THE PSYCHOLOGY
OF EVERYDAY THINGS

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PREFACE

This is the book I have always wanted to write, but I didn't know it. Over the years I have fumbled my way through life, walking into doors, failing to figure out water faucets, incompetent at working the simple things of everyday life. "Just me," I would mumble. "Just my mechanical ineptitude." But as I studied psychology and watched the behavior of other people, I began to realize that I was not alone. My difficulties were mirrored by the problems of others. And we all seemed to blame ourselves. Could the whole world be mechanically incompetent?

The truth emerged slowly. My research activities led me to the study of human error and industrial accidents. Humans, I discovered, do not always behave clumsily. Humans do not always err. But they do when the things they use are badly conceived and designed. Nonetheless, we still see human error blamed for all that befalls society. Does a commercial airliner crash? "Pilot error," say the reports. Does a Soviet nuclear power plant have a serious problem? "Human error," says the newspaper. Do two ships at sea collide? "Human error" is the official cause. But careful analysis of these kinds of incidents usually gives the lie to such a story. At the famous American nuclear power plant disaster at Three Mile Island, the blame was placed on plant operators who misdiagnosed the problems. But was it human error? Consider the phrase

"operators who misdiagnosed the problems." The phrase reveals that first there were problems—in fact, a series of mechanical failures. Then why wasn't equipment failure the real cause? What about the misdiagnoses? Why didn't the operators correctly determine the cause? Well, how about the fact that the proper instruments were not available, that the plant operators acted in ways that in the past had always been reasonable and proper? How about the pressure relief valve that failed to close, even though the operator pushed the proper button and even though a light came on stating it was closed? Why was the operator blamed for not checking two more instruments (one on the rear of the control panel) and determining that the light was faulty? (Actually, the operator did check one of them.) Human error? To me it sounds like equipment failure coupled with serious design error.

And, yes, what about my inability to use the simple things of everyday life? I can use complicated things. I am quite expert at computers, and electronics, and complex laboratory equipment. Why do I have trouble with doors, light switches, and water faucets? How come I can work a multimillion-dollar computer installation, but not my home refrigerator? While we all blame ourselves, the real culprit—faulty design—goes undetected. And millions of people feel themselves to be mechanically inept. It is time for a change.

Hence this book: POET, *The Psychology of Everyday Things.* POET is an outgrowth of my repeated frustrations with the operation of everyday things and my growing knowledge of how to apply experimental psychology and cognitive science. The combination of experience and knowledge has made POET necessary, at least for me and for my own feeling of ease.

So here it is: part polemic, part science. Part serious, part fun: POET.

Acknowledgments

do), signs that are illegible (and nonintelligible), stovetops that confuse, light switches that defy even the original installer to figure them out. A striking example of all that is wrong with design, lodged in the home of the most knowledgeable of users. A perfect combination to set me off. Of course, my own university and my own laboratory have horrors of their own, as will become all too apparent later in this book.

A major argument in POET is that much of our everyday knowledge resides in the world, not in the head. This is an interesting argument and, for cognitive psychologists, a difficult one. What could it possibly mean for knowledge to be in the world? Knowledge is interpreted, the stuff that can be only in minds. Information, yes, that could be in the world, but knowledge, never. Well, yeah, the distinction between knowledge and information is not clear. If we are sloppy with terms, then perhaps you can see the issues better. People certainly do rely upon the placement and location of objects, upon written texts, upon the information contained within other people, upon the artifacts of society, and upon the information transmitted within and by a culture. There certainly is a lot of information out there in the world, not in the head. My understanding of this point has been strengthened by years of debate and interaction with a very powerful team of people at La Jolla, the Cognitive Social Science Group at the University of California, San Diego. This was a small group of faculty from the departments of psychology, anthropology, and sociology, organized by Mike Cole, who met informally once a week for several years. The primary members were Roy d'Andrade, Aaron Cicourel, Mike Cole, Bud Mehan, George Mandler, Jean Mandler, Dave Rumelhart, and me. Given the peculiar (although typically academic) nature of this group's interaction, they may not wish to acknowledge anything to do with the ideas as they are presented in POET.

And, finally, at the Applied Psychology Unit in England, I met another visiting American professor, David Rubin of Duke University, who was analyzing the recall of epic poetry—those long, huge feats of prodigious memory in which an itinerant poet sings from memory hours of material. Rubin showed me that it wasn't all in memory: much of the information was in the world, or at least in the structure of the tale, the poetics, and the life styles of the people.

My previous research project was on the difficulties of using computers and the methods that might be used to make things easier. But the more I looked at computers (and other demons of our society, such as aircraft systems and nuclear power), the more I realized that there was nothing special about them: they had the same problems as did the

simpler, everyday things. And the everyday things were more pervasive, more of a problem. Especially as people feel guilt when they are unable to use simple things, guilt that should be not theirs but rather *the designers and manufacturers of the objects.*

So it all came together. These ideas, the respite of the sabbatical. My experiences over the years fighting the difficulties of poor design, of equipment that could not be used, of everyday things that seemed foreign to human functioning. The fact that I was asked to give a talk on my work at the APU, which caused me to start writing down my ideas. And finally, Roger Schank's Paris birthday party, where I discovered the works of the artist Carelman and decided it was time to write the book.

Formal Research Support

The actual writing was done at three locations. The work began while I was on sabbatical leave from San Diego. I spent the first half of my sabbatical year at the Applied Psychology Unit in Cambridge, England, and the last half at MCC (the Microelectronics and Computer Technology Corporation) in Austin, Texas. MCC is America's research consortium dedicated to the task of developing computer systems of the future. Officially I was "visiting scientist"; unofficially I was a sort of "minister without portfolio," free to wander and interact with the numerous research programs under way, especially those in the area called "human interface." England is chilly in the winter, Texas hot in the summer. But both provided exactly the proper friendly, supportive environments that I required to do the work. Finally, when I returned to UCSD, I revised the book several more times. I used it in classes and sent copies to a variety of colleagues for suggestions. The comments of my students and readers were invaluable, causing radical revision from the original structure.

People

There is a big difference between early drafts of POET and the final version. Many of my colleagues took the time to read various drafts and give me critical reviews. In particular, I wish to thank Judy Greiss-

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"Kenneth Olsen, the engineer who founded and still runs Digital Equipment Corp., confessed at the annual meeting that he can't figure out how to heat a cup of coffee in the company's microwave oven."[1]

You Would Need an Engineering Degree to Figure This Out

"You would need an engineering degree from MIT to work this," someone once told me, shaking his head in puzzlement over his brand new digital watch. Well, I have an engineering degree from MIT. (Kenneth Olsen has two of them, and he can't figure out a microwave oven.) Give me a few hours and I can figure out the watch. But why should it take hours? I have talked with many people who can't use all the features of their washing machines or cameras, who can't figure out how to work a sewing machine or a video cassette recorder, who habitually turn on the wrong stove burner.

Why do we put up with the frustrations of everyday objects, with objects that we can't figure out how to use, with those neat plastic-wrapped packages that seem impossible to open, with doors that trap people, with washing machines and dryers that have become too con-

1.1 Carelman's Coffeepot for Masochists. The French artist Jacques Carelman in his series of books *Catalogue d'objets introuvables (Catalog of unfindable objects)* provides delightful examples of everyday things that are deliberately unworkable, outrageous, or otherwise ill-formed. Jacques Carelman: "Coffeepot for Masochists." Copyright © 1969–76–80 by Jacques Carelman and A. D. A. G. P. Paris. From Jacques Carelman, *Catalog of Unfindable Objects*, Balland, éditeur, Paris-France. Used by permission of the artist.

fusing to use, with audio-stereo-television-video-cassette-recorders that claim in their advertisements to do everything, but that make it almost impossible to do anything?

The human mind is exquisitely tailored to make sense of the world. Give it the slightest clue and off it goes, providing explanation, rationalization, understanding. Consider the objects—books, radios, kitchen appliances, office machines, and light switches—that make up our everyday lives. Well-designed objects are easy to interpret and understand. They contain visible clues to their operation. Poorly designed objects can be difficult and frustrating to use. They provide no clues—or sometimes false clues. They trap the user and thwart the normal process of interpretation and understanding. Alas, poor design predominates. The result is a world filled with frustration, with objects that cannot be understood, with devices that lead to error. This book is an attempt to change things.

The Frustrations of Everyday Life

If I were placed in the cockpit of a modern jet airliner, my inability to perform gracefully and smoothly would neither surprise nor bother me. But I shouldn't have trouble with doors and switches, water faucets and stoves. "Doors?" I can hear the reader saying, "you have trouble

opening doors?" Yes. I push doors that are meant to be pulled, pull doors that should be pushed, and walk into doors that should be slid. Moreover, I see others having the same troubles—unnecessary troubles. There are psychological principles that can be followed to make these things understandable and usable.

Consider the door. There is not much you can do to a door: you can open it or shut it. Suppose you are in an office building, walking down a corridor. You come to a door. In which direction does it open? Should you pull or push, on the left or the right? Maybe the door slides. If so, in which direction? I have seen doors that slide up into the ceiling. A door poses only two essential questions: In which direction does it move? On which side should one work it? The answers should be given by the design, without any need for words or symbols, certainly without any need for trial and error.

A friend told me of the time he got trapped in the doorway of a post office in a European city. The entrance was an imposing row of perhaps six glass swinging doors, followed immediately by a second, identical row. That's a standard design: it helps reduce the airflow and thus maintain the indoor temperature of the building.

My friend pushed on the side of one of the leftmost pair of outer doors. It swung inward, and he entered the building. Then, before he could get to the next row of doors, he was distracted and turned around for an instant. He didn't realize it at the time, but he had moved slightly to the right. So when he came to the next door and pushed it, nothing happened. "Hmm," he thought, "must be locked." So he pushed the side of the adjacent door. Nothing. Puzzled, my friend decided to go outside again. He turned around and pushed against the side of a door. Nothing. He pushed the adjacent door. Nothing. The door he had just entered no longer worked. He turned around once more and tried the inside doors again. Nothing. Concern, then mild panic. He was trapped! Just then, a group of people on the other side of the entranceway (to my friend's right) passed easily through both sets of doors. My friend hurried over to follow their path.

How could such a thing happen? A swinging door has two sides. One contains the supporting pillar and the hinge, the other is unsupported. To open the door, you must push on the unsupported edge. If you push on the hinge side, nothing happens. In this case, the designer aimed for beauty, not utility. No distracting lines, no visible pillars, no visible hinges. So how can the ordinary user know which side to push

1.2 A Row of Swinging Glass Doors in a Boston Hotel. A similar problem to the doors from that European post office. On which side of the door should you push? When I asked people who had just used the doors, most couldn't say. Yet only a few of the people I watched had trouble with the doors. The designers had incorporated a subtle clue into the design. Note that the horizontal bars are not centered: they are a bit closer together on the sides you should push on. The design almost works—but not entirely, for not everyone used the doors right on the first try.

on? While distracted, my friend had moved toward the (invisible) supporting pillar, so he was pushing the doors on the hinged side. No wonder nothing happened. Pretty doors. Elegant. Probably won a design prize.

The door story illustrates one of the most important principles of design: *visibility.* The correct parts must be visible, and they must convey the correct message. With doors that push, the designer must provide signals that naturally indicate where to push. These need not destroy the aesthetics. Put a vertical plate on the side to be pushed, nothing on the other. Or make the supporting pillars visible. The vertical plate and supporting pillars are *natural* signals, *naturally* interpreted, without any need to be conscious of them. I call the use of natural signals *natural design* and elaborate on the approach throughout this book.

Visibility problems come in many forms. My friend, trapped between the glass doors, suffered from a lack of clues that would indicate what part of a door should be operated. Other problems concern the *mappings* between what you want to do and what appears to be possible, another topic that will be expanded upon throughout the book. Consider one type of slide projector. This projector has a single button to control whether the slide tray moves forward or backward. One button to do two things? What is the mapping? How can you figure out how to control the slides? You can't. Nothing is visible to give the slightest hint. Here is what happened to me in one of the many unfamiliar places I've lectured in during my travels as a professor:

The Leitz slide projector illustrated in figure 1.3 has shown up several times in my travels. The first time, it led to a rather dramatic incident. A conscientious student was in charge of showing my slides. I started my talk and showed the first slide. When I finished with the first slide and asked for the next, the student carefully pushed the control button and watched in dismay as the tray backed up, slid out of the projector and plopped off the table onto the floor, spilling its entire contents. We had to delay the lecture fifteen minutes while I struggled to reorganize the slides. It wasn't the student's fault. It was the fault of the elegant projector. With only one button to control the slide advance, how could one switch from forward to reverse? Neither of us could figure out how to make the control work.

All during the lecture the slides would sometimes go forward, sometimes backward. Afterward, we found the local technician, who explained it to us. A brief push of the button and the slide would go

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Taste (7) für Diawechsel am Gerät

  Diawechsel vorwärts = kurz drücken,

  Diawechsel rückwärts = länger drücken.

Button (7) for changing the slides

  Slide change forward = short press,

  Slide change backward = longer press.

1.3 Leitz Pravodit Slide Projector. I finally tracked down the instruction manual for that projector. A photograph of the projector has its parts numbered. The button for changing slides is number 7. The button itself has no labels. Who could discover this operation without the aid of the manual? Here is the entire text related to the button, in the original German and in my English translation:

forward, a long push and it would reverse. (Pity the conscientious student who kept pushing it hard—and long—to make sure that the switch was making contact.) What an elegant design. Why, it managed to do two functions with only one button! But how was a first-time user of the projector to know this?

As another example, consider the beautiful Amphithéâtre Louis-Laird in the Paris Sorbonne, which is filled with magnificent paintings of great figures in French intellectual history. (The mural on the ceiling shows lots of naked women floating about a man who is valiantly trying to read a book. The painting is right side up only for the lecturer—it is upside down for all the people in the audience.) The room is a delight to lecture in, at least until you ask for the projection screen to be lowered. "Ah," says the professor in charge, who gestures to the technician, who runs out of the room, up a short flight of stairs, and out of sight behind a solid wall. The screen comes down and stops. "No, no," shouts the professor, "a little bit more." The screen comes down again, this time too much. "No, no, no!" the professor jumps up and down and gestures wildly. It's a lovely room, with lovely paintings. But why can't the person who is trying to lower or raise the screen see what he is doing?

New telephone systems have proven to be another excellent example of incomprehensible design. No matter where I travel, I can count upon finding a particularly bad example.

When I visited Basic Books, the publishers of this book, I noticed a new telephone system. I asked people how they liked it. The question unleashed a torrent of abuse. "It doesn't have a hold function," one woman complained bitterly—the same complaint people at my university made about their rather different system. In older days, business phones always had a button labeled "hold." You could push the button and hang up the phone without losing the call on your line. Then you could talk to a colleague, or pick up another telephone call, or even pick up the call at another phone with the same telephone number. A light on the hold button indicated when the function was in use. It was an invaluable tool for business. Why didn't the new phones at Basic Books or in my university have a hold function, if it is so essential? Well, they did, even the very instrument the woman was complaining about. But there was no easy way to discover the fact, nor to learn how to use it.

I was visiting the University of Michigan and I asked about the new