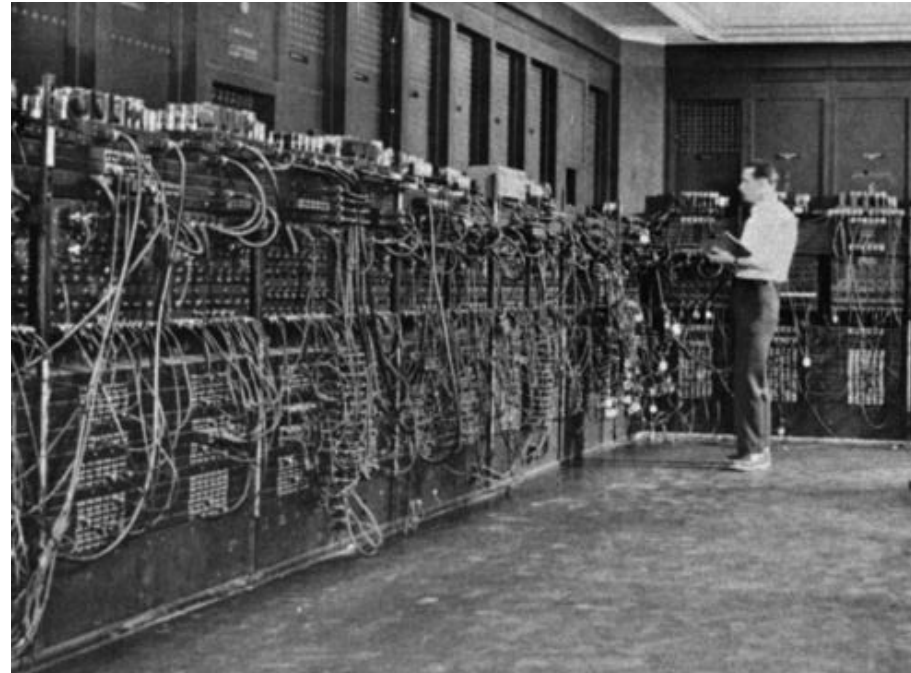


# MISSION IMPOSSIBLE.IT



*photo of ENIAC computer ca 1945*

Stan Yack



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Your Reporter recently met up with someone who not only knows computers well but is articulate enough to discuss them - a talent which in my experience few software or hardware humans possess. Stan Yack is interesting enough with his cryptic comments about today's technological explosion to warrant an interview, but it is his analysis of the human part of that equation which convinces me that here was a worthy heir to McLuhan - someone who wants communication tools to remain that and not acquire mythical dimensions. So journey with us into a land oft feared, that of Computers - but this time, with a knowledgeable guide.

## Mission Impossible: IT



*“It has come to our attention that modern information technology tools have become so unwieldy that their misuse poses a threat to the survival of the global economic system.*

*“Your mission, Stan, should you decide to accept it, is to reduce the anxiety of computer users, and the uncritical use of defective tools, by publishing a document that debunks some common myths about computers.*

*“As usual, should anyone on your team be killed or captured, or should your efforts be lampooned or ignored, the agency will disavow any knowledge of your existence.*

*“This message will self-destruct on your next computer crash ...”*

*Why did the message come to you, Stan?*

Because I was ready! My life seems to be dominated by defective computers. I recently entered the phrase “computer bug” into the Google Internet search engine, and found over one hundred and fifty thousand web pages. The first of those showed a [picture of a moth](#), which in 1945 was found in an early computer, the Mark II Aiken Relay Calculator. The Mark II operators at Harvard University later claimed that was the first case of an actual bug being found inside a computer, and said that by removing the moth they had “debugged” the computer. But it was much earlier, in 1889 that [Thomas Edison](#) first invoked the image of a troublesome insect hiding inside a mechanical device when he reported that he had “worked for two days on a bug in my phonograph”.

I was born two years after the first real computer bug was found at Harvard. My relationship with computers began in 1963, when my high school math class spent one day at the University of Waterloo. There we learned how to create computer programs by marking magnetic circles on cards. I was doing pretty well until the point on my special pencil broke; I blamed myself for pressing too hard.

*So, are computer failures caused by computer users?*

No way! That broken pencil should have alerted me to the untruth of that myth. I've often heard people say that it's their own fault that they can't use their computer very well. And that does seem to be a logical conclusion, because when something goes wrong with a modern computer tool, there will always be some recent user action whose correlation with the failure makes that action the most obvious probable cause. But the root causes of many computer failures are far less obvious, having technical



explanations intelligible only to those schooled in the arcane digital arts. In fact, when a computer system goes wrong it's hardly ever your fault.

In my many years of using computers, my broken pencil was followed by more than a few failures, including unreadable diskettes, crashed hard drives, invalid page faults, unavailable domain name servers, ... I've long stopped believing that those computers failures were my fault.

Most of the computer-using community has matured with me, and few experienced users today assume that if a computer system doesn't work right, it's probably their own fault. But the myth of computer infallibility still causes distress for many users, especially for novices.

Have you ever experienced inexplicable computer behaviour, maybe even a failure that required you to restart an application or reboot your system? If you have, the millions of "computer bug" Web pages listed by Google show that you are not alone. When you do encounter machine misbehaviour, you can take comfort in the fact that using a computer in a reasonable way can never be labeled a user error. When some normal action on your part (like opening a window or clicking on a hyperlink) is followed by a "crash", your action cannot be identified as the cause.

I say that it's usually not even your fault when you can't figure out how to get your computer to do what you want it to do. Maybe you're browsing an Internet website, and you find the text too small to be read without a magnifying glass. Captain Picard on the bridge of the star ship Enterprise would just say "Computer, increase font size!" But in the real world, your computer isn't listening, so you'll have to select some menu item, or type some numbers, or select an icon in a palette, or drag a control, or click a button ...

To answer your simple question "How do I increase the font size?" it seems logical to turn to the browser's online help. But for a modern, sophisticated application like a web browser or a word processor the quantity of Help verbiage is enormous, and the Help system's tools for narrowing your search often don't produce the answer you need. So you may turn to the paper documentation (if there is any), or to the Internet, or to your friends and colleagues, or in desperation to your young nephew the computer nerd.

Or you may just give up and squint at the small type. But if you persevere, and you discover what action to take, even then the computer may not respond the way you expect. You may take a scientific approach, vary your request a little and try again; but often the computer still won't behave properly. If you're really persistent you may try another variation, and another, and another ... and sometimes the cursed thing will just lock up and stop responding entirely! When that happens, take a deep breath and purge yourself of paranoid fantasies. Take my word that there's no mind inside the computer conspiring against you! (I can tell you more about that later.)

[Alan Cooper](#) is the designer of a revolutionary computer application construction tool called [Visual Basic](#). In [The Inmates Are Running The Asylum](#), he belittled some software as "dancing bearware – brought in from the wild not when it dances well, but as soon as it can dance at all". Cooper said that software is often hard to use because programmers and engineers design computer interfaces for programmers and engineers, not for ordinary users.

Don't let yourself be boggled by technical gibberish. Error messages like "illegal instruction" or "invalid page fault" or "memory leak" were created to assist software diagnosticians fluent in computer dialects. Presentation of such incomprehensible messages to users is symptomatic of a software manufacturer's improper design, or bad implementation, or inadequate testing – or all three.



*Nice to know it's not my fault. Computers can be pretty intimidating!*

No one can deny that by using computers humans have been able to do some amazing things. We've shrunk the planet with a world-wide communication network; we've watched movies of a flight over the canyons of Mars; we've seen blood flowing inside our own hearts; a few of us have even golfed on the moon.

And computers do keep getting faster and roomier. For about twenty years now, "[Moore's law](#)" has held true, as every two or three years we've seen a tenfold improvement in computer capacity and speed.

But factual reports of quantitative progress sometimes slip into science fiction speculation, as, for example, with weather.


*So it's true? Computers can accurately forecast the weather?*

It's true that computers can forecast today's weather accurately, at least most of the time. But be prepared to be surprised by rain or snow tomorrow, and [don't expect any certainty](#) in the forecast for the week after next. To predict the weather at your outdoor wedding reception Saturday afternoon six months from now ... you might as well use astrology, numerology, or pyromancy.

The myth of accurate, long-term weather forecasting using more powerful computers has been categorically refuted. We know that the accurate prediction of the future state of a "[chaotic](#)" system like the weather is not just a time-consuming computation problem; it's a [theoretical impossibility](#). The behavior of such "dynamical" systems (the scientific objects studied by "chaos theory") is inherently unpredictable, because a [dynamical system](#) will exhibit "sensitive dependence on initial conditions". That's been called the "[butterfly effect](#)", a metaphor for the fact that an unobservable small change

(like a tiny wisp of air moved aside by a butterfly's wings) can have an enormous effect (like a hurricane's path shifting several hundred miles).

The unpredictability of the future state of a dynamical system means that a computer accurately forecasting next month's weather (never mind next year's) is no more conceivable than a computer squaring the circle, or flying faster than the speed of light.

 *And what about those Star Trek computers that can follow spoken instructions? I know right now it's projection, but someday won't computers be able to understand natural languages?*

A "natural" language is what people use to communicate with each other, like English, French, Mandarin, Swahili. A "formal" language is what we use to pass on instructions to a computer, like COBOL, FORTRAN, Java, C++. Natural language understanding is what I hope you're experiencing right now: making sense of this essay. As children, all normal human beings learn to speak and understand their native languages. But no computer has ever matched that accomplishment.

In the 1960s, computer scientist and educator Joseph Weizenbaum wrote and released a computer program called [ELIZA](#) that dispensed pre-packaged advice. In responses to its human correspondents' typing, ELIZA generated apparently pertinent feedback by scanning the input text for trigger words and regurgitating canned questions and comments modeled after those of a Rogerian psychotherapist. When it found the word "mother" in the human's input, it might respond with the question "Did you have a happy childhood?", but in no sense did ELIZA "understand" either the symptoms of its patients or the "wisdom" of its diagnoses. The ELIZA computer program just performed some simple syntactic manipulations, feigning



understanding by matching input text to table entries that someone had decided were reasonable responses.

Weizenbaum knew full well that his computer program was hopelessly unprepared to master the complexities of natural language. He called ELIZA a “[parody of a psychotherapist](#)”, and said that he wrote that program in part to expose the myth of computer understanding of natural language. But he wasn’t prepared for the reaction of his test subjects, as credulous members of his MIT academic community (computer scientists excluded) huddled over their teletypes, conducting what they believed were intimate conversations with a wise computerized therapist.

 *All right, but don’t computers have artificial intelligence?*


Computers far exceed the human ability to calculate, to store and retrieve information, and to quickly and reliably respond to stimuli in simple ways. Computer programs have also been written to solve complex, “knowledge-based” problems in fields as diverse as mineralogy, drug interactions, and chess. But computers are not “intelligent”.

For several years there have been contests at universities like MIT & CALTECH where computer programs are presented which seek to pass a limited version of the “[Turing test](#)” for computer intelligence. The contestant programs exchange email messages with human examiners in an attempt to fool them into judging that the computer correspondents are human.

The computer programs are much better at doing that when the dialogues are restricted in content to specific limited domains of discourse, like places to eat Sushi in Manhattan, or references to trees in 19th century English poetry, or World Series baseball records. But

that’s not what Alan Turing had in mind when he invented his test in 1950. As a measure of its intelligence Turing proposed testing a computer for total “natural language understanding”, and that can only be exhibited when the conversation is not limited.

Turing knew that in real human dialogues, there are **never** predefined domains. A human dialogue might range anywhere over the whole of human existence or beyond: a discussion of computer architecture leading to chess playing programs, leading to Bobby Fisher, leading to world politics, leading to political philosophy. To determine the best frame of reference to bracket a discussion, humans solve without apparent effort what cognitive scientists call the “[frame problem](#)“, which is something no computer has ever done. Sure, there are some useful computerized language tools, like programs to assist human experts in the translation of technical documents, and programs that perform single-speaker voice-to-text transcription. But there are no computerized tools that have demonstrated natural language understanding at even the level of the average three-year-old child.

 You can buy an inexpensive, computerized toy that will beat you at checkers, or scrabble, or chess (if you’re a grandmaster, you’ll have to pay a bit more), but for no amount of money can you buy a computerized assistant that can follow instructions like these:

“Find me my ... you know, that hi-tech audio thingamajig I got from that nerdy guy in accounting that I met at the chief’s 2005 Super Bowl party.”

Any executive assistant could easily handle that request, and probably wouldn’t consider it to be much of an intellectual challenge. But there is no computer anywhere on this planet that can do it. In fact, humans have not yet built a computer that can match the intelligence of the average two-year-old child, never mind that of a mature adult. And there are many things that even a one-year-old can do that a computer



can't, like recognize his mother's voice in a noisy room, and know when he's being ignored.

Artificial intelligence ("AI") has been a science fiction staple for many years, from Karel Capek's automats to Star Trek's all-knowing but unfeeling android Data. But in the real world, computers are just not as smart as people. Will they ever be? Well, maybe. But I'll go out on a limb and predict that they won't. I bet that's got you itching to remind me about some famous nay-sayers of human progress, to tell me how history has laughed at predictions that "<technology> will never <do something>".

Well, I have heard about [many of those predictions](#), such as "radio has no future" (Lord Kelvin) and "man will never fly" (too many forecasters to list here). And about my claim that there'll never be computers smarter than humans, I know that many respected computer science experts predict that we will eventually build our intellectual betters. So I do have to admit that it's possible the day will come when opinions like mine are condemned as bigoted, pre-enlightenment "human race-ism". But I also know that there are some things that science and mathematics have shown to be impossible even in theory (like dividing by zero), and that it's been proved it's mathematically necessary for a logical system of any complexity to be [incomplete](#). The incompleteness of a computer's algorithms (which is unavoidable because they are part of a logical system) is something that has led me to conclude that a "thinking computer" is not possible.

*But -*

- Yes, yes! This is only my opinion! And yes, as a negative prediction it can never be proven, only refuted. But one fact is clearly true: the day of intelligent computers has not yet arrived. The pro-AI and anti-AI debaters all make use of sophisticated computer applications

to research and broadcast their opinions, but no matter how much Googling you do, you won't find any computer intelligences contributing to the debate. (Two of the most famous human debaters are "pro" [Marvin Minsky](#) and "anti" [Roger Penrose](#).)

*Well, I think our readers know your opinion now about the possibility of computers replacing us. But surely, you must at least concede that computers make us more productive?*

I do admit that computers help us to do some things very much faster, and that they have let us do things that we couldn't do before, some of which we did not even imagine. But do computers actually make us more productive?

When everything works as it's supposed to ... wow! I can use powerful computerized tools to review and edit documents, music, pictures, movies. I can find information on almost any topic by typing a few words into an Internet search engine. In fact, I performed all of the research for this essay using those tools, without ever leaving my office (except to get parts to repair my computer).

I recently bought a new Internet router with wireless capability, and it was installed and working with less than half an hour's work. The next day, my wife's new notebook computer was delivered, and twenty minutes after taking it out of the box she had it connected to the Net through the new router and downloading her email from work. Pretty impressive! But computer tools are not always so trouble-free.

In order to accomplish a task as easy to request as "download my new email messages", many components in an enormously complex world-wide network of hardware and software must operate correctly. Those systems do usually work; but their complexity and volatility



contribute to their “brittleness”, and failures can manifest symptoms whose cure sometime seems beyond human ability (at least of this human).


Just a week before my wife’s amazing success connecting her wireless notebook to the Internet, I had an encounter with a “simple” software change that didn’t go nearly as smoothly.

The trouble began after I had finally gotten fed up with various Windows 98 shortcomings (don’t ask!) and I’d decided to upgrade to Windows XP Pro (as all my techie friends had been telling me to do for some time). I plugged in the XP Pro installation CD, and in just over an hour the upgrade was complete ... but the upgraded PC could no longer access the Internet. Well, I’m no newbie; I knew what to do next: I powered devices off and back on again, replugged and swapped cables, changed control panel settings, reinstalled software ... but none of that helped. The newly-installed Windows XP Pro software just wouldn’t connect to the Internet, even though it was using the same hardware through which Windows 98 had connected just an hour before.

For a couple of days I accessed the Internet using my older, Windows 95 backup system, but I quickly got fed up with the poorer performance of that slower computer. So I “uninstalled” XP Pro (kudos to Microsoft for providing an uninstaller) on my faster main computer, and back to Windows 98 it could again connect to the Internet. But I was still committed to dumping Windows 98 (again, don’t ask), and I wanted to resolve the problem of XP Pro not connecting to the Net.

I spent hours and hours searching the Internet for clues, talking to my many technical contacts, and stewing in vendors’ telephone voice jails. After a week I had the answer: buy and install a new hard disk, and perform a “clean” install of XP Pro instead of an upgrade to

Windows 98. And that worked. The cleanly installed XP Pro system connected to the Internet right away. But after I’d installed a virgin XP Pro system to replace my personalized version of Windows 98, I had to waste time reinstalling other software and restoring my settings. In the end, the OS upgrade cost me \$200 for the XP Pro CD (a bargain) and \$150 for a new Hard Disk, 20 hours labour filled with anxiety and stress troubleshooting the failure and re-personalizing my new system.

 But that’s just one anecdote about one person’s lost productivity. Humans have been using computers for over 50 years, intensively for a least 20. Is there any empirical evidence about the effect of computers on the productivity of the computer-using community world-wide? Well, yes, there is. A [1996 Gartner Group study](#) for STB Accounting Systems found that PC users typically spend 43% of their time “futzing around”. “Futzing” actually a technical term, coined I think by psychologist Thomas Landauer, for time spent doing useless things that you hope will enable you to do useful things.


How much futzing around do you do with your computer? How much time do you spend installing obligatory software upgrades and learning to use new, “improved” user interfaces, or updating SPAM filters and purging email, or updating virus definitions, or (god-forbid!) recovering from a “malware” infection. How often do you wait on hold for 30 minutes, a captive of lo-fi Muzak and vendor advertising, just to be told that you should reinstall something?

I always try to have something else to do while my computer is doing that sort of stuff: something to read, coffee to drink, a bathroom break to take. To me that’s just another necessity of modern life, like taking along reading material when I go to the bank planning to communicate with a human being. One way to reduce the time you lose futzing around is to have a second computer to use when your first computer is unavailable; in my case that’s two extra computers.



My home/office computer network includes one Macintosh and two Windows PCs all hi-speed connected to the Net, and to each other. While I'm "defragging" a hard drive on one computer, I try to make sure that at least one of the other computers is available to do something useful, like edit documents, or access the Net. But a multi-computer approach is probably not within your budget.

It seems that not a day goes by that I'm not affected by at least one computer failure. Most of those disruptions are minor, and I quickly adapt (though not always cheerfully). But occasionally a more serious problem will occur, and I will be presented with some incomprehensible cyber-death cry like a Windows "invalid page fault" or a Macintosh "bus error". And sometimes the whole computer system will totally lock up and I have to "reboot" it, or even power it off and back on again..


 Why do these things happen to me? I'm a conscientious cyber-citizen; I don't install under-tested, "bleeding edge" software, or hack into the operating system to modify the behavior of my tools. An experienced computer user, sure I open a lot of windows, and I often run several different applications at once. But isn't that just doing what I'm *supposed* to be able to do? When I reported that behavior to a less adventurous friend, he compared it to someone trying to drive at 200 kph just because the car's speedometer goes up that high. I say that operating a computer isn't like driving a car. Computers don't come with warning signs about opening too many windows in a web browser if you're using it to watch video, or about playing an MP3 while downloading a software update, or about using other applications while a CD is being formatted. And comparing computers to automobiles? Well, when you start out in your small hybrid to drive to the New England seaside, you're not concerned that you may end up stranded in the Arizona desert in a broken down SUV with an oil leak and four flat tires. But that seems to happen all the time with computers.

*Okay, but... shouldn't computer problems have simple solutions?*

You'd think so! But you know what life is like...

I heard about one home Internet connection that failed occasionally in bad weather, when rain-soaked tree branches fell on the service provider's junction box and shorted some connections inside. It wasn't until the fourth on-site vendor visit that the problem was fixed, and that happened only because when the customer mentioned that his Internet response times seemed to be worse when it rained the service rep happened to be listening. What about the world-wide system of hardware, software and communications technology that supports your own email and web browsing? More and more often, failures with that system can be triggered by distant events, such as a power failure in Michigan, or the release of malware by a computer hacker in Germany.

Can the progress of computer systems be predicted with much certainty? You'd think that was true, since their hardware and software is based on well-understood physical and mathematical principles. But computer systems are more and more embedded in the larger, chaotic systems of the natural world, which includes humans and human culture. And more often than not, when simple answers are offered for complex problems in human domains, those answers are based on misconceptions and/or misrepresentations.

 Sometimes a rant like this one will prompt a born-again technophile to tell me that he has a simple solution: "Use Rogers, not Sympatico" (or vice versa), "Switch to Linux", or "Upgrade to XP Pro." Well, I haven't switched to Linux, but I've been using XP Pro for a while now, and it does seem better than what I had before: I still find applications freezing, but Windows rarely does. So I now tell people that XP Pro is the version of the Windows operating system they should choose (warning them of course to do a "clean" install or find it pre-installed on a new PC).



But upgrading to the latest software version won't guarantee fewer problems, especially if you are using less than so-called "state of the art" hardware (like a PC more than a few months old). I heard about one system running Windows XP Home on slightly older hardware that occasionally crashed, and even rebooted itself when it was powered up but not being used. That problem was eliminated only after the installation of a new "motherboard" (the PC equivalent of a brain transplant). The cyber-doctor who did that digital surgery wasn't certain, but he said that he thought the problems might have been caused by "BIOS incompatibilities". Don't worry if you don't know what that means. (You might be interested to know that creating the [BIOS](#) for the first IBM PC is what launched Bill Gates' career). The important lesson is that hardware and software don't always play nice together, and that even for a knowledgeable technician, diagnosing their misbehaviours can be quite a challenge.

My own hypothesis is that as computer systems become more and more complex and embedded in the world, they must be regarded as dynamical systems; that the binary absoluteness of the digital computer metaphor (it's either "one" or "zero", "on" or "off") will be overwhelmed by chaotic interactions with elements of interconnected systems. I believe that more and more we will find computer systems producing "garbage output" even when they have been provided with non-garbage input.

*But aren't we better off with computers than without them?*


*Haven't computers improved our lives?*

There certainly appear to be many ways that our lives have been improved by computers, and so you may think I've finally crossed the line by questioning this last proposition. Without computers, I wouldn't be able to plug in a plastic card and get cash at 3 a.m.; I wouldn't have telephone CallerID freeing me from the urge to answer

telemarketing calls at dinner time; my doctor wouldn't have had the scanner that helped him diagnose and repair my injured knee.

But some less desirable things also would not exist without computers, like telephone voice jails that block customer access to service personnel, or Net porn and email Spam. And without computers, we wouldn't experience the loss of productivity and self-confidence when our professional and personal lives are disrupted by the demands and side-effects of mandatory updates to our computer tools.

[Alan Cooper](#) says that many computer users just "grit their teeth and put up with the abuse inflicted on them by the dancing bearware." [Bjarne Stroustrup](#), the designer of the C++ computer programming language, says that for some time he wished that his computer was as easy to use as his telephone. He says that his wish finally came true ... since he now has trouble using his (computerized) telephone!

 Computers have certainly improved my own life. They have given me many years of employment as a computer softsmith and as an online instructional designer; and they provide me with anecdotes for conversations such as we're having right now. But my years of experience with computers, and my professional focus on the quality of their "user interfaces", have inclined me to be alert to encounters with computer systems where I am treated badly. I've concluded that computer systems will not on balance have a positive effect on our lives if manufacturers don't spend a greater effort designing and maintaining quality user interfaces, and performing more thorough testing of new and updated systems.

So what remedies am I suggesting? Perhaps members of design or development or testing teams should stand up to their bosses and say things like "My responsibility to the larger community compels me to reject your unrealistic project plan", or "We should tell customers



the truth about what our product can and can't do". Well, sure, that would help. But not all of us work as developers of computer systems (at least not yet); and not many of us have the courage of a Gandhi or a Mandela to stand up to the powerful and change the world. And of course a single individual is almost always powerless.

But as [Margaret Mead](#) and others have told us, power can be and always has been exercised by individuals working together. Talking to you and to your readers through you is part of my attempt to spread the word, and to mobilize resistance.

*So do you have any final words for our readers?*

I feel a calling to expose false claims of computer perfection, to do my best to fight what some of us call computer abuse of human beings, and to shame vendors who distribute hard-to-use and unreliable computer systems. I've sworn to resist forced interactions with uncomprehending automated systems, and to never conduct natural language transactions with entities less responsive than a two-year-old child.

I hope that you don't judge my arguments here to be sophomoric or fanciful, or even dead wrong. Even if you find my arguments reasonable, and not the rant of an "over the hill" ex-softsmith, in a troubled world with so many important causes demanding your attention, you may not share the priority of my commitment to struggle to improve the quality of computer tools.

But YOU can help without diverting too much energy from other causes, just by being skeptical of advertisers' claims, and by not accepting the blame for the mistakes and misdeeds of your IT toolsmiths. And if the time comes when you decide that more vigorous action is warranted, I hope that you will heed my warning

to be suspicious of the motives of the powerful and self-interested who scorn you, and to be wary of those offering simple solutions to complex problems.

#### **Further Reading:**

**[Alan Cooper: \*The Inmates Are Running The Asylum ...\* \(1999, 2004\)](#)**

About his former employer, Cooper says: "Microsoft does little or no design, and its products are famous for making people feel stupid."

**[Herbert Dreyfus: \*What Computers \(Still\) Can't Do\* \(1972, 1979, 1992\)](#)**

Dreyfus predicts that the AI project will fail because researchers' conceptions of mental functioning are naïve. He suggests that those researchers would do well to acquaint themselves with modern philosophical approaches to being human.

**[Barbara Garson: \*The Electronic Sweatshop\* \(1988\)](#)**

Garson explores in thought-provoking, at times frightening, detail the "second industrial revolution," showing how and why computer technology is dehumanizing the modern workplace.

**[Roger Penrose: \*The Emperor's New Mind\* \(1989\)](#)**

Penrose is a mathematician and physicist who believes that some aspects of the human mind will never be duplicated by artificial intelligence, supporting his view with material drawn from quantum mechanics and brain structure.

**[Theodore Roszak: \*The Cult of Information\* \(1986\)](#)**

Roszak cuts through the advertising hype, media fictions, and commercial propaganda that have heralded the high-tech revolution and shows us the risks of confusing what computers can do well (process and store information) with what they cannot do at all (reason and feel).



**David Shenk: *Data Smog* (1997)**

Media scholar and Internet enthusiast Shenk examines the troubling effects of information proliferation on our bodies, our brains, our relationships, and our culture, then offers strikingly down-to-earth insights for coping with the deluge.

**Clifford Stoll: *Silicon Snake Oil - Second Thoughts on the Information Highway* (1995)**

Stoll looks at our network as it is, not as it's promised to be, intelligently questioning where the Internet is leading us.

**Ellen Ullman: *Close to the Machine: Technophilia and its Discontents* (1997)**

Ullman uses her experiences as a programmer, writer, commentator, and consultant to show the many contradictions that can arise from technology, discussing how technology has affected not only the workplace but the work space.

**Norbert Wiener: *The Human Use of Human Beings* (1988)**

This entirely equationless text is a popularization of mathematician Wiener's ideas about humans and machines, as well as a fascinating piece of philosophy and sociology.

**Joseph Weizenbaum, *Computer Power and Human Reason* (1976)**

A distinguished computer scientist's elucidation of the impact of scientific rationality on man's self-image.



*Detail of the famous Cray-II supercomputer from the mid 1980's*

## About the Author

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# Stan Yack

Stan Yack is a semi-retired instructional designer and computer softsmith who in recent years has settled into the role of a technology demystifier. Some of his efforts to help people suffering bytes from digital tigers are documented at [www.softsmith.ca](http://www.softsmith.ca) which contains his other writings as well a summary of his professional activities.



According to his online resume, Stan is “a senior information systems professional experienced in all aspects of information technology”. He wields that experience as his neo-Amish shield against unthinking Technophilia.

Stan has grown beyond his youthful training as a science nerd, and in addition to reading science fiction he now studies philosophy, language and the human mind, struggling to understand (among other things) how neurons and quantum weirdness may give rise to intelligence and conscious awareness.



# About North Wind Press

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