, demonstrates that many current interface paradigms are dead ends, and that making computers significantly easier to use requires new approaches. He explains how to effect desperately needed changes, offering a wealth of innovative and specific interface ideas for software designers, developers, and product managers.

The Apple Macintosh helped to introduce a previous revolution in computer interface design, drawing on the best available technology to establish many of the interface techniques and methods now universal in the computer industry. With this book, Raskin proves again both his farsightedness and his practicality. He also demonstrates how design ideas must be built on a scientific basis, presenting just enough cognitive psychology to link the interface of the future to the experimental evidence and to show why that interface will work.

Raskin observes that our honeymoon with digital technology is over: We are tired of having to learn huge, arcane programs to do even the simplest of tasks; we have had our fill of crashing computers; and we are fatigued by the continual pressure to upgrade. *The Humane Interface* delivers a way for computers, information appliances, and other technology-driven products to continue to advance in power and expand their range of applicability, while becoming free of the hassles and obscurities that plague present products.

Jef Raskin (www.jefraskin.com) is a user interface and system design consultant based in Pacifica, California. He invented the Apple Macintosh and the Canon Cat computers. His clients range from start-ups to multinationals such as Hewlett-Packard, IBM, Motorola, NCR, Xerox, Ricoh, Canon, McKesson, and AT&T. Raskin's extensive publications include some 500 articles that have been published in over forty periodicals including *Wired*, *Forbes* ASAP, *IEEE Spectrum*, *IEEE Computer*, *Nature*, *Quantum*, newspapers, and the *Communications of the ACM*. Raskin, who has taught at the University of California, Stanford University, and elsewhere, often leads seminars and has made many radio and TV appearances, as well as speaking at numerous seminars and conferences.

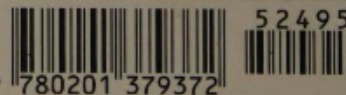
Cover design by Jennifer L. Collins (with Aza Raskin)

The cover illustration was drawn by the author using Ashlar Vellum, a product discussed in the book.



Text printed on recycled paper

ADDISON-WESLEY
Pearson Education



9 780201 379372

5 2 4 9 5

ISBN 0-201-37937-6

\$24.95 US

\$37.50 CANADA