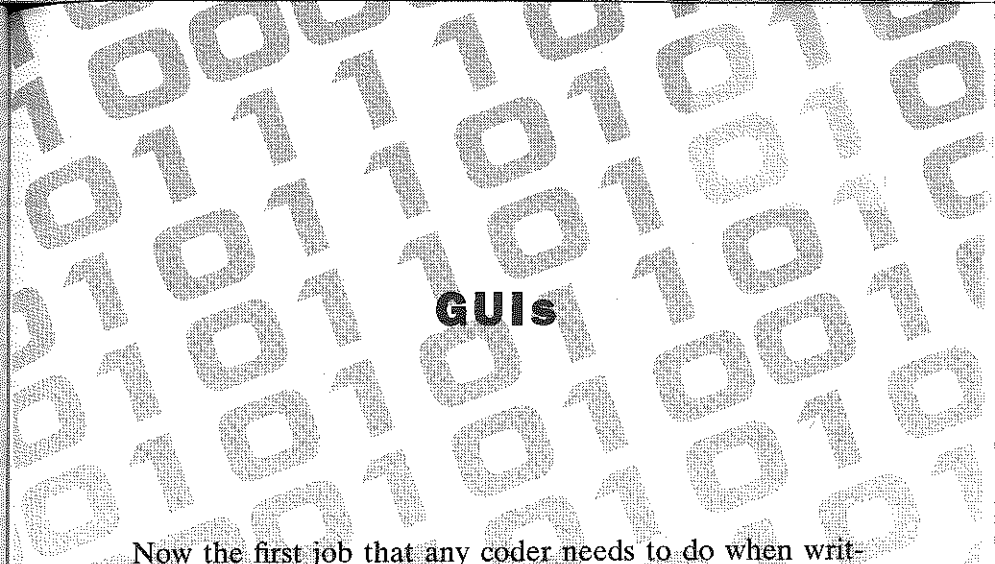
at communicating with a large number of terminals at once. Consequently, it was no longer necessary to use batch processing. Card readers were shoved out into hallways and boiler rooms, and batch processing became a nerds-only kind of thing, and consequently took on a certain eldritch flavor among those of us who even knew it existed. We were all off the batch, and on the command line, interface now—my very first shift in operating system paradigms, if only I'd known it.

A huge stack of accordion-fold paper sat on the floor underneath each one of these glorified teletypes, and miles of paper shuddered through their platens. Almost all of this paper was thrown away or recycled without ever having been touched by ink—an ecological atrocity so glaring that those machines were soon replaced by video terminals—so-called glass teletypes—which were quieter and didn't waste paper. Again, though, from the computer's point of view, these were indistinguishable from World War II–era teletype machines. In effect we still used Victorian technology to communicate with computers until about 1984, when the Macintosh was introduced with its Graphical User Interface. Even after that, the command line continued to exist as an underlying stratum—a sort of brainstem reflex—of many modern computer systems all through the heyday of graphical user interfaces, or GUIs, as I will call them from now on.



GUIs

Now the first job that any coder needs to do when writing a new piece of software is to figure out how to take the information that is being worked with (in a graphics program, an image; in a spreadsheet, a grid of numbers) and turn it into a linear string of bytes. These strings of bytes are commonly called files or (somewhat more hiply) streams. They are to telegrams what modern humans are to Cro-Magnon man, which is to say, the same thing under a different name. All that you see on your computer screen—your Tomb Raider, your digitized voice mail messages, faxes, and word-processing documents written in thirty-seven different typefaces—is still, from the computer's point of view, just like telegrams, except much longer and demanding of more arithmetic.

The quickest way to get a taste of this is to fire up your web browser, visit a site on the Net, and then select the View/Document Source menu item. You will get a bunch of computer code that looks something like this:

```
<HTML>

<HEAD>

<TITLE>C R Y P T O N O M I C O N<TITLE>

</HEAD>

<BODY BGCOLOR="#000000" LINK="#996600" ALINK=
"#FFFFFF" VLINK="#663300">

<MAP NAME="navtext">
  <AREA SHAPE=RECT HREF="praise.html" COORDS="0,37,
84,55">
  <AREA SHAPE=RECT HREF="author.html" COORDS="0,59,
137,75">
  <AREA SHAPE=RECT HREF="text.html" COORDS="0,81,101,
96">
  <AREA SHAPE=RECT HREF="tour.html" COORDS="0,100,
121,117">
  <AREA SHAPE=RECT HREF="order.html" COORDS="0,122,
143,138">
  <AREA SHAPE=RECT HREF="beginning.html" COORDS="0,
140,213,157">

</MAP>

<CENTER>
```



```
<TABLE BORDER="0" CELLPADDING="0" CELLSPACING=
"0" WIDTH="520">

<TR>

  <TD VALIGN=TOP ROWSPAN="5">
  <IMG SRC="images/spacer.gif" WIDTH="30"HEIGHT=
"1" BORDER="0">
  </TD>

  <TD VALIGN=TOP COLSPAN="2">
  <IMG SRC="images/main_banner.gif" ALT="Cryptonom
incon by Neal Stephenson" WIDTH="479" HEIGHT="122"
BORDER="0">
  </TD>

</TR>
```

This crud is called HTML (HyperText Markup Language) and it is basically a very simple programming language instructing your web browser how to draw a page on a screen. Anyone can learn HTML and many people do. The important thing is that no matter what splendid multimedia web pages they might represent, HTML files are just telegrams.

When Ronald Reagan was a radio announcer, he used to call baseball games that he did not physically attend by reading the terse descriptions that trickled in over the telegraph wire and were printed out on a paper tape. He would sit there, all by himself in a padded room with

a microphone, and the paper tape would creep out of the machine and crawl over the palm of his hand printed with cryptic abbreviations. If the count went to three and two, Reagan would describe the scene as he saw it in his mind's eye: "The brawny left-hander steps out of the batter's box to wipe the sweat from his brow. The umpire steps forward to sweep the dirt from home plate," and so on. When the cryptogram on the paper tape announced a base hit, he would whack the edge of the table with a pencil, creating a little sound effect, and describe the arc of the ball as if he could actually see it. His listeners, many of whom presumably thought that Reagan was actually at the ballpark watching the game, would reconstruct the scene in their minds according to his descriptions.

This is exactly how the World Wide Web works: the HTML files are the pithy description on the paper tape, and your web browser is Ronald Reagan. The same is true of graphical user interfaces in general.

So an OS is a stack of metaphors and abstractions that stands between you and the telegrams, and embodying various tricks the programmer used to convert the information you're working with—be it images, e-mail messages, movies, or word-processing documents—into the necklaces of bytes that are the only things computers know how to work with. When we used actual telegraph equipment (teletypes) or their higher-tech substitutes ("glass teletypes," or the MS-DOS command line) to work with our computers, we were very close to the bottom of that stack. When we use most modern operating

systems, though, our interaction with the machine is heavily mediated. Everything we do is interpreted and translated time and again as it works its way down through all of the metaphors and abstractions.

The Macintosh OS was a revolution in both the good and bad senses of that word. Obviously it was true that command line interfaces were not for everyone, and that it would be a good thing to make computers more accessible to a less technical audience—if not for altruistic reasons, then because those sorts of people constituted an incomparably vaster market. It was clear that the Mac's engineers saw a whole new country stretching out before them; you could almost hear them muttering, "Wow! We don't have to be bound by files as linear streams of bytes anymore, *vive la revolution*, let's see how far we can take this!" No command line interface was available on the Macintosh; you talked to it with the mouse, or not at all. This was a statement of sorts, a credential of revolutionary purity. It seemed that the designers of the Mac intended to sweep command line interfaces into the dustbin of history.

My own personal love affair with the Macintosh began in the spring of 1984 in a computer store in Cedar Rapids, Iowa, when a friend of mine—coincidentally, the son of the MGB owner—showed me a Macintosh running MacPaint, the revolutionary drawing program. It ended in July of 1995 when I tried to save a big important file on my Macintosh PowerBook and instead of doing so, it annihilated the data so thoroughly that two different disk crash utility programs were unable to find any trace

that it had ever existed. During the intervening ten years, I had a passion for the MacOS that seemed righteous and reasonable at the time but in retrospect strikes me as being exactly the same sort of goofy infatuation that my friend's dad had with his car.

The introduction of the Mac triggered a sort of holy war in the computer world. Were GUIs a brilliant design innovation that made computers more human-centered and therefore accessible to the masses, leading us toward an unprecedented revolution in human society, or an insulting bit of audiovisual gimcrackery dreamed up by flaky Bay Area hacker types that stripped computers of their power and flexibility and turned the noble and serious work of computing into a childish video game?

This debate actually seems more interesting to me today than it did in the mid-1980s. But people more or less stopped debating it when Microsoft endorsed the idea of GUIs by coming out with the first Windows system. At this point, command-line partisans were relegated to the status of silly old grouches, and a new conflict was touched off: between users of MacOS and users of Windows.*

There was plenty to argue about. The first Macin-

* According to a rigorous, and arguably somewhat old-fashioned, definition of "operating system," Windows 95 and 98 are not operating systems at all, but rather a set of applications that run on MS-DOS, which *is* an operating system. In practice, Windows 95 and 98 are marketed and thought of as OSes and so I will tend to refer to them as such. This nomenclature is technically questionable, politically fraught, and now legally encumbered, but it is best for purposes of this essay, which is chiefly about aesthetic and cultural concerns.

toshes looked different from other PCs even when they were turned off: they consisted of one box containing both CPU (the part of the computer that does arithmetic on bits) and monitor screen. This was billed, at the time, as a philosophical statement of sorts: Apple wanted to make the personal computer into an appliance, like a toaster. But it also reflected the purely technical demands of running a graphical user interface. In a GUI machine, the chips that draw things on the screen have to be integrated with the computer's central processing unit, or CPU, to a far greater extent than is the case with command line interfaces, which until recently didn't even know that they weren't just talking to teletypes.

This distinction was of a technical and abstract nature, but it became clearer when the machine crashed. (It is commonly the case with technologies that you can get the best insight about how they work by watching them fail.) When everything went to hell and the CPU began spewing out random bits, the result, on a CLI machine, was lines and lines of perfectly formed but random characters on the screen—known to cognoscenti as "going Cyrillic." But to the MacOS, the screen was not a teletype but a place to put graphics; the image on the screen was a bitmap, a literal rendering of the contents of a particular portion of the computer's memory. When the computer crashed and wrote gibberish into the bitmap, the result was something that looked vaguely like static on a broken television set—a "snow crash."

And even after the introduction of Windows, the underlying differences endured; when a Windows machine

got into trouble, the old command line interface would fall down over the GUI like an asbestos fire curtain sealing off the proscenium of a burning opera. When a Macintosh got into trouble, it presented you with a cartoon of a bomb, which was funny the first time you saw it.

These were by no means superficial differences. The reversion of Windows to a CLI when it was in distress proved to Mac partisans that Windows was nothing more than a cheap facade, like a garish afghan flung over a rotted-out sofa. They were disturbed and annoyed by the sense that lurking underneath Windows' ostensibly user-friendly interface was—literally—a subtext.

For their part, Windows fans might have made the sour observation that all computers, even Macintoshes, were built on that same subtext, and that the refusal of Mac owners to admit that fact to themselves seemed to signal a willingness, almost an eagerness, to be duped.

Anyway, a Macintosh had to switch individual bits in the memory chips on the video card, and it had to do it very fast and in arbitrarily complicated patterns. Nowadays this is cheap and easy, but in the technological regime that prevailed in the early 1980s, the only realistic way to do it was to build the motherboard (which contained the CPU) and the video system (which contained the memory that was mapped onto the screen) as a tightly integrated whole—hence the single, hermetically sealed case that made the Macintosh so distinctive.

When Windows came out, it was conspicuous for its ugliness, and its current successors, Windows 95, 98, and Windows NT, are not things that people would pay

money to look at either. Microsoft's complete disregard for aesthetics gave all of us Mac-lovers plenty of opportunities to look down our noses at them. That Windows looked an awful lot like a direct ripoff of MacOS gave us a burning sense of moral outrage to go with it. Among people who really knew and appreciated computers (hackers, in Steven Levy's nonpejorative sense of that word), and in a few other niches such as professional musicians, graphic artists, and schoolteachers, the Macintosh, for a while, was simply the computer. It was seen as not only a superb piece of engineering, but an embodiment of certain ideals about the use of technology to benefit mankind, while Windows was seen as both a pathetically clumsy imitation and a sinister world domination plot rolled into one. So, very early, a pattern had been established that endures to this day: people dislike Microsoft, which is okay; but they dislike it for reasons that are poorly considered, and in the end, self-defeating.

THE INTERFACE CULTURE*

A few years ago I walked into a grocery store somewhere and was presented with the following *tableau vivant*: near the entrance a young couple were standing in front of a large cosmetics display. The man was stolidly holding a shopping basket between his hands while his mate raked blister-packs of makeup off the display and piled them in. Since then I've always thought of that man as the personification of an interesting human tendency: not only are we not offended to be dazzled by manufactured images, but we like it. We practically insist on it. We are eager to be complicit in our own dazzlement: to pay money for a theme park ride, vote for a guy who's obviously lying to us, or stand there holding the basket as it's filled up with cosmetics.

I was in Disney World recently, specifically the part

* Apologies for this section title to Steven Johnson, author of *Interface Culture: How New Technology Transforms the Way We Create and Communicate,* Harper San Francisco (1997) and Basic Books (1999).

of it called the Magic Kingdom, walking up Main Street USA. This is a perfect gingerbready Victorian small town that culminates in a Disney castle. It was very crowded; we shuffled rather than walked. Directly in front of me was a man with a camcorder. It was one of the new breed of camcorders where instead of peering through a viewfinder you gaze at a flat-panel color screen about the size of a playing card, which televises live coverage of whatever the camcorder is seeing. He was holding the appliance close to his face, so that it obstructed his view. Rather than go see a real small town for free, he had paid money to see a pretend one, and rather than see it with the naked eye, he was watching it on television.

And rather than stay home and read a book, I was watching him.

Americans' preference for mediated experiences is obvious enough, and I'm not going to keep pounding it into the ground. I'm not even going to make snotty comments about it—after all, I was at Disney World as a paying customer. But it clearly relates to the colossal success of GUIs, and so I have to talk about it some. Disney does mediated experiences better than anyone. If they understood what OSes are, and why people use them, they could crush Microsoft in a year or two.

In the part of Disney World called the Animal Kingdom there is a new attraction called the Maharajah Jungle Trek. It was open for sneak previews when I was there. This is a complete stone-by-stone reproduction of a hypothetical ruin in the jungles of India. According to

its backstory, it was built by a local rajah in the sixteenth century as a game reserve. He would go there with his princely guests to hunt Bengal tigers. As time went on, it fell into disrepair and the tigers and monkeys took it over; eventually, around the time of India's independence, it became a government wildlife reserve, now open to visitors.

The place looks more like what I have just described than any actual building you might find in India. All the stones in the broken walls are weathered as if monsoon rains had been trickling down them for centuries, the paint on the gorgeous murals is flaked and faded just so, and Bengal tigers loll amid stumps of broken columns. Where modern repairs have been made to the ancient structure, they've been done, not as Disney's engineers would do them, but as thrifty Indian janitors would—with hunks of bamboo and rust-spotted hunks of rebar. The rust is painted on, of course, and protected from real rust by a plastic clear-coat, but you can't tell unless you get down on your knees.

In one place you walk along a stone wall with a series of old pitted friezes carved into it. One end of the wall has broken off and settled into the earth, perhaps because of some long-forgotten earthquake, and so a broad jagged crack runs across a panel or two, but the story is still readable: first, primordial chaos leads to a flourishing of many animal species. Next, we see the Tree of Life surrounded by diverse animals. This is an obvious allusion (or, in showbiz lingo, a tie-in) to the gigantic Tree of Life that dominates the center of Disney's Animal

Kingdom just as the Castle dominates the Magic Kingdom or the Sphere does Epcot. But it's rendered in historically correct style and could probably fool anyone who didn't have a Ph.D. in Indian art history.

The next panel shows a mustachioed H. sapiens chopping down the Tree of Life with a scimitar, and the animals fleeing every which way. The one after that shows the misguided human getting walloped by a tidal wave, part of a latter-day Deluge presumably brought on by his stupidity.

The final panel, then, portrays the Sapling of Life beginning to grow back, but now Man has ditched the edged weapon and joined the other animals in standing around to adore and praise it.

It is, in other words, a prophecy of the Bottleneck: the scenario, commonly espoused among modern-day environmentalists, that the world faces an upcoming period of grave ecological tribulations that will last for a few decades or centuries and end when we find a new harmonious modus vivendi with Nature.

Taken as a whole the frieze is a pretty brilliant piece of work. Obviously it's not an ancient Indian ruin, and some person or people now living deserve credit for it. But there are no signatures on the Maharajah's game reserve at Disney World. There are no signatures on anything, because it would ruin the whole effect to have long strings of production credits dangling from every custom-worn brick, as they do from Hollywood movies.

Among Hollywood writers, Disney has the reputation of being a real wicked stepmother. It's not hard to see

why. Disney is in the business of putting out a product of seamless illusion—a magic mirror that reflects the world back better than it really is. But a writer is literally talking to his or her readers, not just creating an ambience or presenting them with something to look at. Just as the command line interface opens a much more direct and explicit channel from user to machine than the GUI, so it is with words, writer, and reader.

The word, in the end, is the only system of encoding thoughts—the only medium—that is not fungible, that refuses to dissolve in the devouring torrent of electronic media. (The richer tourists at Disney World wear t-shirts printed with the names of famous designers, because designs themselves can be bootlegged easily and with impunity. The only way to make clothing that cannot be legally bootlegged is to print copyrighted and trademarked words on it; once you have taken that step, the clothing itself doesn't really matter, and so a t-shirt is as good as anything else. T-shirts with expensive words on them are now the insignia of the upper class. T-shirts with cheap words, or no words at all, are for the commoners.)

But this special quality of words and of written communication would have the same effect on Disney's product as spray-painted graffiti on a magic mirror. So Disney does most of its communication without resorting to words, and for the most part, the words aren't missed. Some of Disney's older properties, such as Peter Pan, Winnie the Pooh, and Alice in Wonderland, came out of books. But the authors' names are rarely if ever mentioned, and you can't buy the original books at the Disney store. If you could, they would all seem old and queer, like very bad knockoffs of the purer, more authentic Disney versions. Compared to more recent productions like *Beauty and the Beast* and *Mulan*, the Disney movies based on these books (particularly *Alice in Wonderland* and *Peter Pan*) seem deeply bizarre, and not wholly appropriate for children. That stands to reason, because Lewis Carroll and J. M. Barrie were very strange men, and such is the nature of the written word that their personal strangeness shines straight through all the layers of Disneyfication like X-rays through a wall. Probably for this very reason, Disney seems to have stopped buying rights to books altogether, and now finds its themes and characters in folk tales, which have the lapidary, timeworn quality of the ancient bricks in the Maharajah's ruins.

If I can risk a broad generalization, most of the people who go to Disney World have zero interest in absorbing new ideas from books. This sounds snide, but listen: they have no qualms about being presented with ideas in other forms. Disney World is stuffed with environmental messages now, and the guides at Animal Kingdom can talk your ear off about biology.

If you followed those tourists home, you might find art, but it would be the sort of unsigned folk art that's for sale in Disney World's African- and Asian-themed stores. In general they only seem comfortable with media that have been ratified by great age, massive popular acceptance, or both. In this world, artists are like the

anonymous, illiterate stone carvers who built the great cathedrals of Europe and then faded away into unmarked graves in the churchyard. The cathedral as a whole is awesome and stirring in spite, and possibly because, of the fact that we have no idea who built it. When we walk through it, we are communing not with individual stone carvers but with an entire culture.

Disney World works the same way. If you are an intellectual type, a reader or writer of books, the nicest thing you can say about this is that the execution is superb. But it's easy to find the whole environment a little creepy, because something is missing: the translation of all its content into clear explicit written words, the attribution of the ideas to specific people. You can't argue with it. It seems as if a hell of a lot might be being glossed over, as if Disney World might be putting one over on us, and possibly getting away with all kinds of buried assumptions and muddled thinking.

And this is precisely the same as what is lost in the transition from the command line interface to the GUI.

Disney and Apple/Microsoft are in the same business: short-circuiting laborious, explicit verbal communication with expensively designed interfaces. Disney is a sort of user interface unto itself—and more than just graphical. Let's call it a Sensorial Interface. It can be applied to anything in the world, real or imagined, albeit at staggering expense.

Why are we rejecting explicit word-based interfaces, and embracing graphical or sensorial ones—a trend that accounts for the success of both Microsoft and Disney?

Part of it is simply that the world is very complicated now—much more complicated than the hunter-gatherer world that our brains evolved to cope with—and we simply can't handle all of the details. We have to delegate. We have no choice but to trust some nameless artist at Disney or programmer at Apple or Microsoft to make a few choices for us, close off some options, and give us a conveniently packaged executive summary.

But more importantly, it comes out of the fact that during this century, intellectualism failed, and everyone knows it. In places like Russia and Germany, the common people agreed to loosen their grip on traditional folkways, mores, and religion, and let the intellectuals run with the ball, and they screwed everything up and turned the century into an abattoir. Those wordy intellectuals used to be merely tedious; now they seem kind of dangerous as well.

We Americans are the only ones who didn't get creamed at some point during all of this. We are free and prosperous because we have inherited political and value systems fabricated by a particular set of eighteenth-century intellectuals who happened to get it right. But we have lost touch with those intellectuals, and with anything like intellectualism, even to the point of not reading books anymore, though we are literate. We seem much more comfortable with propagating those values to future generations nonverbally, through a process of being steeped in media. Apparently this actually works to some degree, for police in many lands are now complaining that local arrestees are insisting on having their Miranda rights read to them, just

like perps in American TV cop shows. When it's explained to them that they are in a different country, where those rights do not exist, they become outraged. *Starsky and Hutch* reruns, dubbed into diverse languages, may turn out, in the long run, to be a greater force for human rights than the Declaration of Independence.

The written word is unique among media in that it is a digital medium that humans can, nonetheless, easily read and write. Humans are conversant in many media (music, dance, painting), but all of them are analog except for the written word, which is naturally expressed in digital form (i.e. it is a series of discrete symbols—every letter in every book is a member of a certain character set, every "a" is the same as every other "a," and so on). As any communications engineer can tell you, digital signals are much better to work with than analog ones because they are easily copied, transmitted, and error-checked. Unlike analog signals, they are not doomed to degradation over time and distance. That is why digital compact disks replaced analog LPs, for example. The digital nature of the written word confers on it exceptional stability, which is why it is the vehicle of choice for extremely important concepts like the Ten Commandments, the Koran, and the Bill of Rights. This is generally thought to be a rather good idea. But the messages conveyed by modern audiovisual media cannot be pegged to any fixed, written set of precepts in that way and consequently they are free to wander all over the place and possibly dump loads of crap into people's minds.

Orlando used to have a military installation called McCoy Air Force Base, with long runways from which B-52s could

take off and reach Cuba, or just about anywhere else, with loads of nukes. But now McCoy has been scrapped and repurposed. It has been absorbed into Orlando's civilian airport. The long runways are being used to land 747-loads of tourists from Brazil, Italy, Russia, and Japan, so that they can come to Disney World and steep in our media for a while.

To traditional cultures, especially word-based ones such as Islam, this is infinitely more threatening than the B-52s ever were. It is obvious, to everyone outside of the United States, that our arch-buzzwords—multiculturalism and diversity—are false fronts that are being used (in many cases unwittingly) to conceal a global trend to eradicate cultural differences. The basic tenet of multiculturalism (or "honoring diversity" or whatever you want to call it) is that people need to stop judging each other—to stop asserting (and, eventually, to stop believing) that this is right and that is wrong, this true and that false, one thing ugly and another thing beautiful, that God exists and has this or that set of qualities.

The lesson most people are taking home from the twentieth century is that, in order for a large number of different cultures to coexist peacefully on the globe (or even in a neighborhood) it is necessary for people to suspend judgment in this way. Hence (I would argue) our suspicion of, and hostility toward, all authority figures in modern culture. As David Foster Wallace has explained in his essay "E Unibus Pluram," this is the fundamental message of television; it is the message that people absorb, anyway, after they have steeped in our media long enough. It's not expressed in these highfalu-

tin terms, of course. It comes through as the presumption that all authority figures—teachers, generals, cops, ministers, politicians—are hypocritical buffoons, and that hip jaded coolness is the only way to be.

The problem is that once you have done away with the ability to make judgments as to right and wrong, true and false, etc., there's no real culture left. All that remains is clog dancing and macrame. The ability to make judgments, to believe things, is the entire point of having a culture. I think this is why guys with machine guns sometimes pop up in places like Luxor and begin pumping bullets into Westerners. They perfectly understand the lesson of McCoy Air Force Base. When their sons come home wearing Chicago Bulls caps with the bills turned sideways, the dads go out of their minds.

The global anticulture that has been conveyed into every cranny of the world by television is a culture unto itself, and by the standards of great and ancient cultures like Islam and France, it seems grossly inferior, at least at first. The only good thing you can say about it is that it makes world wars and Holocausts less likely—and that is actually a pretty good thing!

The only real problem is that anyone who has no culture, other than this global monoculture, is completely screwed. Anyone who grows up watching TV, never sees any religion or philosophy, is raised in an atmosphere of moral relativism, learns about civics from watching bimbo eruptions on network TV news, and attends a university where postmodernists vie to outdo each other in demolishing traditional notions of truth and quality,

is going to come out into the world as one pretty feckless human being. And—again—perhaps the goal of all this is to make us feckless so we won't nuke each other.

On the other hand, if you are raised within some specific culture, you end up with a basic set of tools that you can use to think about and understand the world. You might use those tools to reject the culture you were raised in, but at least you've got some tools.

In this country, the people who run things—who populate major law firms and corporate boards—understand all of this at some level. They pay lip service to multiculturalism and diversity and nonjudgmentalness, but they don't raise their own children that way. I have highly educated, technically sophisticated friends who have moved to small towns in Iowa to live and raise their children, and there are Hasidic Jewish enclaves in New York where large numbers of kids are being brought up according to traditional beliefs. Any suburban community might be thought of as a place where people who hold certain (mostly implicit) beliefs go to live among others who think the same way.

And not only do these people feel some responsibility to their own children, but to the country as a whole. Some of the upper class are vile and cynical, of course, but many spend at least part of their time fretting about what direction the country is going in and what responsibilities they have. And so issues that are important to book-reading intellectuals, such as global environmental collapse, eventually percolate through the porous buffer of mass culture and show up as ancient Hindu ruins in Orlando.

You may be asking: what the hell does all this have to do with operating systems? As I've explained, there is no way to explain the domination of the OS market by Apple/Microsoft without looking to cultural explanations, and so I can't get anywhere, in this essay, without first letting you know where I'm coming from vis-à-vis contemporary culture.

Contemporary culture is a two-tiered system, like the Morlocks and the Eloi in H. G. Wells's *The Time Machine,* except that it's been turned upside down. In *The Time Machine,* the Eloi were an effete upper class, supported by lots of subterranean Morlocks who kept the technological wheels turning. But in our world it's the other way round. The Morlocks are in the minority, and they are running the show, because they understand how everything works. The much more numerous Eloi learn everything they know from being steeped from birth in electronic media directed and controlled by book-reading Morlocks. That many ignorant people could be dangerous if they got pointed in the wrong direction, and so we've evolved a popular culture that is (a) almost unbelievably infectious, and (b) neuters every person who gets infected by it, by rendering them unwilling to make judgments and incapable of taking stands.

Morlocks, who have the energy and intelligence to comprehend details, go out and master complex subjects and produce Disney-like Sensorial Interfaces so that Eloi can get the gist without having to strain their minds or endure boredom. Those Morlocks will go to India and tediously explore a hundred ruins, then come home and build

sanitary bug-free versions: highlight films, as it were. This costs a lot, because Morlocks insist on good coffee and first-class airline tickets, but that's no problem, because Eloi like to be dazzled and will gladly pay for it all.

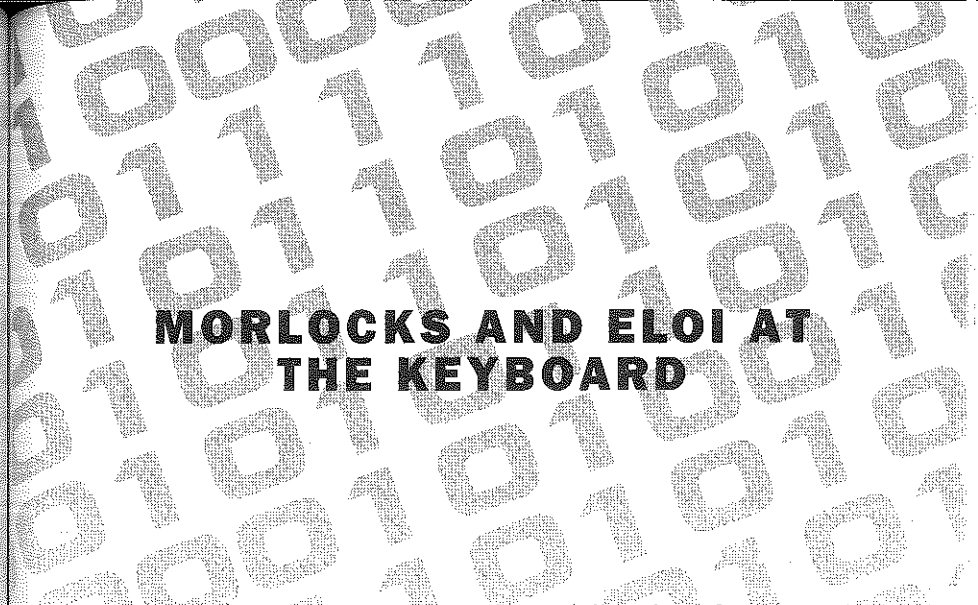
Now I realize that most of this probably sounds snide and bitter to the point of absurdity: your basic snotty intellectual throwing a tantrum about those unlettered philistines. As if I were a self-styled Moses, coming down from the mountain all alone, carrying the stone tablets bearing the Ten Commandments carved in immutable stone—the original command line interface—and blowing his stack at the weak, unenlightened Hebrews worshipping images. Not only that, but it sounds like I'm pumping some sort of conspiracy theory.

But that is not where I'm going with this. The situation I describe here could be bad, but doesn't have to be bad and isn't necessarily bad now.

It simply is the case that we are way too busy, nowadays, to comprehend everything in detail. And it's better to comprehend it dimly, through an interface, than not at all. Better for ten million Eloi to go on the Kilimanjaro Safari at Disney World than for a thousand cardiovascular surgeons and mutual fund managers to go on "real" ones in Kenya. The boundary between these two classes is more porous than I've made it sound. I'm always running into regular dudes—construction workers, auto mechanics, taxi drivers, galoots in general—who were largely aliterate until something made it necessary for them to become readers and start actually thinking about things. Perhaps they had to come to grips with

alcoholism, perhaps they got sent to jail, or came down with a disease, or suffered a crisis in religious faith, or simply got bored. Such people can get up to speed on particular subjects quite rapidly. Sometimes their lack of a broad education makes them overapt to go off on intellectual wild-goose chases, but hey, at least a wild-goose chase gives you some exercise. The spectre of a polity controlled by the fads and whims of voters who actually believe that there are significant differences between Bud Lite and Miller Lite, and who think that professional wrestling is for real, is naturally alarming to people who don't. But then countries controlled via the command line interface, as it were, by double-domed intellectuals, be they religious or secular, are generally miserable places to live.

Sophisticated people deride Disneyesque entertainments as pat and saccharine, but if the result of that is to instill basically warm and sympathetic reflexes, at a preverbal level, into hundreds of millions of unlettered media-steepers, then how bad can it be? We killed a lobster in our kitchen last night and my daughter cried for an hour. The Japanese, who used to be just about the fiercest people on earth, have become infatuated with cuddly, adorable cartoon characters. My own family—the people I know best—is divided about evenly between people who will probably read this essay and people who almost certainly won't, and I can't say for sure that one group is necessarily warmer, happier, or better-adjusted than the other.



MORLOCKS AND ELOI AT THE KEYBOARD

Back in the days of the command line interface, users were all Morlocks who had to convert their thoughts into alphanumeric symbols and type them in, a grindingly tedious process that stripped away all ambiguity, laid bare all hidden assumptions, and cruelly punished laziness and imprecision. Then the interface-makers went to work on their GUIs and introduced a new semiotic layer between people and machines. People who use such systems have abdicated the responsibility, and surrendered the power, of sending bits directly to the chip that's doing the arithmetic, and handed that responsibility and power over to the OS. This is tempting, because giving clear instructions, to anyone or anything, is difficult. We cannot do it without thinking, and depending on the complexity of the situation, we may have to think hard about abstract things, and consider any number of ramifications, in order to do a good job of it. For most of us, this is hard work. We want things to be easier. How badly we want it can be measured by the size of Bill Gates's fortune.