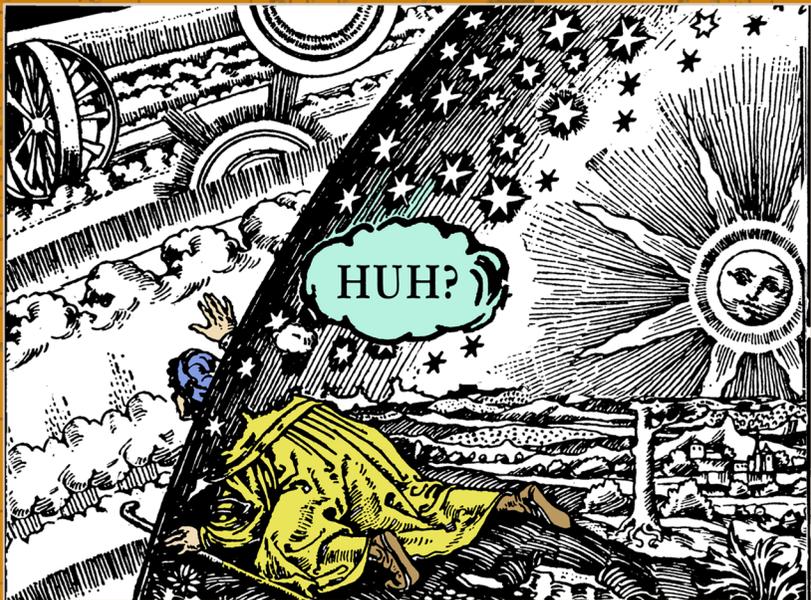


Secrets OF
Gizmotics



Notes on Life Among the Machines

ALAN ROBBINS

Secrets of Gizmotics

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Published by
Alan Robbins
575 West End Avenue Suite 9D
New York, NY 10024

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Versions of many of these essays first appeared in *The New York Times* Business Section “From the Desk Of” column from 1996 to 1997.

Also by Alan Robbins

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PART ONE
THE GIZMOS

Welcome to the Gizmos

*"I would say that we are seeing a shift
in the boundary between the given and the made."*

Walter Truett Anderson



Technology is a funny thing.

Not funny haha...just surprising.

We made it but it is beyond our command. We tinker it into existence but not into submission. It follows our lead then zigs its own way.

From Frankenstein to Jurassic Park, this is a common theme in fiction but the fact of it is hard to digest. The problem is a kind of dyspepsia; we look at the Gizmos – the big one, the one that rhymes with cosmos – as the latest gimcrack but not the whole enchilada.

In fact, our technology is a complex system in which change takes place and which is always in process. It follows the rules that systems follow, set by the universe of systems, not by us. It interacts with other systems, gets feedback and feeds forward, influences and is influenced. All of which leads to unexpected patterns of convergence, synergence, emergence. That is why

we can envision and fashion it, design and refine it, make it and break it, but we cannot rule, dominate, or otherwise whip it into submission. The forces at work are more powerful than our need to master the universe.

That is why so many things seem out of control.

Because they are...weapons, cities, networks, cell phones. The copy machine.

Each new thing we make with our compulsive tinkering is never just another doohickey. Each takes us on a trip through uncharted waters, making waves throughout the whole. Forces are unleashed that we can barely foresee and rarely contain. And each change in the Gizmos leads to a new round of innovention and the contradiction of a made world that is beyond our making.

Not that we can stop in any case.

Humanity and machinery are inextricable. There has never been a time

when we were human beings without our technology nor are we ever truly separated from it. A normal day in the modern world in any city is spent almost entirely within the Gizmos, barely touching the world of muck and mire.

This is the technocosm we have been building piece by piece and item by item, within the biocosm into which were born. It is the great human enterprise, based on our unshakable belief that everything can be remade, improved, fixed. Stone to steel, carbon to silicon, cotton to rayon, water to seltzer.

In fact, technology is not something we have at all. It is something we are. Like language or culture, the mechanism of making things is in our brains, part of our nature. We are Homo Techne, the skillful ones; technology is one of the things that make us us.

I thought about all this with Frankenstein in mind. No, not the original novel and not even the movie. It was the classic scene from the Mel Brooks spoof in which the blind man tries to light a cigar but instead sets the creature's thumb on fire. There it is, the Gizmos in a nutshell...our best intentions gone awry. A thing we made that has its own destiny, separate from what we would do with it if only we could do what we wanted. Which we cannot.

Although our creative monkeying propels it, technology has its own emergent energy. The vagaries of interplay and synergy with other systems continually push it past our intentions. Each new thing we come up with becomes an active part of this system with repercussions we never designed into it. Like Frankenstein monsters and genetically tricked dinosaurs in fiction, our real creations go off on their own.

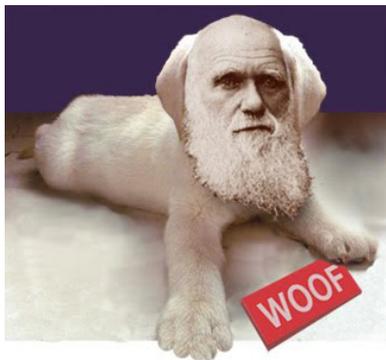
This makes our made world stubbornly unruly. It grows without a plan, expands without boundaries, develops without any overall design. It is the reason we seem to be constantly igniting our own thumbs.

Come to think of it, that's pretty funny haha too.

On Geegaw Evolution

“A human is that animal that breaks out of the animal kingdom by creating machines.”

Bruce Mazlish



Do thingums really evolve?

Sure feels that way whenever the made world spirals out of control.

For evolution to work in the bioworld, you only need four things...a changing context, a mechanism for newness, a method for selection, and a way to record the changes into the next round. That is how change makes it possible for species with new adaptive traits to be selected for reproduction and pass them on to the next generation.

Is there a similar kind of geegaw evolution?

Could be.

The changing context is the morphing world of the Gizmos. The mechanism for newness is our incessant fiddling and permanent dissatisfaction with the way things are. The selection process is a complex interaction of technical, industrial, social, economic and natural systems that boost some developments and delete others. Each round of changes is passed on because the system is ongoing. All this alters the system itself, which creates the context for a new round of change.

Of course, it is easy to overuse the word evolution. The theory is broad enough to explain just about anything and so people have tried to do...from the way money moves to methods for creating a master race. Darwin did not even use the word evolution in *Origin of the Species*, preferring instead to rely on the more generic term transformation. Even so, the principles were almost immediately applied to other unnatural systems...T.H. Huxley wrote about machine evolution and Samuel Butler pointed out that mankind's changing needs provided an impetus for the natural selection of machines.

You could say that since we consciously make choices, this is not really evolution at all – any more than animal breeding is – because evolution is about random changes that last. Without random change, no natural selection, and

therefore no evolution.

But that is too literal to be fun.

And the key point – the motive behind evolutionary views in general – is that systems become increasingly complex as a result of tiny unguided alterations. In other words, systems are self-ordering and no one is in charge. I am reminded of this every time I take my dog for a walk.

For 20,000 years the descendants of the animals known as *Tomarctus* and *homo sapiens* have grown increasingly interdependent. During this time we have imposed on them the process known as breeding which has evolved an entirely new animal known as *Canis familiaris*. At least 115 separate breeds are recognized by the American Kennel Club, in all their different looks, talents, and personalities.

My little terrier who can sit like a butler for hours until you rub his belly would seem to have as much in common with a wolf as I do with the Zippy the Monkey but that is the whole point...drastic change without a previous plan. The power of this idea also appealed to Darwin who based his ideas about natural selection in part on animal breeding.

But dogs have also changed us and altered our evolution. They could hear and smell so we could become watchers; they were alert so we could concentrate; loyal so we could wander; efficient trackers so we could have time to plan. Dogs may even have helped to make our entire Gizmos possible by allowing us to turn our backs to the cave door and fiddle with our tools. This is not to suggest that without Fido there would be no fax, but it is true of dynamic systems that the influences back and forth are broad and deep.

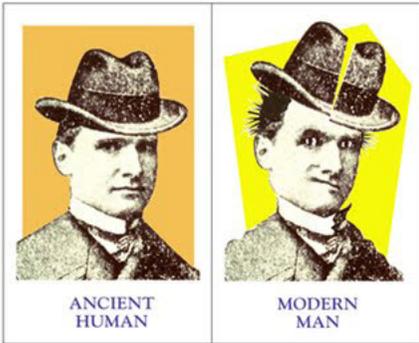
From a hunter with his hound to me and my cute pet in just a few tweaks of interdependent selection. No question that it is a complex changing world in which we whirl, hovering somewhere between the fungi and the angels. And the evolutionary notion is a good way to bring it all down to earth. So maybe things do evolve in a way and maybe Darwin would not roll over at the idea at all.

My dog, however, is another matter.

Perfluxity

*“The whool of the whaal in the wheel
of the whorl...”*

James Joyce, *Finnegan’s Wake*



Our response to technology is a lot like swimming.

It looks smooth from a distance but up close it is just a series of attempts to stop sinking. Not very graceful but it seems to have worked.

Our problem now is that the cloud computing revolution has swelled the ocean bigtime with instant news and new instances, updates and downloads, a blither of information about the latest innovations, styles, hot spots and cool

tools. All this has jacked up the pace of change to a degree that it makes previous revolutions look downright glacial.

We can respond to this with amusement, surprise, shock, or distress, depending on our sense of tragicomedy. Most of us react with an odd mixture of all of these at once, a unique form of dizziness due to the warpspeed of change and the overwhelming amount of new stuff. You know the feeling; you get it every time you google and get 12 million hits. Or try to decide which new phone to buy. Or struggle to keep up with the latest software upgrade.

This desperate attempt to stay afloat leads to unique kind of nausea we might call perfluxity. It is that familiar feeling of being uploaded and downsized, inputted and outsourced, undermined and overwhelmed all at the same time

Perfluxity is where perplexity meets the flux of change. It is disorientation from too much of anything...information, products, choices, changes. To be perfluxed in the modern world is to be dunked into the sea of things we have made and feel it swirling. You get a taste of it whenever you dip into the datastream, a double dip when you have to make a choice about anything, and a near drowning from the waves of feedback.

Take the phone for example.

It is hard to imagine, but there was once a single phone in the world; it be-

longed to Alexander Graham Bell. By 1900 there were hundreds of thousands but they were all the same model. Now there are as many different kinds of phones as there were total phones at the turn of the last century. And you can find out more about any one of them on the Web than most humans could find out about everything in their entire lives throughout most of history.

Feeling tizzy?

Welcome to perfluxity, a natural response to the made world.

People since the Industrial Revolution and the age of mass production have no doubt felt this way. Recipe for a made world...mix together equal parts of logic and vertigo; add dashes of planning and madness to taste, beat together with order and pandemonium and toss in an obsessive need to remake things. Heat.

Voila...the human adventure.

What is new now is not the recipe itself but the temperature. The Web, the computer revolution, the digital conversion, and mobile access have cranked everything up to the boiling point and cooked our neurons in the process. We go around permanently perfluxed but still adjusting to one revolution – one new magical gizmo –after another

Yet perfluxity can also be a good thing because it can stabilize us. If we paid no attention to it we might never get beyond a third-grade approach to life...that is, spin until we throw up. Loads of fun but not exactly a strategy for living.

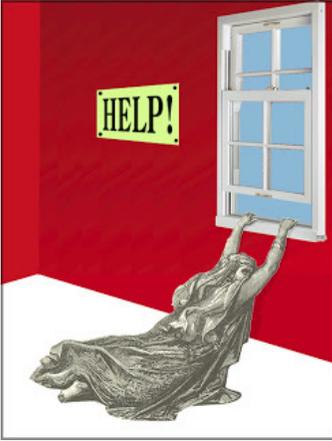
So on the up side perfluxity is a kind of attempt to stay afloat. Like a cast-away bobbing in the ocean but studying the logic of the waves and hoping for an insight, perfluxity is a balance we strike between swimming and drowning. It is similar to the sensation one might get from a whorling wheel, to borrow Joyce's imagery. Or a wheeling whorl for that matter. Disarray and confusion as myriad forces batter us every whichway but perhaps a hint too at the stately rules of complexity behind it all.

To accept perfluxity as a way of life is to deal with change on the most human level. In other words...don't be upset about feeling confused and deranged as the world spins and whirls. We are meant to feel this way. This is a good thing; an aspect of our humanity that keeps us from actually becoming machines.

Meanwhile, keep swimming.

The Defenstration Point

“Perhaps you are discouraged, maybe hopeless. Don’t give up. Don’t despair, you may yet be cured.”
Advertisement for the Heidelberg Electric Belt
in the *Sears, Roebuck & Co. Catalog, 1902*



I smell trouble whenever I see those fateful words “easy setup.”

They were in front of me like a specter as I tried to figure out how to use my new phone. All I had to do was take it out of the box, follow the on-screen icons, and bingo...contact in no time.

Meanwhile, four days later...

Everyone has similar tales about almost every new whizbang we buy. The myth of the jiffy setup seems to have taken an early exit off the Infobahn, along with the fairytale of simplicity.

So why do machines seem to be getting harder to use rather than easier? Is it due to their evolution into more complex lifeforms or our

devolution into a dumber one?

Neither...because the simple truth is that new technology is always befuddling at first. It is a myth of simplicity of which we dream. Our techuman evolution involves an ongoing struggle of adjustment and adaptation. And of course, our normal response to frustration is...to feel frustrated. This is the reason that all devices go through a stage we might call The Defenstration Point.

This is the point when frustration is so high that we are ready to toss the thing out the window, the literal meaning of the word “defenstration.” We have all been there. Yet as disturbing as this feeling might be, it is a natural part of life with machines.

In the dim myth of the modern age, for example, our first television set was easy to set up back in the good old days. It looked like a piece of furniture and was supposed to function with the same simplicity. Plug it in, turn it on, and welcome Uncle Miltie into your living room.

But was that really the case?

I remember everyone in my family fiddling with the volume, channel, horizontal, and vertical control knobs. Not to mention a strange ring around the

channel selector whose function we could never quite grasp. And then there was the arcane artistry of adjusting the rabbit ears. After a while, the task of managing the reception became so formidable that it was left to the resident expert in the field...my father. I have a clear picture in mind of the entire family sitting back on the couch and shouting suggestions to him as he wrestled with the metal poles.

Once, when the picture was really fuzzy and we were reaching the Defenestration Point, my mother boldly ignored the dire warning, opened the back of the TV, and vacuumed out the dust. To our amazement, the picture actually improved!

Yet even as machines become more efficient, the Defenestration Point stays with us as more features are added. Rabbit ears are nothing compared to using a remote – or two or three – to manage the high-def TV, digital cable box, and web-enabled DVD player. Even I, with my genetic predisposition – My Mother Once Vacuumed A Vacuum Tube AND LIVED! – had to call in the cable guy in when I reached the D-point on that one.

The telephone itself is a good example. Alexander Bell once said that he thought the main reason for its success was simplicity of use...pick up the handset, make a call. That lovely moment lasted for about a month after Bell's first demonstrations. Then the D-point set in with managing the ear and mouthpiece, figuring out how to talk into it, and how to carry on a disembodied conversation.

Consider this segment from an 1877 ad for the newfangled invention: "After speaking, transfer the Telephone from the mouth to the ear very promptly. When replying to communication from another, do not speak too promptly. Much trouble is caused from both parties speaking at the same time. When you are not speaking, you should be listening."

Now of course, it is common to seek help, as I had to, in order to make a call by tapping strange icons, navigating a complex voice system, entering long strings of numbers. The paper jam, the screen freeze, the dropped signal, that unbearable car alarm in the middle of the night – all too familiar D-Points – even back to the first thumb smashed by a rock intended for a spearhead.

So next time you reach the dreaded Defenestration Point, relax and step back. It is not bad luck, the MOIO factor, a technoconspiracy, or stupidity that is doing you in. It is simply ingenuity moving faster than habit.

Evolution.

The natural disorder of things.

Technode Love

“Without tools he is nothing; with tools he is all.”

Thomas Carlyle



Buying new silverware is a big deal.

It has to look right of course but more importantly, it has to feel right. Weight, heft, shape, texture. We looked and touched our way through dozens of samples until we found the right set, the one that felt just so in the hand.

I love the ones we bought, love the new butter knife.

You know what I mean...it feels good.

Is it odd to have feelings at all about a simple technode? Probably. Feelings and machines do not seem to fit together well; machines are cold

whereas we are hot-blooded. To feel one way or another is to invoke what Ruskin called the “pathetic fallacy,” the imposition of our emotional states on external phenomena. Machine chat is supposed to be logical and orderly, while feelings are amorphous, messy, and contradictory. We make fun of ourselves for loving our cars, buying presents for our computers, being angry at our Blackberrys.

Yet we do it all the time.

And why not?

Feeling is simply a link between ourselves and the world and so, in this vast Gizmos that we are making, it can be a reasonable guide to action. In a way, to feel about stuff at all is to embrace and even exercise our own techumanity.

We have probably always had feelings about our tools. Sharpened stones, for example, have been dated back 300,000 years and it makes sense to assume that one of the earliest tools was some form of cutting device. Our forebears would have needed such a tool to slice off bits of meat, dig for tubers, skin animals, or cut down plants. It is pleasant to think that our first tool was not a weapon but a piece of paleolithic dinnerware. A kitchen utensil. Something to dine with, that felt good in the hairy hand, civilized, a step up from the muck. And it must have been satisfying to get the job done with the tool in hand. Must have felt good.

Other creatures, of course, use tools. Apes and various birds have been observed using sticks to pluck insects from their hiding places; some sea otters use rocks to break clams. Do they have feelings about these devices? Doubt it. Wasps and termites even have technology...complex architectures that include air circulation, function separation, egg hatcheries, and more. But they presumably do not feel one way or another about these designs because they are the result of genetic patterning, a closed system that does not evolve.

But who knows.

After all, we are not a wasp.

What makes our own feelings about our stuff so complex is that these objects morph as the system evolves. That sharp stone became a knife somewhere along the line which itself evolved into a thousand different variations, fixes, and redos in flint, copper, bronze, iron, steel, plastic, ceramic – even laserlight – in all imaginable shapes, sizes, and styles.

Form follows futzing and the knife becomes not just a type of object but an entire category of extended action. In this way, a knife can be a hammer, a doorstop, or a pen for carving monograms into trees. Even a chair for a balancing yogi. A shard can be a knife and so can a feather if it cuts through soft butter.

Categories morph, uses evolve...and feelings flutter like debutantes around them.

Then too, the knife did not just cut better than teeth, rip better than fingernails. It expanded our cuisine and begat the meal, which begat the fork as a way of skewering food, which in turn begat the table knife with no sharp poin. Yea and these begat the table setting, which led to the reclining dinner, and then course servings, and waiters and checks, and posh restaurants, and takeout menus. Formal meals that helped structure the day paved the way for clocks, schedules, work hours, iPads. That sharpened shard has helped us become what we are. No wonder we have feelings about it.

The lowly knife makes it possible to alter the universe in a fundamental way, severing the given connection to the world as it presents itself. The knife is a techuman moment, our shot at evolving the Gizmos. It is right to feel something about it because it is human to.

Pass the butter please?

Humanity

“We’ve got no power, Captain.”

Montgomery Scott, Enterprise engineer



Some years ago, folks digging under the skin of France in a cave called Menez-Dregan, discovered what was apparently a 500,000 year-old fire pit. The find was significant because it was twice as old as any previously known use of fire. The jury is still out on the origins of this fire pit, but the age of the site plus a number of other clues suggest a startling conclusion.

The fire in question was probably not made by our clever sapiens ancestors but instead by one of our predecessors. *Homo erectus* perhaps, that evolutionary discard. So maybe we were not the first ones to manipulate fire; another species did it first. Our

forebears were perhaps just good thieves.

That makes one more nudge from the center of the universe for us.

Our sun is an ordinary star, our planet is at the edge of a common whorl, our ancestors had fur, we behave unwittingly, share most of our genes with bananas, and probably did not even invent fire.

The fall of the ape from the apex.

That dig revealed a diminished past...and who knows what humiliations the future will hold. It is a fictional given that one day we will create our own replacements, some superduper descendent of the Web, let's say, that will gain awareness and start to delete us, the way we are extinguishing so many other species.

Come to think of it, even if all human beings vanished right now, the natural world would barely notice, the universe hardly twitch. Even our own technology would continue on by itself for some time...uncaring, unweeping. Most electronic devices would go on for many hours. There was a news report of a doomed Learjet that traveled for 4 hours and 1400 miles on its own after all the humans on board died. Computer networks could continue for days or even weeks doing their computations. Lights would stay lit until power plants ran down, months in

some cases, maybe years. The online world might even continue to expand and grow and evolve for who knows how long.

Shrinking past, dwindling future. A moment of true humility about the fragile place of the human animal in the world might be in order.

A kind of humanity.

It might even be the case that our rationality, consciousness, intelligence, and wisdom do not really amount to all that much in the end. There may be other roads to awareness, other paths to mastery...even technological ones. Current arguments against the ascent of the machine suggest that computation – no matter how sophisticated – can never lead to consciousness because the first merely transcribes while the second transcends. But who knows?

Transcendence might very well be a natural effect of complex systems. The notion that no other creature – natural or artificial – could possibly be as clever as we are may be pure bozocentrism. Whales, insects, and even homo erectus might have something to say about that. Machines too someday. All it would take is a bit of emergence.

Emergence occurs when one system evolves to overcome the rules of the one in which it is embedded. With our culture, language, and technology, humans have emerged from the biocosm to create our gizmotic world. New innovations – should we happen to survive ourselves – will do doubt emerge us further from the animal world and its evolutionary constraints. So perhaps our machines will find their own way to burst through the human bubble, not as a result of our plans but by systemic evolution.

When that happens, prepare yourself for humanity on a grand scale.

Then what are we to make of that irritating little fire pit? Does it tell the tale of our aggressive ingenuity or imply our inevitable doom? What does it say about our future and the destiny of our technology? A reporter in the 1940s asked Mao Zedong what impact he thought the French Revolution had on his own Communist revolution 150 years later. His answer was...it is too soon to tell. A coy reply perhaps but also shrewd. Maybe it is the same with the impact of that fire pit half a million years ago regarding questions like what it means and where we are headed and what comes next.

Maybe it is always just too damn soon to tell.

"It's alive! It's alive!"
Victor Frankenstein



Photoshop may have it in for me. Perhaps I have insulted it without knowing. Or maybe it is simply fed up with my attempts to retouch photos of myself. Who knows?

I say this because the program keeps crashing the moment before I save all my work. Doesn't matter how far along I am, or what the project is, or how complex the file... it crashes just in time to drive me nuts, every time. Which means that it seems to know just when to do that.

None of the tech blogs I consulted helped; plenty of theories but no explanations. And

no cure. One wise geek said it was no big surprise at all and chalked it up to the MOIO (pronounced mo-yoh) Factor. MOIO is not Yiddish. It is an acronym for Mind Of It's Own. That may be a joke but it is also one of the most persistent ways in which we think about machines.

Everyone knows that a technode cannot think for itself. Not yet at least. For now MOIO simply reflects our sense of the complexity all around us. But while single widgets are mindless, technology as a whole does have a mind of its own in a way because it operates in an evolutionary sphere beyond our plans and schemes. Surprising outcomes often fall outside the narrow definition we have of mind...what we intend, wish, or will. It is not that they are thinking for themselves exactly, just that they are not thinking for ourselves.

This incorrigible capacity is what we are invoking when we resort to the MOIO explanation. It is part of our co-evolution with technology, reflecting a desire for smarter machines on one hand and an outright dread of them on the other.

All of which brings to mind the story of the Golem.

In the most common telling of this fable, the Golem of Prague was created

by Rabbi Judah Lowe in the 17th century as a mash-up of Batman and Gumby. Made of clay, it was brought to life by a secret sign written on a piece of paper that was slipped into its mouth. During the week it brought criminals to justice and exposed anti-Semites. But Rabbi Lowe removed life from the creature every Friday so it could not go out on its own and desecrate the Sabbath. He did that by erasing one letter from the paper which contained the word Emeth in Hebrew, which means truth. Erasing the first letter turned it into the word Meth, which means death. This led to all sorts of problems of course because our relationship to machines is filled with truth and death. It also, I suppose, makes Hebrew the first programming language.

Naturally, like Frankenstein and other similar stories, mistakes are made and the creature runs amok. These are cautionary tales about power and control and they are the very embodiment of MOIO. This is worth remembering because as the Gizmos evolves, the secret signs get hidden under newer layers of complexity...underlying structures become more untouchable and out of reach.

Model T cars, for example, came with a toolbox that allowed drivers to fix most of the problems that arose on the road but to do so now you would need a truckful of computerized diagnostic devices that would themselves need experts to fix. For the same reason, I cannot get into the Emeth within my computer to understand the motives of Photoshop. And on the grandest scale of all, the secret sign is lost in the flux. I may be able to turn off my computer but no one on earth can turn off the Web.

Yet the moral of most golemic tales does not come from MOIO run amok. That provides the adventure but not the lesson. What really touches us is the critical moment in such stories. That instant – so poignant, so central – when what we have made turns to us for answers we do not have. That scary point when the created stops serving and starts demanding. And we stop ordering and must begin explaining.

Sounds like science fiction all right. ...a futuristic Photoshop with artificial intelligence that refuses to fix the blemishes because, unlike me, it will not lie.

But a friend of mine who is a rabbi has suggested that this dilemma between creator and created may be cosmic. Perhaps, she says, this is precisely the same position our creator is in, relative to us. It is a view of the universe that relies on a Great Initiator, inventive and hopeful, but one who is surprised at outcomes and struggling to keep up. No more in control of the biocosm than we are of our own technocosm.

And with no better answers to our questions than we will have for our machine creations...once they wake up and ask.

Hello, Photoshop...anyone home?

The Lipshitz of Technology

“Technology is a queer thing. It brings you great gifts with one hand and stabs you in the back with the other.”

C.P. Snow



Think of technology as a Lipshitz. The word comes from my Uncle Sol who was in the jewelry business. To Uncle Sol, everything big that happened was a Lipshitz, always pronounced with a twinge of caution and a tinge of encouragement. If you got a good grade in school, everyone was proud of you but to Sol it was simply a Lipshitz. When someone got married, that was a classic Lipshitz. Find a bag stuffed with money and the only response from Uncle Sol

would be, “Oy! What a Lipshitz!”

I had no idea what it meant but when I was old enough – probably about 14 – I asked Uncle Sol exactly what a Lipshitz was and this is what he told me.

One day a very fancy woman came into his jewelry store. Her name was Mrs. Lipshitz. Sol immediately noticed a huge diamond on her finger. Ever the jeweler, he gingerly took her hand and studied the ring through his loop.

“My god, what a stone!” he said.

“Yes. It’s the famous Lipshitz diamond,” the woman said. “A wedding present from my new husband.”

“Mr. Lipshitz must be loaded,” Uncle Sol muttered, “You must be the luckiest gal on earth.”

“I’m afraid it is just not that simple,” she said.

“Why?”

“Because with this famous Lipshitz diamond comes the famous Lipshitz curse!”

“Lipshitz curse? What’s the Lipshitz curse?”

“Mister Lipshitz,” the woman said.

Okay...old joke but not without insight.

To call technology a Lipshitz is not to say that it has good and bad aspects.

It is not that simple. It means that technology is both good and bad at the same time. The benefit is the drawback; the blessing is the curse. In philosophy this kind of contradiction is called teleology. In my family, this is wisdom.

The blessing of technology is that it is revolutionary and gives us a chance to expand and evolve, to create a new world. But the curse is exactly the same... that it is revolutionary. It shakes us up, rattles our foundations, threatens to change and even destroy what we have worked so hard to build in the first place. This is not only true for modern technology but for all the tools we have made, right back to the first stone that we used to kill a moose or a neighbor.

This paradox answers the believers and the doubters, that debate between those who think that machines give us new opportunities for better ways to live versus those who believe they are simply destroying everything human that they touch. The truth is not that simple. We do not have the luxury of sitting back and appraising something so intrinsic to our human nature.

Besides, the hype always outstrips the hope and the promise of newness is never fulfilled. That is not the fault of technology, it is a problem with the nature of promises. Possibility is boundless, expanding at the rate of our desires, but results have to take the bumpy road through reality. So even as the world of our making fails to live up to our dreams, it becomes the raw material for new dreams.

Thus the cycle of change.

As the Gizmos grows, we have to be smart and accept both the pluses and minuses of our innovations. We have to be critical and flexible at the same time, take the long evolutionary view as well as the short peek through our cravings. We do not want to be philes or phobes. We need to become Lipshitzians, perfectly schizological, firmly of two minds.

Fret and fuss we must but what we create will always reflect our own dual nature. Nothing we make is simply good or bad; everything is both. Luckily our talent for balancing opposites is also instinctive. No matter how new, we have always adapted to the changes we have initiated and come out pretty much the same... just like human beings.

For better *and* worse.

“A machine is as distinctively and brilliantly and expressively human as a violin sonata or a theorem in Euclid.”

Gregory Vlastos



Try to imagine alien visitors returning to earth 500,000 years after the first homo sapiens appeared and taking a quick genetic sampling to see what had developed. Based on that test they would have to conclude that we were a very dull vessel indeed. Our DNA has hardly budged. They would, of course, be missing the point, which is that biology is only part of the picture. Culture, technology, communication, and other complex systems are where the real change has taken place. Evolution is not just the story of raveling chains of nucleotides but of dynamic system

interactions.

All sorts of complex adaptive systems evolve over time, finding energetic balances between order and entropy. Complex adaptive systems are ones that tend to organize themselves into patterns. This happens because agents within the system react to other agents and to changes in the system itself. The tiny adjustments that result from these interactions – even via accidents and random events – get recorded by the agents, reproduced, and magnified throughout the system.

This is a theory of complexity that has been used to explain financial patterns, social behaviors, and other complexities. It is another way of applying the idea of evolution to situations beyond the biologic and it addresses a fundamental irony of the evolutionary model...the emergence of order. Random changes can bring about an orderly progression and the sense that evolution is going somewhere, leading towards some kind of development even though unplanned.

We certainly believe this to be the case in our case.

We do not think of ourselves as randomly changing, helter-skelter, from one eon to the next. On the contrary, we envision ourselves as improving, growing, expanding. Complexifying and becoming. In fact, along with the philosopher Jean-Paul Sartre, we believe that the most human thing about us is our becoming, our open-ended possibility, our hope against hope for new hope.

But if the technocosm is also evolving, perhaps even someday to the point of emergence, then what exactly are we becoming? Mighty lords of the universe or mere maintenance workers? Druids or drones? There is no easy answer to this; it is all in flux. We are so mixed up with our devices that we cannot be unblended. After all, where would we be without the things we have made and more importantly, who would we be? Somewhere along the line – imperceptibly at first, surprisingly later on, undeniably in the end – we became something quite unique on the planet.

We are a techuman species, inseparable from our works.

Two coevolving systems of humanity and machinery have turned us into this new animal. We have to reinvent our notion of ourselves as something in between high technicians who have lost their humanity and lowly humanoids who have lost their magic. All the decisions before us about energy, environments, medical advances, information freedom and more need to be addressed from this angle.

Our lack of omnipotence means that we have to be careful about our choices. More deliberate. Our best guide in making them will not come from engineering and even less from ideology. It will come from wrangling with the problems while remembering our Lipshitzian nature, that is, our unique capacity for both empathy and cruelty, kindness and hate, reason and lunacy, help and holocaust. We will have to take each choice as it comes and weigh it in the scales of our duality, while trying to keep our human needs and our technological hopes at the fulcrum.

Maybe we should not worry about those alien DNA testers missing the big picture. Maybe will wipe ourselves out first as they arrive to find the machines and the roaches running the earth rather happily. They might not even notice the absence of the flabby fleshmavens with the funky genomes.

Maybe we are the only ones who would miss us.

One more reason to think carefully about what we do next.

PART TWO
PARABOXES

A Choice Dilemma

“Do not attempt to adjust your picture...”

Introduction to the *Outer Limits* television show



Perfluxity – that so very modern feeling of dizziness – is not just a question of consumer choice.

It is built in to every thing we touch. Like the remote for example, which is supposed to help us manage the blizzard of options available to us through the TV screen. Nice. Yet my remote has 35 different buttons on it that lead to layers and layers of screens with option lists and menus. I finally felt in control only to the extent that I could effectively manage five of those buttons...on and off, channel, volume, mute, previous.

Somewhere across town, I imagine a young girl watching the prince slip the shoe onto Cinderella's tiny foot and wildly hitting the remote buttons to bring up a choice menu. This is a generational issue, of course, but also one of temperament.

If you are haunted by the hunch that the world has recently shattered into a billion bits of data and that your only glue gun is a tiny cursor skidding around the pixels, then choices probably make you nervous. On the other hand, if you are comfortable onscreen and on remote, you are no doubt already bored to tears by the linear nature of this text.

This difference actually touches on one of the hottest topics of the Gizmos – interactivity – and how much or little we can tolerate.

Interactivity makes some kinds of information much more accessible. Catalog searches, list browsings, library research, referencing. Imagine trying to locate information on the Web without search engines. Is there anyone who would rather grope through the old library card catalogs to find a book? No matter...there is no drawer in the world that could hold all the cards.

Whenever the variety and quantity of information is too overwhelming, interactivity is the only way to manage it. Instead of being a passive mucker, it al-

lows you to manipulate the datastorm, pick and choose only the parts that interest you, swim through hierarchies of material rather than sink into endless selections.

That much is obvious.

The bigger debate about interactivity is not about research but entertainment. The highly touted promise – or threat to the perflaxed – is that not only computer games but TV shows and movies and whatever new formats come along will all be interactive. Do we really want to vote our way through every explosion in the next flick or become a character with a motive in every soap opera we soak up? All the major software, publishing, Web, and movie companies are struggling to find an answer to this. And to an even bigger question...is it even possible to tell a good story interactively?

The linear stores told in novels, plays, and films, tend to be deep and narrow. They focus on a few well-drawn characters and events, carefully developed and deeply textured. This is great for the telling of hero's journeys, for memoirs, short stories, murder mysteries, fairy tales...and essays. You know where you are going and you cannot wait to get there. The last thing anyone wants is 45 alternative endings in a digital Tale of Two Cities. What we love about Dickens, for one thing, was his ability to pick the best ending and give it to us.

Nothing can compete with the seductive power of a tale well told. Novelists want to tell their stories in a precise series of events, of disclosures. They want to guide you through them, word by word. The experience is intimate, private... and manipulative.

In fact, directing your interest and attention is part of the art, part of knowing how to unfold the tale...when to speed up, slow down, pack in details, gloss over. This is precisely the joy of linear stories, this sense of being led. When it works you get Cinderella. Or Dickens. When it fails, you get my Cousin Marty. To be stuck at a dinner hearing him drone on endlessly about some experience is to grasp the painful drawback of the linear narrative.

Interactive stories, on the other hand, are broad and shallow. There is a lot more going on. More information, more details, more possibilities. But none of it is as cohesive. In fact, it is up to you to as viewer or reader to tie it all together. To be an interactive user, you have to pay attention, take action, and make choices for the material to congeal.

This approach is what you might call Frag & Frac.

Frag as in fragmented, coming in pieces that you have to assemble. And Frac as in fractal, like those complex patterns in fractal geometry...the more you look, the more there is to look at. All this makes for a very intense and immediate experience. But for this to work, you must be willing as a user to be playful and exploratory, to let go of the guiding hand. To chart your own course rather than take the ride.

It is not any easy choice and the challenge to designers of the Gizmos is knowing which approach works best when.

Take My Chip, Please

“In order to make an apple pie from scratch, you must first create the universe”

Carl Sagan



My computer is what is known as a tough room. I mean that in the stand-up sense that it never seems to get my jokes. It transcribes them well enough, stores them, transmits them, even translates them...but nary a guffaw. It is great at handling gigs but not so much giggles.

I know how dumb that insight sounds, but humor is at the top of every Gizmotician's list of must-have traits simply because it is so human. Like the researchers at the University of Cincinnati who built a bot that gets puns. It is really a language parser that finds ill-fitting words and when a similar sounding word fits better into the sentence, it decides it has found a joke. Or the folks at the University of North Texas who created a program that flags sentences that have any jokish word in them...like the word "drunk."

But all that is pretty petty stuff. A computer that really knew funny would be a breakthrough not just in machine comedy but in artificial life,

because humor may be the last bastion of human pre-eminence now that chess and calculus have been conquered.

To accomplish that you would need something beyond an algorithm (and surely beyond Al Gore Rhythm for that matter...bah-dum.) to actually groan at a pun or hoot at a jab. To wit: wit. In fact you would need some kind of A-Con – Artificial Consciousness – because humor involves our understanding of ourselves as beings in the world and our place in it and therefore why things do not work out. After all, that is what most humor is based on. Aggravation, irony, outright rage...these are the wellsprings of the hahaha and I know of no lab in the world working on that.

One reason for this might be the notion that consciousness – on any level – is

impossible to recreate in the artificial realm of the Gizmos. The two are incompatible. In this view, it is not enough for computers to do what they do so well... compute really really fast. Consciousness is not computation, no matter how swift, and never can be.

Take the problem of the Chinese Room for example.

This is a thought experiment like Castel's Ocular Harmonium or Turing's Machine. The original version of the Chinese Room problem involved imagining a man in a room but let us consider a more updated version. Suppose you had a chip implanted near the auditory center of the brain that could instantly take any phrase said to you in Chinese and forward the signal to your cortex in English. A translation chip, in other words, assuming of course that you only spoke English. Pretty neat, but could you then say that you understood Chinese? The chip is simply a cool device, making computations not sense. True understanding and knowledge rely on consciousness; you need self-awareness to have true knowledge of.

Or do you?

If you can hear Chinese and understand it in your own tongue, so to speak, isn't that knowing Chinese? The computation people don't think so. Knowledge is something deeper than data, consciousness more profound than merely manipulating it.

The opposing view is not so strict.

It suggests that consciousness is not a single thing, on or off, have it or don't. Instead it can be seen as a vast scale of possibility ranging from a slug's mere glimmer of sentience all the way up to Emmanuel Kant. Those folks see knowledge the same way too. Computers "know" in a limited way; we "know" in a more expansive way. In this sense, you with your chip do "know" Chinese in some sense and on some level because knowledge is variable, just as consciousness is.

So maybe those rudimentary punbots and drunkbots are a step in the right direction towards something like Tummler 5.1 – a low brow comic entertainment AI – that would bother asking if the name Pavlov rings a bell...bah dumbum. Or even better would not only know that "eleven plus two = twelve plus one" is correct but smile when it realized that the two statements are also perfect letter anagrams of each other.

Or know to pause in the middle of "take my wife...please" not because there is an ellipsis there but because that is where the fun is.

Humor, cleverness, the appeal of hardyharhar...these are all moves towards a conscious gizmo, which is clearly where all this is heading. And it is a worthwhile endeavor because, as Hermann Hesse said, eternity is a mere moment, just long enough for a joke. After all, when you think about it, on one level the only difference between even the lamest comedian and Emmanuel Kant is mostly that Kant was not all that funny.

But then again, he didn't have an open mike night.

Ba-dum.

The Ring of the Neoluds

“The engines he will have invented will be beyond his strength to control...”

Henry Adams, writing in 1862



Our responses to Gizmos evolution are all over the place.

They range from blind acceptance to healthy skepticism to outright rage at the machine. Most folks become whine connoisseurs, always aggravated. But for a smaller group, the world is going right to hell on a microchip. Like writers who think that Twitter ruined storytelling, teachers who say video games wreck knowledge, and daters who say the Web killed love.

I understand these modern Luddites very well; they are really preservationists. Their concern is that in our rush to the new, we will lose something essential to our human nature. Become less than what we are. It is a story

heard from Eden to the Matrix.

The name Luddite, as everyone knows by now, was originally given to a group of textile workers in England in the 19th century. Led by a mysterious King Ludd, they were opposed to the mechanization of the textile industry and destroyed some of the new automated looms. A few of them were even executed as terrorists.

Their modern descendants have the luxury of a different time and place. The textile workers were desperately fighting for the economic survival of their families; the arguments against technology nowadays are more about mood than food. Perhaps we should distinguish modern silicon-bashers from their forebears by calling the current cranks neo-Luddites. Or simply Neoluds.

One of the main concerns among the Luddites of the 1800s was that the new machinery was going to destroy the key industry of hand-crafted hosiery; the first of the new gizmos were automatic sock stitchers. Besides jobs, they felt that this kind of mechanization marked the end of diligence and personal responsibility. And the subsequent demise of humanity.

Of course, they were right in some ways.

Fine hosiery did become extinct and so tube socks came to rule the earth. But the gadgets did not kill off the socks, new lifestyles did. The world changed and priorities shifted. Goods became products, mass production changed fashions, and fine craft found new places to root. Did we lose something in the bargain? Perhaps. But not so much our humanity as a fancy pair of hand-made socks.

This kind of fretting is common among Neoluds. Like a crabby friend of mine who complains that "word processing" makes writing too easy. The computer, he feels, makes it a matter of simply piling up ideas rather than weaving them together into a beautiful tapestry. Rewriting on a typewriter took sweat, which is the great lubricant of deliberation, he says. He also thinks of insert and delete keys as some sort of swindle. Scrolling through text is not reading, he claims, it is skimming.

But if that is true then why stop at computers?

Typewriters themselves surely ruined the resolution that went into handwritten manuscripts. Pencils encouraged ambivalence by making statements erasable. And writing itself must have destroyed the need for the keen memory that oral storytelling required. Come to think of it, why not turn the clock back to the grand old days of cuneiform and press wedges into clay blocks. Every word had to really mean something then.

Did computers change the literary craft? Of course they did. Writing in the age of the keyboard is punchier, more heated, less ruminative and distant. More personal and immediate but also more disposable. But is this the end of the great art of writing or simply another change of socks?

What really separates the Neoluds from the cautiously fascinated like me is their assumption that the familiar is necessarily better. Like most curmudgeons, they want to return the world to the way it was before they felt out of place in it. But not before that. The true danger of the new technology is not that it kills anything off but that it shakes things up. It threatens to turn old fogies into new learners and puts expertise at risk. It turns style on its head. This is all very unsettling to those of us who have comfortably settled in.

On the other hand, this contrary sensibility performs a vital service. We do not, after all, want to discard everything that works just to be modern. Every new diddlewitz ain't progress. Neoluds remind us to think in human terms, to keep our human needs at the center of our concerns. That attitude forces us to ask not just how something works but how it works on us. Not just what is the software but what is the emotional wear...and tear. Not only what the thingy does but what it does for us as people. And those are good questions to keep in mind.

In the film *The Right Stuff*, the astronauts find out that the space capsule they will be orbiting in does not have a window. The engineers insist that they do not need one; it costs more to put one in, there is nothing much to see, and the astronauts are only passengers anyway. What the engineers fail to understand is that the astronauts do need a window and for a very simple reason...they are people and people need windows. Caught up in the technology, it is possible to lose sight.

The basic Neolud complaint is not that machines are windowless but that they are soulless. That computers are chipping away at our humanity, turning us into a race of isolated automatons. Cyberzombies and screen geeks. Visions of jacked-in crackpots run through their fantasies.

It is good to guard against this future but good not to get too nuts about it either. Once the dust settles on each new upheaval, we come out pretty much the way we always do. A complex species, ambitious and fearful, inventive and dumb-founded, hopelessly lost but always peering out the window in expectation.

Hello Parabox

*“Well...here’s another fine mess
you’ve gotten us into.”*

Oliver Hardy



No doubt the inventor had a twinge of pride when he was issued patent number 100,906 back in March of 1870.

He had become, after all, a member of an elite group of ingenious Yankees, a group with less than 100,000 other members at that time. And unlike some rather frivolous entries – of which patent number 556,248 for a self-tipping hat serves as a good example – this one was simple, clever, and had the potential to save lives.

The patent was granted for a new kind of life preserver, an inflatable one that would fit around the user’s neck. The illustration in the patent application shows a dapper fellow in a top hat floating gracefully as his paddle-wheel ship goes down behind him. Thanks to the new invention he is not drowning but instead being held in gentle suspension by the doughnut around his neck, his head above the water, his cigar dry enough to puff.

In spite of the patent, the device never quite took hold, which is true for most patents. The most common reason for this is that the majority of inventors, inventive as they may be, rarely have the funds, contacts, or acumen to actually produce their own products. Engineering is not marketing. And what makes a good invention does not always make a good product. But in the case of 100,906 there was perhaps another more significant cause for the lack of success.

It could kill you.

The blown-up collar had to be tight enough so that your head did not slip through but if it was that tight, you would likely strangle while dangling from it in the high seas. What the inventor really came up with was not so much a revolutionary life preserver as a unique kind of floating gallows. But even that stunning application never helped bring it to market.

Well, not exactly.

Every invention, each new technode, is a wee miracle of creativity...a prob-

lem defined, a solution proposed, a device devised, a patent applied for, and so on. But each one is also part of this whole synergent system we call technology. There is more in it than was put in, more to it than the pieces, and it has greater impact than any of the parts would suggest.

In this way, as part of a system, dead ends are revisited, great ideas revised, solutions reworked, revamped, reiterated. Two millennia after the Greeks used steam to open temple doors, Robert Newcomen realized that it could be used to power an engine to pump water. Two centuries after the use of punched cards to create fancy patterns on Jacquard looms, the idea was recycled to input information into a computer. And 100 years after the blow-up life-preserver, EMS crews use an inflatable doughnut-shaped brace to save your neck after a traumatic accident.

That is why we can never know what the impact of any particular invention will eventually be. Small attempts to solve local problems can fail miserably but lead to big solutions elsewhere. In this sense, each invention is a parabox.

You know what it is.

The classic example is officially known as the Phantom Box, a black plastic cube roughly six inches on each side. It has a switch on the top that turns it on. When you push the switch, a lid opens and a hand emerges which pushes the switch the other way, turning itself off. One version of it is a big hit on YouTube right now. In other words, the device is a paragon of paradox...a machine that un-machines itself. A device whose sole purpose is to undo the only thing that can be done to it, namely turning it on.

All the devices we create are paraboxes or at least paraboxical because each one carries within it the potential to solve a problem and to create one as well. The airplane can take you somewhere or strand you somewhere you could never be without the airplane. The digital organizer can make your life simpler or more confusing. The cell phone can put you in touch or keep you out of it. The pen can allow you to write something down or prevent you from doing one thing and one thing only...writing something down.

The Rule of the Parabox says that when things work, they work; but when they do not work, they still work...just in the opposite direction. They unwork. You try to send a fax but it does not go through; the machine has become an unfaxing device.

On the other hand, this is one of the frustrations that in an evolving Gizmos can lead to new developments. Inventors thrive on these frustrations and every new whizbang has a parabox somewhere in its ancestry. The life-saver becomes a life saver. In this way every parabox becomes useful in the next round of solutions and you never know how important a failed technode will be.

For example, think about that banged shin in the middle of the night as a new means of finding furniture in the dark. Okay, that may be overdoing it.

But the next time you get that sinking feeling when something doesn't work – or actually unworks – don't panic. Take the long view. Feel it, know it, be it. It is an important moment. Not just the object failing but rather the system succeeding because it is an opportunity for innovation.

Not to mention another fine lesson in humanity.

Robot Dreams

“Klaatu Birada Nikto!”
-Patricia Neal to the robot in
The Day the Earth Stood Still



I memorized the words Klaatu Birada Nikto when I first heard them.

This was the classic phrase uttered to the robot Gort in the film *The Day The Earth Stood Still* back in 1951. It was never translated in the film but must have meant something like “Klaatu’s in trouble, go get him, carry him back to the spaceship, and bring him back to life pronto,” because that is precisely what Gort did. Efficient little language there.

But to put it more simply it probably meant “fix the problem!”

I knew the phrase would come in handy as robots began to proliferate because this was the promise in comics, books, films, and on television throughout the fifties. It was

clear that some key commands were going to be needed and fix the problem – or something like it – would surely be at the top of the list.

Human-made humans have a long history in myth and fact.

The word robot – as everyone knows by now – was introduced in 1921 by a Czech writer named Karel Capek in a play called *R.U.R.* in which robotic workers rose up against their human oppressors. The word lasted longer than the drama itself but the assumption that mechanical men would thrive in the new mechanized world took root. We were becoming overwhelmed and would certainly need help. As the mad scientist Rotwang says in the movie *Metropolis*, he intends to invent a machine “in the image of man, that never tires or makes a mistake.” Hence Robby and HAL and C3PO and Sonny and Gort and the seemingly eternal quest for an automatic lawn mower.

In the play, the robots actually wind up beginning a new species that takes the place of humans but only after they exhibit human traits like laughter, timidity, protection.

No need for Klaatu Birada Nikto then...the problem to fix is us.

But no one frets much about robots anymore. They show up in movies, of course, and in Japan where they love karakuri and AstroBoy and Asimo. But it is amazing to look back at the predictions of the Atomic Age of my youth and see just how little presence robots of any kind actually have in the everyday world.

There are industrial robots in factories – a population estimated at some 1 million – and plenty of fancy medical mechanisms that might qualify. Some toys too. Sad-eyed test dummies, tireless performers in theme parks. But this is hardly the army of technoids, replicants, androids, cyborgs, and robots we were led to expect. In spite of periodic breakthroughs in artificial intelligence, language use, mobility, and shape recognition, the robotic repopulation of the world is still only a fantasy.

So I keep wondering...where did all the robots go? Did they die out? Are they hiding somewhere? Did I memorize that famous phrase for nothing?

Not exactly.

One reason that the robot population has not blossomed is our own complexity. Human talents are far more intricate than predicted and the savvy required to mimic human actions and behaviors is far more problematic than once thought. Good news for us I suppose.

A second reason is as poignant as the fate of the dinosaurs. Robots too were extincted, to some extent, when something unexpected hit the earth. Not a meteor but the microchip. It put the smarts in the ordinary devices we use and undermined the need for humanlike intermediaries. No need for a robocop to patrol the house with a home security system. Nor a tin butler to deliver messages if you have email.

But a third explanation for the scarcity of robots is more telling. It is the fact that our lives are becoming more and more virtual...built on information rather than mechanics. Bits not atoms. In the Gizmos we are creating, communication overtakes action and our social presence is more vital than our physical one. The virmen – virtual men and women – have outpaced the robots. Mannequins, puppets, dolls, automata, and robots, have given way to netbots, avatars, and other ghosts in the machine. After all, they are more present, more multi-functional, more reliable, and we can shower them with affection without risk of rust.

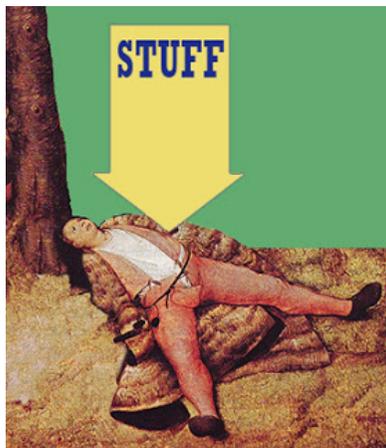
But they also might just evolve faster.

So I am still keeping Klaatu Birada Nikto around just in case.

A Case of Profusia

“Enough, my dear, is never enough”

Oscar Wilde



I bought an iPod years ago with a grand vision in mind, to get rid of every previous format and have my entire musical life on that tiny sliver of technology. But as I started converting a few CDs I saw that vision fade like a dream on waking. I suddenly understood that transferring all those disks and tapes and albums would take many lifetimes. Not to mention the whole new world of iTunes to download.

I also found that I could not quite bring myself to throw out the older stuff. What if the iPod failed, what if it got lost, what if I was stranded in my living room with access only to my old stereo?

So now in addition to all those audio tapes, CDs, and vinyl albums, I ended up with the iPod with all the new digital music. Not to mention the radio, the stations on the Web, and the fifty cable music channels.

I should have known that would happen.

Audio tapes themselves did not allow me to throw out LPs; CDs did not replace the tapes; the iPod would not clean house either. The iPad won't displace a thing. And don't get me started on movies with all our old VHS tapes, new DVDs, Netflix deliveries, hundreds of movie channels, and online streaming video.

Our sense of comfort has not been wrecked simply by the speed of change. The profusion of it is just as disorienting. Unlike other revolutions, the digital one reaches into every cranny of our crammed lives, giving us more choices to make than ever before with all the attendant anxiety. All this because the new never seems to replace the old but merely piles on top like so much gizmotic sediment.

This struggle is not just taking place in my living room.

The question of how and whether new technologies supplant older ones and

the proliferation of stuff in general affects investments worldwide, as well as our investment in progress. The issue has been raised again between TV and the Web. The right guess will determine the value of stock portfolios for years. And yet, in the near future, it seems obvious to me which one will triumph. In fact, I can guarantee my choice based on two principles of technology.

The first is The Principle of Underlap.

All technological change goes through a redundant period in which the new co-exists with the old. The telephone, for example, was in widespread use by the late 1880s but it did not immediately replace the telegraph which was invented forty years earlier. In fact, telegraphy was still popular all the way to World War II because it offered something the phone could not...the delivered messages could be given directly to a person rather than to a machine. In the same way, Polaroids did not replace 35mm film because the older technology had the edge in reproduction and flexibility. Television and the motion pictures futurists were sure they would overwhelm have already co-existed for almost 60 years for a simple reason...every format has its strengths. TV is one thing but there is nothing like going to the movies. Typewriters lasted 20 years into the age of the word processor because you could fill out forms; mimeo machines underlapped the dry-copier by a decade.

The second guideline for my prediction comes from The Principle of ReVision. In an age of industrial capitalism, nothing is made once. Every product is re-copied, re-branded, re-tooled, re-marketed. This leads to a new consumer stress syndrome in reaction to how to choose, which to select, what to buy, which is better.

Chronic profusia.

An inflammation of alternatives resulting in a rash of indecision.

I once saw an exhibit that displayed a hundred hammers starting with a rock, going through a doctor's reflex tester and a claw shop hammer all the way to a railroad mallet. And I am sure they missed plenty. The fact that each invention is only a partial solution for a temporary situation forces us to keep improving and remaking. If any technode worked perfectly for all time on any one problem, it would never change. Like the shark, the first stab would be the right one and there would be no need for further iterations.

We are not sharks; we are techumans and so we keep adjusting to our adjustments and fill the world with stuff.

In 1914, Henry Ford boasted that you could get his new-fangled Model T in any color as long as it was black. Less than twenty months later, that one model was available in 9 colors. By 1923 there were eighty different models of cars on the American market, every single one in a wide variety of colors. Today of course, profusia reigns across the Gizmos both physical and virtual.

So which technology am I betting on between TV and the Web? The answer is obvious...both. Between Underlap and ReVision I am sure that everything will happen all at once for maximum profusia.

And if I am right in my investments, I may even be able to afford all the new stuff I am going to need, cozy in the knowledge that nothing will get thrown out to make room for it.

The Unspoken Word

*“In mathematics you don’t understand things.
You just get used to them.”*
John von Neumann



My email message was composed of just two letters. I was proud of it too... out-tweeting Twitter and the ultimate in digital pith.

A colleague had written a very long email outlining an elaborate schedule laced with decisions but in the end asking me if this was all feasible. With some glee, I was able to bounce her lengthy message right back to her, adding only

my one word response: No.

As a word lover I like to think of this as terseness raised to the level of an art. Not quite on the level of that famous six-word story attributed to Hemingway: “For Sale, Baby Shoes, Never Worn.” but something. Most folks, on the other hand, my colleague included, will probably see it as the further destruction of civil discourse.

At the moment Twitter is the ultimate assault but even email itself, now an antique format, raises issues like the conflict between artistry and vulgarity or brevity and gas, but there is nothing really new in this and nothing especially digital. Every leap in the technology of communication initiates the same controversies of manners and language, as we continually revamp our style of communication to match the new medium. Twitter is just the latest example but email is still considered the more common format.

In fact, despite the webbing of the globe, we are not that different in our struggles from those of our colonial ancestors for whom identical issues were raised by their own communications revolution...the birth of the postal system.

In 1692 King William II of Great Britain set the stage for this revolution by giving Thomas Neale a monopoly on all postal services in the colonies. This made it possible for the first time to send messages from point to point with some consistency. It also helped promote the idea of letters as a form of popular communication, not just announcements from authority.

Just like email, the system grew at astronomic rates to accommodate a

popular hunger for discourse. In fact, more than three-quarters of the growth of the entire Federal government from 1776 to 1876 was in the post office alone. With letters becoming so common, all the issues of style and substance came into question.

In other words, the same debate we have over email.

A guide to letter writing from the 19th century lists the seven C's of proper correspondence...clear, correct, complete, courteous, concise, conversational, considerate. Nowadays it sometimes seems that only concise remains. Shorter sentences and more brusque construction are the email norm. It makes sense. The low resolution of most computer monitors and their inner glow make reading text a challenge. And most email applications display lines that are 75 characters long whereas we are used to reading lines in a book that are only 50 characters long. This makes it more tiring to read a lot of text onscreen and we can expect the trend in terseness to continue for a while.

Most of my email correspondents do not even compose complete responses to my messages. Instead, they send my own letter back to me with comments inserted. I found this insulting at first, as though they could not be bothered to compose themselves on my behalf. But the real explanation is that this is simply more efficient for the kind of details exchanged in email.

This focus on function over form gives some of my communications the feel of high seas semaphore but there is an art to that too – see baby shoes above – and leaner language may not mean thinner meaning.

Standard usage is also undergoing an assault...or renaissance depending on your point of view. As at any time of change, new words are constantly entering the lexicon. Like all the new “e” words...the emailstrom of eologisms of the past few year. And of course the new abbreviations that everyone loves to hate... BTW, FYI, LMFAO. This too, by the way, is reminiscent of a colonial America that saw the birth of dozens of new abbreviations like C.O.D., P.D.Q., and of course the greatest shortcut of all time...O.K.

But punctuation may be in for the biggest shakeup. The comma may finally have to step aside as a bevy of new symbols come into play. Commas were fine in letter writing as a way of handling embedded thoughts but digital messaging is shallower and more intense and lends itself to the linking of ideas, to stringing statements. Punctuation becomes a kind of glue and we get dashes and ellipses and asterisks and plus signs.

The postal surge of the early 1800s, of course, led to renewed emphasis on penmanship and the creation of Copperplate and other forms of expressive, cursive writing. With email we cannot rely on such handy subtleties. But the desire to manipulate emphasis can be seen in increased use of capitals, color tints, underlining and other visual accents. Plus emoticons and dingbats that create wee graphic pictures that turn the text into a rebus.

And then there is the great unending battleground of spelling.

Purists of every age bemoan the lost craft of spelling but it is interesting to note that standardized spelling is a fairly recent phenomenon. It was not until the early 17th century that English printers began to use consistent spelling. Dictionaries, lordly tomes used to impose the will and style of the upper classes, began to appear early in the century; an Italian one in 1612, a French one in 1694. But it was not until 1755 with the publication of Samuel Johnson's Dictionary that an accepted guide was available.

Johnson's was the first purely commercial venture, financed by a cartel of booksellers, and it succeeded in beginning the habit of standardization. But even that was challenged right away. By 1789 Noah Webster began to push for a unique American orthography to act as a "band of national union." Meaning... we'll spell things just the way we want to, thank you very much.

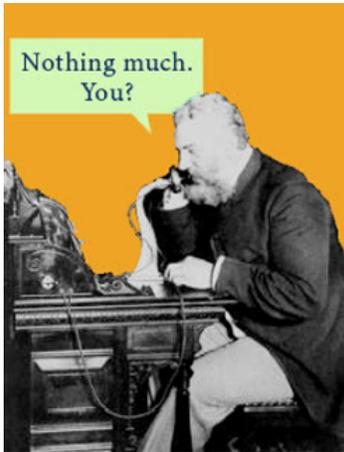
Purity or variance, take your pick. Personally I am not a stickler as long as the meaning is clear and some of the email fumbles are fun. Like the lengthy message mentioned earlier in which my colleague accidentally called a seminar in a distant city a "confarence." Then, she had the nerve to even out-out-pith me with her more reduced response to my terse "no."

She quickly shot back a single letter: Y.

Learning to Listen

“Is is always was...next.”

Graffiti at MIT



“Do you want this marriage to work or not?”

This guy – a total stranger – was asking the question with the intensity of a spurned lover. Of course, I had my own opinion about it but I kept my thoughts to myself like the ten or so other people who had also been listening to his ongoing negotiation. It was a complex relationship involving kids and in-laws and a possible crime worthy of a soap but we were all involved in simply because he happened to be standing on line with us at the bank while on his cell phone. Even being called up to the counter did not interrupt his call and I was curious enough about the outcome to wait for an adjacent window so I could overhear the resolution. Why not? I was already

deeply involved in his conjugal affairs, which were a lot more interesting than my financial ones.

I plead guilty to the belief that literature is merely gossip that sticks; unfolding stories of any kind are inherently fascinating. Hence reality TV. But this was not a case of blatant snooping. I had no option but to overhear his conversation, since he made no attempt to muffle his remarks or modulate his voice. And because he was using a Bluetooth earpiece, he might just as well have been speaking to any one of us. In fact he seemed oblivious to the distinction between his inner and outer world as he carried on this very private conversation in public. At one point, he looked at me looking at him and may or may not have even seen me there.

The most striking thing was not that he was forcing me to listen in. That is typical of life on any city street and I am accustomed to wandering through snippets of other people’s cellular monologues. Chalk it up to irritainment... pervasively annoying media of all kinds.

What intrigued me was that he continued the conversation while conducting a complicated transaction with the bank teller. Wasn’t the relationship important enough to deserve his full attention for a few moments? And if not,

wasn't his money? Still, romantic at heart, I was rooting for a reconciliation as he continued to deliberate.

This conflict between private and public communication is part of the next iteration of the Gizmos as cell phones take over communication. But it is an old story in fact. Newspapers, for example, have always tested a similar thin line between reportage and libel. Nathaniel Butter and Nicholas Bourne were the principal publishers of corantos in England throughout the 1620s. These newsheets were popular because, as the name suggested, they promised current news. But it did not take long for the line to be crossed. By 1632 they were suppressed by the government because of pressure from the Spanish ambassador who was personally offended by information regarding the royal house of Austria.

All new technologies of communication raise this issue as they make it easier for private information to slip into the public realm. Tape recordings of personal conversations from presidents to mobsters continue to challenge our legal notions on the subject. And the popularity of talk radio and reality TV has ushered in a whole new Age of Divulgence. It is not surprising then that phones too are implicated in this shifting sensibility, given that there are over 4 billion of them in use worldwide.

The public phone I grew up with was housed in a booth with doors that closed. It was meant to be an intimate space; Clark Kent even changed clothes there. In Manhattan there are no booths on the street anymore, only a few metal shells that could barely contain a rumor. Instead of stepping away from the street for privacy, the street itself has become the conversation space. But rudeness is not the force behind this annexation of public space...connectivity is. People on the phone are actually engulfed in a dual reality, the conversation in that world and the body in this one. This is a weird place to be but it is increasingly becoming a natural space to inhabit.

It is in fact harder on the overhearer because it challenges the etiquette of listening which is ambiguous at best. The responsibility for controlling private information has shifted from the phoner to everyone else. It is no longer their job to be discreet, it is up to each of us to listen or not.

Again, this is nothing new in the evolution of the Gizmos. Even in the early days of telephonics, all sorts of social interactions were called into question. How, for instance, to address a person whose class you could not determine from observation...first name, last name, title? How to acknowledge the caller...with the formal "greetings", a casual "hello", a jaunty "howdy?" Bell himself favored the international nautical word "ahoy!" Every country eventually settled on its own salutation: Americans say "hello," Italians "pronto," Spanish "bueno."

The issue was even raised by the very first phone call ever made on March 10, 1876. In the Hollywood version we have come to cherish, Alexander Graham Bell shouts into the phone "Mr. Watson, come here, I want you!" because he has

spilled acid on his pants. This version – with its very modern sharing of private pain – is based on Watson’s autobiography written 50 years after the event. The actual episode, however, was no doubt more accurately described in Bell’s own notebook written at the time. By that account, there was no acid. Bell simply announced “Mr. Watson – Come here – I want to see you” into the apparatus. Not a personal plea for help at all, just an pronouncement for posterity. Yet it is the more intimate one that resonates and stays with us.

Not to worry,

As always when these shifts occur, a new set of manners and codes will emerge, an etiquette to tell us how to be polite all over again. Elephants have infrasound, whales have megasonar, and we have 25,000 satellites orbiting the earth, thousands of miles of fiber optic cables coursing through it, a deep wind of electromagnetic signals bathing all of it just to speed up and crank up the chatter. There is just too much to say to stay silent.

By the way, the final words I heard as we stepped away from our prospective windows at the bank that day were “Good, then I’ll see you at 7:00,” as he left.

I was relieved that it was going to work out after all.

Robot Dreams

“Life goes by so fast, stop for a moment and take a look at it”

1970 Ad for Polaroid



Among my prized Gizmotic objects is a rocket ship.

Not a real one but a nice one. It is a Flash Gordon rocket fighter, very cool, red and yellow, and very zoomy. It is the kind of a toy that has come to stand for the future that never was – the tiny pilot seems to be wearing a leather football helmet – but it still carries a nostalgic trace of our dreams of speed. Puffs of white are decaled onto the ends of the jets. But actually the gizmo that best symbolizes

our screeching time to me is something far less retro, less tied into our modernist fantasies or our movie whims.

I have in mind the velocipede.

While not the fanciest of technodes, the velocipede captures both the danger and the romance of acceleration, which is the signature force of the technocosm. Also called the Dandy Horse, it was invented by Baron Karl von Drais in Germany in 1818 and was the first means of transport to rely on two wheels in a line. It was a bicycle before the advent of gears; the rider straddled it and pushed it along by running.

Early ads for the velocipede show an actual dandy, a very hoity upper-class-man in tights as a ruffle, trotting his way down a country road. Very Georgian and snooty. Yet the velocipede is a better symbol for speed than its descendant the bicycle – or the rocket for that matter – because it is so simple. Just two wheels and a seat above; actual running below.

Clearly it is not the practicality of the velocipede that makes it so symbolic of our time. It is the dream. The very idea of devices that keep pace with rapid change. Hopeless dream to be sure – we cannot keep up; it is evolving faster than us – but running along on wheels captures the giddy faith in it.

Consider this: a little over 100 years ago, in 1876, there was one telephone in the world. It was owned by a Mr. Alexander Graham Bell of Boston, proud

owner of the only working phone on the planet. By 1940 almost half the households in America had phones. In other words, it took 65 years for the telephone to go from a hand-made invention to a mass produced consumer product.

By comparison, any photo of a typical New York street from the turn of the century is filled with horse carriages and no cars. A photo of the same street only 25 years later is filled with cars and no carriages. And by 1945 only a handful of households had an experimental product known as a television set. By 1965, 86% had one. Almost total saturation in only 20 years.

And now, let us recall that a mere 25 years ago there was no email, no web searches, no dotcom. In 1991, at the end of the first year of the existence of the Internet, there were only 500 sites to visit. At the end of the next year there were 5,000 sites. At the end of 1993, the third year, there were 50,000 sites, and by 1994 there were 500,000. A tenfold increase every year in only over 5 years. By now there are an uncountable number, because the number is growing so quickly.

In other words, the accelerating rate of change has itself accelerated.

It is not just that changes are happening faster than ever before, it is that speed is happening faster than ever. The pace of the new, the unfolding of the future has been kicked into warp-speed drive. In fact, speed alone is one of the things that turns mere perplexity into sheer perfluxity.

Fiber optic transmissions allow us to send information at the rate of 1.7 billion bps. That is roughly a billion times faster than typing and reading. As an example, if I decided to transmit the entire contents of the Library of Congress to you by reading it over the phone, it would take me 2,000 years. But I could transmit it digitally over a fiber optic cable in less than 12 hours.

Whoosh.

Time compresses, duration shrinks. And so we slice the moment into ever teenier segments to keep up with the change and have no problem knowing of milliseconds, microseconds, nanoseconds. Or even ohnoseconds...those instants in which we realize that we screwed something up. We even develop nanostalgia...nostalgia for things that happened a few media moments ago.

Change is probably always too fast but I doubt that any culture had to deal with it at the velocipedic pace that we do.

I read once that England and Zanzibar had a 38-minute war in 1896. How futuristic of them.

PART THREE

PRACTOLOGY

A Science of Practology

*In the past, shoes could stink
In the present, shoes can blink
In the future, shoes will think*

Sign at the MIT Things That Think lab



Every so often, when I try to boil some water on the stove I turn on the wrong burner.

A minor mishap to be sure. Until you consider that I have tried this thousands of times in the twenty years that I have owned this one stove. I would feel upset except that everyone I talk to seems to have this same experience. The difference is that most people end up blaming themselves, annoyed at not being able to learn something so simple. I am annoyed too but at the stove makers rather than myself. This sense of superiority is not due to an overheated ego. It is the result of

my work in gizmotics, especially as a designer computer games.

You may not see any relationship between boiling a pot of water and clicking on an icon but there is an important one. The connection is in that slippery area of contact between machines and humans known as the interface.

Interface refers to the parts of machines that we humans use and manipulate. In most cases, this includes some kind of control panel. When they work well – an old dial radio for example – there is a natural connection between the function of the device and our behavior. Dials are good controls because they are analogous. Turn more, get more. But dials are a dying breed.

In the evolution of interfaces, levers begat switches, which begat dials, then buttons, which have now morphed into clickable icons. These ghostly objects are increasingly going to be the way we manipulate the world. As we continue our sprint from the industrial to the virtual, the interface problem becomes tricky because there is no direct link between the action and the result. This makes it even harder to manage a standard problem of interface design...making the controls easy to use rather than simply efficient.

The controls on a new cable router, to take one example among many, were designed to accommodate the mechanism of the box, not the layout of my

hands and intellect. There were four tiny buttons around the rim that had to be pressed in bizarre sequences to access dozens of functions, all while looking away at the TV screen. It came with a thick instruction manual that would have added another layer of holding and looking. Great plan for a smart octopus, not so great for me.

This same focus on engineering over manipulation is the reason most people never use most of the functions on most of their devices. The buttons are made to accommodate the layout of the electronics, not the patterns by which people actually do things.

The stove is a perfect example, particularly on older models like mine where the burners are set up in a square array while the knobs are arranged in a line. Without a visual relationship, there is no way to relate the two. It was designed for efficient function...a square of burners and a row of dials fit best in the limited space.

However, if my use of the device were the key factor, the patterns of knobs and burners would match, or be color coded, or any number of other alternatives. And my phone would not have a 40-page instruction booklet outlining dozens of arcane features I will never use. It would help me do one thing....talk to someone.

One page.

What we need to make sure that interfaces work is a science of Practology.

We need a way of thinking about machines that focuses on how things are actually going to be used. After all, the interface is essentially what protects us from the innerface, the inner workings of the device. Good interfaces should be intuitive, simple, and immediately useable by both novices and sophisticates. Like a piano keyboard. One note, one sound, left to right up the scales. Chopsticks or Rachmaninoff is up to you.

The touch screen at my ATM has a great interface: simple options, simple actions, and no moving parts. The choices are grouped in ways that allow me to make a limited number of decisions at a time. Very nice.

On the other hand, bad interfaces force us to relearn the procedures every single time. Like some software applications or Web sites that hit you with a dizzying swarm of icons all equally available so that you can never quite organize your own choices.

Some interface designs only become comfortable over time as our habits rise to the occasion. It is hard to imagine now, but there is no particular reason for directing a car with our hands on a wheel while adjusting the speed with foot pedals. Early cars had tillers not steering wheels and the brake was manually operated. The mass produced version could just as well have reversed the controls we have now: pedals for direction – press left go left, press right go right; – and handles for speed – push forward to accelerate, pull back to slow. Yet now, 80

years after the pattern was established, wheels and pedals seem like the most natural setup in the world. Ditto for the QWERTY layout on a keyboard.

So why can't I turn on the right burner on the stove as easily as I can gun the gas or type the word "gas"? Because of repetition. In spite of trying a few times a week, I really only practice on my stove intermittently while I am continually rehearse the wheel and pedal all the time I drive and the keys as I type this. A professional water boiler would probably not have my problem.

Designers can therefore get away with lousy interfaces if people use them all the time and repeat the awkward behaviors over and over. That is why you can become familiar even with a befuddling word processor or email system. But if the use is intermittent, there is no excuse...it is the fault of the design.

No practology at work.

And either way, habit or utility, it is the designer's job to take our needs into account, not the other way around.

Of Towers and Mazes

"If you build it, he will come."

Voice in the cornfield in *Field of Dreams*



For the past few years I have been conducting secret research.

The results illuminate something fundamental about our approach to the Gizmos. And like some of the best discoveries, this one is based on a simple device. In this case, a set of small marble blocks.

The unwitting subjects of my study have been dinner guests over the past few years. As any host/researcher knows, there is an odd gap between the time the table is cleared of the main course and the moment when coffee

and dessert are served. When I noticed a set of marble blocks on a shelf, I idly set them out on the table so that the guests could play with them to pass the time.

Of course I had no idea that this little gesture would point to a basic issue in the way we approach information. What I discovered is that people can be divided into two categories. Not herb tea versus decaf cappuccino but something more basic to our techuman nature...tower builders and maze makers. In other words, the ones who take the blocks and build up and up as opposed to the ones who build out and out.

You might probably assume, as I did at first, that this is a gender issue... men up, women out. But that is not at all what my research shows. Age is not a factor either. In fact, it has become clear from both careful observation and careless chitchat, that the difference between the two groups is cognitive.

Tower builders are linear thinkers.

These are people who process the world systematically, sequentially, one tidbit at a time. They are lineasts and build their monuments the same way they assemble their worldview, step by step. They consider each piece carefully, adjust each new placement, and try to beat gravity by the sheer force of their logic and precision. Their goal seems to be to create a kind of unassailable coherence...a structure that is both consistent and impressive. The risk, of course, is great. One

false move, one misplaced assertion, can bring the whole construction tumbling down.

Maze makers are different. They are optophiles.

This word comes from the Latin root *optare*, meaning to choose. The maze makers love choices, options, parallel lines of reasoning. They tend to create dynamic patterns that may be confusing but that also draw you in by their complexity. And the maze makers work differently too. They build by constant adjustment and re-evaluation, moving and shifting.

The maze makers are not looking for simplicity. On the contrary, the goal seems to be to create a rich interaction of forms. Yet there is a big risk here too; their designs may not come tumbling down at once but can easily dissipate into chaos.

After-dinner whimsy or an insight into the designing mind?

Before you dismiss the question, I should point out that this distinction reflects a very basic gizmotic conflict...an issue in information design. The tower builders like their data in a steady stream, one tidbit at a time while the maze makers like a lot of choices, picking and choosing their own nuggets. What drives the lineasts crazy is how easily you can lose track of where you are, where you were, or where you are going. But it is just this freedom of choice that appeals to optophiles.

Stories on the one hand and snippets on the other. Chapters versus menus. Email versus Facebook. Focus on what you are doing or do a lot to help you focus.

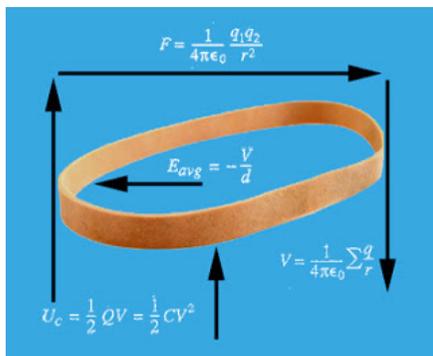
Sound familiar?

If so, then one of these approaches already makes you uneasy. For myself, assuming that they are separate but equal, I have tried suggesting to my lineastic guests that they experiment with building out and to the optophiles that they try building up. Makes sense to offer both, doesn't it? Sorry, not so simple. It never works; we are as we are. Some rare birds are willing to switch sides but always with a slight sense of distress, like combing your hair the wrong way.

Whizbang Secret Revealed

*“It is vain to do with more
what can be done with fewer.”*

William of Occam



I have saved myself hundreds of dollars by invoking a little known secret of the technological universe.

Amazingly, the secret does not rely on any technical expertise, arcane wisdom, or high-level data access. I am going to tell you exactly what it is in a moment so you too can profit from it. This handy piece of understanding has come into play in the recent past as a DVD player, stereo (yes, I still have one), fax machine, and copier all broke down. The

estimated repair bills would have been in the hundreds of dollars. But my chief concern was whether my home tech had reached a point of critical obsolescence. Like some kind of techno-chondriac, all I could think about was how much more I was in for in the coming months.

Then I recalled this secret of the universe that allowed me to fix all these devices by myself for about a dollar each.

No it did not involve a hammer and a hope. All I had to do was ignore the warnings that promised instant incineration if I looked inside the casing, unplug the devices, take out a screwdriver, and open them up. Inside I found the exact same cause for the breakdown in each of the machines. The problem was that a small rubber band had snapped.

Rubber band?

Hard to believe, but the simple fact is that most machines still rely on rubber bands for some crucial part of their operation. The secret of the universe to which I refer is simply this...if anything turns in your technode, look for a broken rubber band before assuming a more complicated cause.

This secret is probably an unexpected modern cousin of a similar principle in philosophy called Occam's Razor. This principle is named for the 14th century writer William of Occam who wrote "it is vain to do with more what can be done

with fewer.” In other words, simplest solutions first.

Fix the rubber band.

You would think that the digital revolution had dispensed with the lowly band of rubber as a useful part, replacing it with microchips and other intangible components. But a basic truth of life with machines stalls this evolution...the fact that the machines still have to operate in a world full of people. No matter how microscopic or virtual our devices get, they still have to be useable by human beings with our fat ears, our cumbersome fingers, our reams of paper, our clumsy mechanics.

In other words, they have to have knobs and buttons and moving parts and therefore transfer energy and motion between wheels and gears. They have to have rubber bands.

It is this collision between the digital and the physical that still provides the weakest link in the technological chain. When my fancy high-tech watch with all its digital functions finally had to be replaced, it was not because the microchips had failed. They were fine. The problem was that the plastic housing that gripped the wristband snapped and could not be mended. Since I could no longer keep the perfectly functioning watch on my wrist, it was useless to me. It had also become a parabox of time, but that is another matter.

Out it went.

In a similar vein, I wonder just how many healthy digital devices are lying in trash heaps right now simply because the plastic “on” switch snapped off.

It is the widespread use – and cheap cost – of rubber bands that places them so unexpectedly at this nexus of technology. Even by 1871, just one year after the rubber baron Dr. Benjamin Goodrich started the first commercial facility, rubber was already being used for a wide variety of applications from firehoses to cigar straps to preserving-jar rings. A century later, bands of rubber are still used in most machines to transfer the power of the motor, to convert the rotation of a knob, to seal off junctions, and even to hold components in place.

In the case of my stereo, when the tone arm refused to move, the repairman was certain he had to replace the entire assembly. But upon opening it up, I saw that a tiny rubber band on a counterweight that acted as a bumper against the casing had partially melted. It was gluing the tone arm in place. The total cost of replacement? 89 cents.

A different repair shop wanted \$45 just to look at my DVD player; the owner was certain that the entire mechanism was defunct. Not so. Inside, I found that the rubber band connecting the motor to the spindle had snapped. I replaced that for a whopping two dollars, only because it was a special type of band with a custom diameter.

Ditto for the fax.

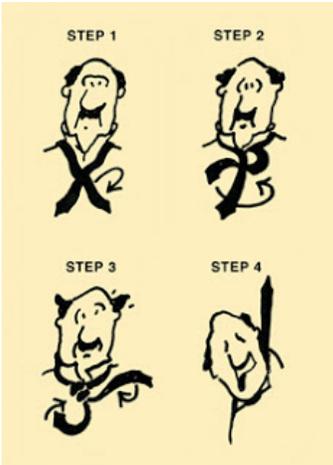
And by the time desktop copier stopping taking paper, I knew just what to look for and found it.

Lest you think that this secret only pertains to home technology, let me remind you of the Challenger disaster of 1986. Top scientists and engineers could not determine the cause of the crash, and it took the eccentric Noble Prize winning physicist Richard Feynmann to provide a clue. He did it not by relying on fancy quantum math, but by invoking this very secret of the universe...fix the rubber band. In a famous demonstration, Feynmann took one of the O-rings – a round band of rubber used as a seal between two propellant chambers – and plunked it in a glass of ice water. Brittle enough to crack when he took it out seconds later, it pointed to a possible propellant leak through the band acting as a gasket.

On that day, at least, even the enormous technology of the space program came down to a lowly rubber band.

A Guide to Misguidance

*To move the cabin, push button for wishing floor.
If the cabin should enter more persons,
each one should press a number of wishing floor.
Driving is going alphabetically by national order.”*
Actual sign in a Belgrade hotel elevator



Every so often my old digital watch sets itself. The alarm goes off at 2 a.m. This happens about once a month despite the fact that I did not set it. I know this is the case because I have no idea how to set the alarm even if I wanted to.

After months of being stymied, I sat down with the instructions and deconstructed them like a Talmudist, finally figuring out what was happening. To set the alarm on the watch, three buttons around the perimeter of the face had to be pressed in a certain sequence. Getting dressed I might snag the first button on my belt while tucking in my shirt. Without knowing it, I had just changed the mode to set the alarm. Sometime later on I might try to read the dial at night and go to press

the illumination button but mistakenly press a different one instead. The alarm had now been activated. Finally, I might hit the third button by bending my wrist at a certain angle and accidentally depressing it. The alarm had now been set to go off.

And since I never changed the alarm time it always sounded at 2 A.M.
Mystery solved.

That a series of trivial and unconnected acts can conspire to wake me up in the middle of the night is not surprising. In fact, it is a basic fact of life among the machines. The MOIO Factor at work. What is more remarkable is that the technology can accomplish something by itself that I cannot do with full use of my intelligence. I hope this is due to the complexities of the expanding technocosm rather than to my shriveling IQ.

Exhibit #1: the instructions for my watch include eight diagrams, five charts, and such classic directions as “press C while in the Alarm mode (after D - A - C) to change the alarm and time signal in the following sequence (alarm on, alarm off, alarm only, time only)”.

This is verbatim from the booklet.

I rest my case.

Exhibit #2: like most folks, I have turned the multi-function DVD player into a movie projector. I never use all the functions. Not because the machine is bad but because the instructions are. In fact, disinstruction and misguidance have become a way of life in the new world.

I cringe, for example, every time I have to buy a new piece of software because I know for an absolute fact that the manual, guidebook, or instructions will be impossible to comprehend. The latest one came with a 700-page tome that read like Husserl without the humor.

Why is it so hard to get clear instructions?

One reason is that the writing of instructions is actually a high art. Try it yourself if you don't believe me. Draw a doodle on some paper, then call up a friend and try to instruct them to recreate it at their end. You will instantly bump up against the fact that language is highly interpretive and ambiguous. This is as true for manual instructions as it is for directions to the nearest gas station.

A second reason for the lack of good instructions is that as machines evolve, they not only get more complex but more general, addressing more and different kinds of procedures. Typewriters were for typing; computers do a lot more. And the more they do, the more steps and procedures are needed to set them up, hook them in, fix, or run. The first dry copier involved 18 separate steps to get a single copy; current models only require two or three...unless you want to do something other than make a single copy, which of course you can and which shoves you back in the world of explanations and directions.

Which brings us to another reason for the confusion...electronics have overtaken mechanics. Even early TVs were mechanical contraptions with the kind of spinning lenses and motors that any screwball with screwdriver could wreck. Now they are all microchipped and there is simply no way to get in and muck around.

Voice recognition, intuitive controls, and online computerized help are all in the works. But until these pan out – if they ever do – our shelves and hard drives will continue to fill up with disinstructions and misguides. Most of these are coldly written, imposingly dense yaddalogs...that's short for yadda-yadda-yadda-logs. Look at this entry, for example, from the User's Manual for the e-mail system at a university in New York. This is the first mention of the Web in the manual (and the manual is about the Web) and it is on page 156.

“One way to bootstrap into the maze of services that is the Internet is to use File Transfer Protocol or FTP. To learn how to use FTP read IP Addresses (page 146), Domain Names (Page 147) and FTP (page 150).”

Typical.

How about a manual that assumes you want to get one specific task done at a time. Written as though you were writing for your kid sister, assuming that the

two of you get along. Starting with naming the task you are trying to accomplish, then listing the steps, numbered 1,2,3, etc.

And what about a lighter touch, like this little piece of technohaiku:

Pressing the restart mode
again, yet still it's blinking
I try not to weep.

National Copy Day

“Roger, we copy...”

Astronaut Buzz Aldrin to the NASA Space Center
when told his previous statement was garbled



Everyone lets October 22nd pass without fanfare.

No office party, no catered lunch.

This is a serious oversight because the date marks the anniversary of a key moment in the story of our technology. It marks the invention of something so crucial to our modern life and work that it really should be a kind of national holiday. Right up there with Secretary’s Day or Flag Day.

October 22nd honors that amazing moment back in 1938 when the world of

modern technology changed forever. Yet for some unknown reason this event is not etched into our collective memory as it should be. Nor is the monumental breakthrough that occurred on that day, nor even the name of the brilliant inventor who made it.

It was on that morning that a shy loner named Chester F. Carlson went into his makeshift laboratory behind a beauty shop owned by his mother-in-law in Astoria, Queens. When he emerged at the end of the day he had a small scrap of paper with the letters “10-22-38 ASTORIA” imprinted on it, fixing the date and place of his long-sought success. Yet in spite of his excitement at seeing that image appear, there would be years of struggle – countless rejections, bankruptcy, divorce – before anyone else would see the potential in his blurry image.

Nowadays, like all inventions seen in retrospect, its emergence seems pre-ordained. What Chester Carlson did on that October day was to create the world’s first instant copy. Until that moment, copies of documents had to be made using photography with its messy chemicals and elaborate procedures, off-set printing with its massive presses and goeey inks, or painstakingly by hand.

With his tiny cloned image in hand, Carlson single-handedly ushered in the Age of Xerox.

Carlson had been fascinated for years with the idea of creating a quick, dry

method of making copies. Inspiration came from his job at an electrical component company where he compared patent documents. Checking them for errors, since many had been hand-copied, pushed his nearsightedness and arthritis to painful limits. "I recognized a very great need for a machine," he later said, "that could be right in an office where you could bring a document to it, push it in a slot and get a copy out."

His work, supported by research at the New York Public Library, was based on the idea of photo-conductivity, the fact that certain materials changed their electrical properties when exposed to light. The idea was simple enough – to get ink to adhere to some parts of a projected image and not others – but the process was hard to control. Yet Carlson was tireless in his pursuit, even getting a law degree when he thought it might help the project along.

On the morning in question, all his efforts paid off. He created a static electricity charge on a zinc plate coated with sulphur by rubbing it with cotton cloth. Then he took a simple glass slide with those characters written on it in ink and held it against the plate under the light of an ordinary gooseneck lamp. Because the coating was photoconductive, the image on the slide was transferred onto the plate in the invisible outlines of static charges. After a few moments of exposure, he removed the slide and dusted the plate with lycopodium powder which adhered only to the charged particles on the plate. He then pressed wax paper against the powder and heated it so that the powder melted onto the paper. Peeling the paper away, he blew off the residual powder.

Ta dah!

The date of the first dry copy was etched into posterity.

Incredibly all the major technology companies of the day were overwhelmed by Carlson's invention. The break came eight years later when the director of research for the Haloid Company, a small manufacturer of photographic supplies in Rochester, New York, read an article about Carlson in a technical magazine. In 1946, with its profits in photographic paper down, the company bought a license to develop a dry copying machine based on Carlson's design. They also gave our language a new word by combining the Greek words *xerox* (meaning dry) with *graphos* (for writing) and coming up with the term xerography to define the new process.

Ten years to the day after Carlson's breakthrough, the redesigned and improved device was officially shown to the world at a meeting of the Optical Society of America in Detroit. The behemoth required fourteen different manual operations, cost hundreds of dollars, and could barely compete with a cheaper and simpler alternative for making copies...carbon paper. It was not until 1960 when the improved 914 Copier was introduced that the power of this new gizmo became clear. Profits doubled and Haloid dutifully changed its name to The Xerox Corporation.

The rest is history. Carlson's wealth blossomed too, from next to nothing to

an estimated \$150 million dollars and he spent the rest of his life giving it away to research projects and charities, often anonymously.

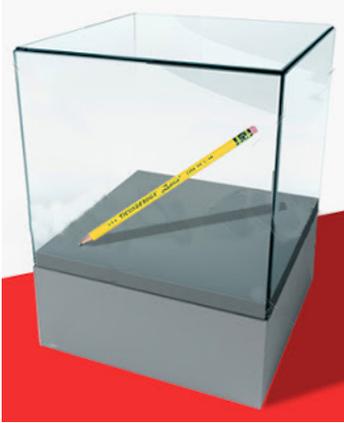
Yankee ingenuity, hands-on creativity, practical tinkering, perseverance, financial success, and philanthropy...it is a story worth celebrating. Not to mention the power of duplication. We now make close to a billion copies a year, use the word xerox as a verb, and naturally assume that every document we touch has its exact clone somewhere in the world, or could.

So let us rectify our xerographic oversight and do the right thing from now on. Here's to National Copy Day...October 22. Mark it down in your calendars. Have a dinner with duplicate servings. Throw an office party and xerox faces. But whatever you do, honor what may very well be the last great moment in the history of tinkering and copy, copy, copy...

The Gizmoseum

*"Men are grown mechanical in head
and in heart, as well as in hand,"*

Thomas Carlyle



I dream of a Gizmoseum...a testament to our technology.

I know there are already plenty of museums devoted to it, but they are all about big tech with a big T...the loom, the plow, the steam engine, the computer. I have a more modest dream in mind...tech in lower case; the daily gizmo, the stuff that makes us techuman at the local level. Cool stuff, quirky stuff, oddities.

My gizmoseum would include a Hall of Ingenuity, those simple designs that we take for granted, that make more with less and seem so simple now that they have been invented. Like the sail which turns a sheet of linen into an exploring machine or the bicycle that turns thighs into generators. And of course the pencil would be there too, maybe on special display; it is democratic since any hand can use it, so elegant that it fits in the merest pinch of the fingers, and a universal device...word processor, imaging system, calculator, and fidget all in one. With a built-in delete to boot.

Down past the bathrooms you would find the Hall of Discards, those sad remnants of ideas gone lame: lonely old Betamax tape, the bizarre and amusing gas pistol, and the rambunctious mechanical television. Have an old Kaypro word processor? It will have an honored home here.

The Hall of Fits and Starts would showcase the humble beginnings of great ideas. Like Robert Goddard's first liquid rocket in 1926 that flew to a height of 41 feet – you could throw a ball higher – but opened the imagination to space flight. Or the Wright flyer that flew for 12 seconds in 1903 over a distance of just 120 feet – shorter than the wingspan of a modern jet – but that paved the way for flight. Plus all the doohickies dismissed as mere toys at first like Carlson's dry copier and Edison's phonograph.

One of my favorite Halls would be down near the gift shop and devoted to

Remnants...scraps of old tech, evolutionary detritus, that stick around like vestigial organs. Like the familiar QWERTY arrangement of letters on the keyboard. That pattern became a standard by 1872 when Christopher Sholes, the inventor, came up with it. No one knows exactly why he hit on QWERTY, but he was probably trying to strike a balance between the demands of the mechanism and of the typist. The QWERTY arrangement made the most-used letters easier to reach while also separating them enough so their typebars would not jam. Not perfect but perfectly familiar because once these scraps become embedded, it is hard to get beyond them. Many studies have shown that the array is extremely inefficient too because it accommodates the machine more than the user and a competing layout called the Dvorak, named after its creator, was based on extensive ergonomic research. Yet in tests, experienced typists working on a Dvorak could only type 10% faster. Why only 10%? Because of the power of habit and that is the basic thrust behind the Hall of Remnants.

Also on display there would be a section of train track showing that the rails were precisely four feet eight and one half inches apart. This is known as Standard Railroad Gauge. But how, you might ask, did anyone come up with such a specific measurement? It is another remnant.

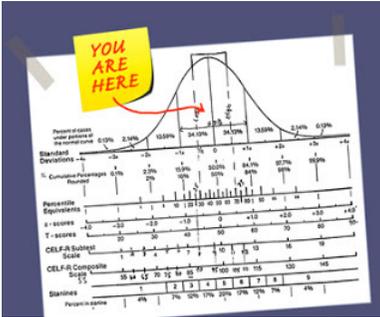
US trains were based on English trains and that was the width used in England because the first rail lines in England were built by the same people who built the pre-railroad tramways. Why was that gauge width used for the tramways? Because the people who built the tramways used the same equipment, tools, and measuring devices that they used for building the wagons that came before the tramways and the wagon wheel spacing was based on that width. The wagon builders in turn relied on the spacing of the well-worn ruts of the old roads in England at the time that Imperial Rome built for their great marching armies. The ruts were formed by the Roman war chariots and any other vehicles, then and since, had to match the ruts or risk destroying their own wheels. All Roman chariots, naturally, had the same standard wheel spacing of four feet and eight and a half inches.

Why? Because that measurement was just wide enough to accommodate the rear ends of two Roman war horses. Sorry to put it this way but in this case, and maybe in many others too, it all comes down to a horse's ass.

The Gizmoseum would point stuff like that out.

Testy Testing

“This test only tests what the test tests.”
Speaker at an educational conference



A friend of mine is really being put to the test trying to get into a good school. For one school alone there were five separate entry tests – two paper exams and three interviews – not to mention a slew of previous test results that she had to submit. This battery was repeated at a number of institutions where all those tests will be graded and analyzed to create a final score that will determine her future, at least as far as each school is concerned.

My friend is three. She is trying to get

into nursery school.

When exactly did test scores become the primary way that we understand ourselves? We are without doubt the most tested, assessed, evaluated and diagnosed people in history and the most evaluated animals as well. From in vitro testing to early IQ tests, through grade school report cards and all those exams to get into and through high school and college, and the endless medical tests of adulthood, our mania for rating and grading marks, and in some cases determines, every aspect of our lives.

Everywhere you look, our key means of applying judgments to individuals relies increasingly on a test score, a bell curve, an average, a mean. Intelligence tests to determine who is smart, quizzes to figure out who is listening, aptitude tests to decide who can continue, standards tests to limit those who can apply. But education is not the only realm that has become test obsessed. Notice, for example, the subtle shift in our use of the word health.

Health no longer refers to how we feel; it now means how we test. Feeling good is fine, but our real well-being depends on a long list of test result numbers for cholesterol, blood pressure, weight, body-fat, cardiac stress, cancer, and on and on. A slight change in any of these scores can put any one of us on permanent medication, change our finances, alter our future and our attitudes about our own lives. Other than the fact that adults want lower scores on their tests while kids want higher ones on theirs, my friend and I are in the same position...relying

on test numbers to tell us who we are and what we will and will not be able to do with our lives.

A bad score on an aptitude test can keep you out of a profession. A bad one on a blood test can send you into a frenzy of worries, appointments, prognoses, and of course further tests. Talk about test anxiety!

Testing and scoring are, of course, expressions of our technology, another set of tools generated by the Gizmos. We could not test without computers, could not calculate without digital apps, could not evaluate without software. As such, all these tests raise the standard question of Lipshitzian evolution....does our use of them make us more human or more humanoid?

The answer for me is fairly straightforward...both. But I think there is a much greater danger that the tests will dehumanize us by reducing the complexity of our lives to a numbers game.

As a teacher I have never even liked grading my own students. I would much rather focus on reaching out, communicating, inspiring – even entertaining – than judging. And although I administer them as part of my job, scores on tests tell me nothing useful about my students. Nothing at all. Tests give me data but not information. Much more significant is the understanding I get from making a connection with them as individuals with their own experiences, sorrows, talents, limits. But this takes time and energy to utilize; a score is instant.

Some of my colleagues tell me that one of my jobs as a professor is to uphold standards and that tests help us do that. But that is not my concern. My interest as a teacher is in trying to get in touch with each student's sense of enthusiasm about the matter at hand...or perhaps about life in general. When this works, I can help them practice motivating themselves and therefore learn to learn for the rest of their lives. And even though I am not always successful at this, I know that everyone can do it, to the best of his or her ability.

There is nothing to test in that kind of process, only something to work at.

Once when I proposed that we eliminate grading completely and simply pass or fail students based on their overall effort, I was accused of being a nihilist. Do away with tests? The system would fall apart! How would we know who was learning? But I suspect that we would know the same way we did throughout the 40,000 years of history before Stanford and Binet. By life. By outcomes. By the learners learning and the others not.

We could not really do away with tests of course. We are far too hooked by the technology of testing – to the paradigm of standards, averages, bell curves, and scores – to understand ourselves any other way. But we should at least hold onto the techuman notion that testing and grading are not the only ways to make decisions about human beings and should adopt some Neolud (which see) some sense of ourselves as untestable, ungraded, inassessable. Those of us who test – educators, doctors, parents – could and should fight the impulse to think of the

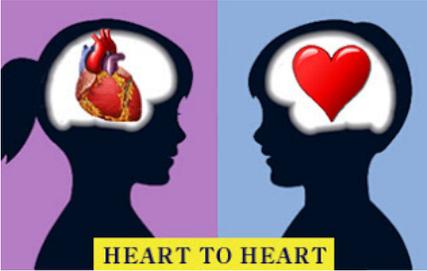
tests as distilling some magical essence from the takers who become mere points on a scale.

“I am not a number, I am a free man,” shouted the Prisoner in the classic TV series. Not any more. But perhaps the trick is in not comparing outcomes to some generic pattern but instead only to those of the same person. In other words, to use testing to measure changes over time for people as individuals rather than how anyone fits into some idealized goal.

Meanwhile, I guess my friend and I are still waiting for our results.

The Digital Divide

“Specialist in women and other diseases.”
Sign on the office door of a Romanian doctor



A common joke online lists the alternatives for deciding whether computers are male or female.

Computers are female because no one but their creator understands their internal logic, the language they use to communicate with each other is incomprehensible to everyone else, even the smallest mistakes are stored in long-term memory for possible later review, and as

soon as you make a commitment to one, you find yourself spending on accessories.

On the other hand, computers are male because in order to do anything with them, you have to turn them on, they have a lot of data but still cannot think for themselves, they are supposed to help you solve problems but half the time they are the problem, and as soon as you commit to one, you realize that if you had waited a little longer, you could have gotten a better model.

One good thing about techumor is that it invites equal opportunity sexism. Yet in the world and in the world of the Gizmos, the equality is not so equal.

Certainly we notice gender differences in the world. Like the classic fact that men look at their nails by making a fist while women extend their fingers. There are a few other differences too, of course, and certainly these differences carry over into the Gizmos as well. For instance, men on blogs tend to provide answers to questions, women tend to share their feelings; men search for answers online, women tend to search for people who can provide them. These differences are often incomprehensible on the other side of the digital divide...like chips passing in the night.

But differences are not the only issue.

Look deeper into our relationship with technology and you find gender bias like the unsaid said that men are better at tech, think more like machines, and tend to not let their emotions get in the way. The simple fact that there are more men than women actually building the Gizmos – as programmers, engineers, de-

signers – almost guarantees that a bias will be built in. It is the same dynamic that insures that there will never enough public toilets for women and too many games that involve blasting the hell out of something.

In fact, in the history of invention we know the names of Bell and Edison and Fulton and Watt but not a hint of Lillian Gilbreth, Margaret Knight, or Beatrix Hicks. Or the thousands of other clever women who slipped through the net of history because it has been so often woven by men. Take the case of Beulah Louise Henry – who I am sure you have never heard of – as just one example.

Born to a distinguished North Carolina family, she began inventing as a small child, sketching mechanical gadgets and getting her first patent for an ice cream freezer with a unique vacuum seal that she had invented at the age of 25.

By 1924 she had patents for an umbrella with detachable, snap-on covers of various colors that was so successful it generated enough money for her to start her own business. Unlike many of her manly counterparts though, Henry was not only inventive but also market savvy. By 1930 she had sold 40 of her inventions to large corporations.

Like Edison she built a large laboratory with a staff of mechanics and model-makers to realize her ideas. And though she had no technical training, she amazed scientists and patent officials with the number, variety, and sophistication of her work. Her 110 inventions and 49 patents included a telephone index that attached to the phone, a collapsible electric fan shield for traveling, a rubber reducing garment, a machine for automatically fastening snap fasteners on clothing, a “Kiddie Klock” for teaching time, an educational game about railroads, “Dolly Dips” soaps for children with their own sponges, a duplicating attachment for typewriters, action dolls, a bobbinless sewing machine and much more.

If you see the focus here you can probably guess the reason for her relative anonymity. She was an inventor of everyday items for real folks, for ordinary life, and mostly for women and their families. Before the Industrial Revolution, women typically lived to the age of 40, spent the entire day on domestic chores, were continually pregnant, and – according to marriage records – were largely illiterate. Beulah Henry was responding to – and aiding and abetting – the changing role of women in our culture.

Not quite as – well...manly – for want of a better word, as steam engines and weapons but far more useful and closer to home. We should know her name as well as we know Edison's. The Lady Henry, as she was called, stood for gizmotics at its best. Technology without gaps. She should be required study for girls as the future unfolds.

Boys too.

"Who gave you that numb?"
James Joyce, *Finnegan's Wake*



Are we running out of bytes?

Bytes, of course, are units of measurement and therefore, like inches, they are limitless as long as there is a way to figure them and a place to store them...head, book, file. The problem is not in our measures but in our nomenclature and even more in the scope of our imagination. To be more accurate, what we are coming to the limit of is words...our ability to describe the realities of the Gizmos in meaningful chunks that resonate with ordinary life.

Imagine bean counters of the Roman Empire trying to measure their expanding turf, much less comprehend it, by pacing out the terrain in inches. What to make of the distance between Rome and the Bosporus as 1,258,329,587,989 unciae, the Roman equivalent of the inch? To make their conquests comprehensible (and save papyrus) the

Romans had to create another order of magnitude and so invented the mile. The word comes from *milia passuum*, Latin for a thousand paces.

Now imagine us trying to cope with the distance from here to the star Arcturus in miles. The measure happens to be eight million million million...but who can grasp such a number? Hence the invention of the light-year, which is the six million million miles that light travels in single year and brings us back to a graspable number...Arcturus is 36 light-years away.

But in the realm of data we go way beyond even those vast numbers and into trillion, quadrillion, quintillion, sextillion, septillion, octillion. And centillion which, in American usage at least, is a 1 followed by 303 zeros. The philosopher Rene Descartes invented the idea of exponents to collapse all those zeros into a single number and our unwieldy centillion becomes simply 10^{303} . But that does not solve our problem because as a matter of comprehension, how can those 303

zeros be understood? The answer is...only in a mathematical, which is to say abstract, sense.

Ordinary language is filled with words that try to humanize big numbers. The word “myriad” comes from the Greek word *myrias* meaning ten thousand, and the word million comes from the Italian *milione* meaning a thousand thousand. Simple words are good but as we move into the expanding universe of cloud computing, we will need a whole new lexicon just to keep up.

I read somewhere that there are 10,000,000,000,000,000,000 stars in the universe and that a proton has a mass of $5/3,000,000,000,000,000,000,000,000$ of a gram, which of course can be summed up by the single word...gazillions or maybe even scads. Once we run out of room on the paper or in our heads, we need to develop a new layer of numbering, a quantum kick to the next level to keep pace with expanding frontiers. Already the lowly byte has already given way to the kilobyte, which represents a thousand characters or the equivalent of less than a page of text. Then came the megabyte, a million characters representing an entire novel. We quickly developed the gigabyte which is a billion characters or an entire library of 1,000 novels. Lately we have the increasingly common terabyte; that's one trillion bytes, the presumed size of Stephen King's oeuvre.

Beyond that the terabyte (a one followed by twelve zeros), the petabyte (fifteen zeros) and the exabyte (eighteen zeros) should hold us for a while. But what are we to make of these numbers besides some obvious questions: are 1,000 mockingbirds equal to one kilomockingbird? If the average electric toothbrush uses 3,000 lines of computer code, why can't it tell me if I need a root canal? What can it possibly mean to know that fiber optic cable can carry 20,000,000,000 bits of information per second and there is still nothing on TV worth watching.

Makes you admire those happy tribes with names for only “one,” “two,” or “many.”

Over and over again our basic measures are being outstripped by the needs we have to measure things and the string of zeros that measures perfectly but becomes entirely detached from life. At a certain factorial the numbers become numbing. What we need now is a new order of magnitude and the words to express it. Chomp and megachomp? Gulp and gigagulp? Or perhaps we should we turn to some Hindu texts that have words for the infinite lifetimes of the cosmos? Or simply go through the alphabet and let 1 trillion bytes equal one cyte, then proceed through kilocytes, megacytes, and gigacytes until we reach 1 trillion again and reset to dyte. Kilodyte, megadyte, gigadyte. Then fyte, gyte, hyte and on and on into unimaginable realms of data.

But obviously I have no good answer here. All I keep thinking about is a geeky bumper sticker I used to see that read “Byte me.”

How many zeros is that?

PART FOUR
TECHUMANISM

The Making of a Gizmotician

“Watch what you’re doing.”
Advice from a Jewish mother



The book that changed my life was not *Catcher in the Rye* or *The Teachings of Don Juan*. To my credit, it also was not the infamous *How to Pick Up Girls*.

It was a little known publication from Hayden Book Company in New York entitled *How to Build a Working Digital Computer*. The book was an extraordinary introduction into the world of information programming and with it you could do precisely what the title promised. Following the directions and diagrams, it was actually possible to build a functioning computer from paper clips, screws, tape, old thread spools, wood, scraps of wire, flashlight bulbs, batteries, and other dirt cheap items.

The result was a bricolage of odds and ends.

The word bricolage was used by the anthropologist Claude Levi-Strauss to describe a certain kind of creative mechanic – a bricoleur – a

handyman who could make things and create tools and devices out of a cartful of junk. The term has now come to mean a certain kind of rough-and-ready practicality, an ability to solve problems with the materials at hand. NeoYankee ingenuity for example.

I spent months working on that computer project and ended up with a contraption that resembled a Boy Scout’s version of a spaceship console. Protruding screws, bent paper clips, flashing flashlight bulbs...it really looked quite ridiculous. But with a certain amount of manual intervention, the computer could be used to add, subtract, divide, and multiply. It could even be programmed to solve simple logic problems.

All the basic elements of the digital data drama were there to be understood from the inside out...core memory storage, logic switches, input and output, binary coding and decoding. Don’t get the wrong picture; I was never a geek in

a garage. How to Pick up Girls was actually my second most influential book. What stayed with me was not the romance of Boolean logic but the idea that you could assemble ordinary, real-life stuff into something that could compute. That was amazing to me and a great lesson in Gizmotics 101.

I owed this to my mother because it was she who taught me about life with machines. My mother was the one who found the book and gave it to me as a present. She believed in hands-on learning. She made sure that I knew how to cook a chicken as well as write a check, that I went to classes in cha-cha as often as karate, and that I knew the rules of conversation along with those of baseball. Ironing pleats, table manners, multiplication tables. It was the kind of study that made you fit for the world.

She also bought me chemistry sets, construction toys, anything that would introduce me to the workings of things...because she liked them herself. The best lessons though were not in construction but deconstruction. My mother was a spare time disassembler. A taker-aparter. With the TV on but barely watched, she used to take apart broken devices and look inside. It was a passion of hers, this unbuilding, the way other mothers might sort their recipes. In fact, she used to get so absorbed that she rarely turned it into a teaching opportunity, as she did with most other things. But I got the point anyway.

She was not a technician or engineer; she had no degree in mechanics. No fancy tools or theories. Just a sixth grade teacher with a screwdriver. But like all teachers, she had that intrepid belief in the power of curiosity. This hobby of hers was a kind of homage to human ingenuity. Her heroes were all the tryers and tinkerers of the world, both known and forgotten...Beulah Henry with all her patents, Robert Goddard inventing rocketry in the desert, George Washington Carver and his peanuts.

I well recall her sitting at the kitchen table in the evening, unscrewing screws to get at the guts of some toaster, telephone, sunlamp. I am sure she had no idea what she might find inside, let alone what to do when she found it. I used to think that she was trying to fix the thing in her role as home repairmom. But as I look back on it now, I know that few things she opened up ever worked again, because she was not mending at all, she was meandering, satisfying her own sense of wonder.

I saw the joy she felt in doing it, in finding out what was inside, in seeing the way things got put together. Maybe this kind of deconstruction was a way of coping with the disruptions of her life, searching for reasons. Yet it was this courage to look, this possibility of understanding, that ended up as her most important lesson of all.

She was an amateur gizmotician, probing and poking to see how things worked. A fiddler on the loose with no goal greater than the idle pleasure of delving. What was inside the telephone that made the voices come out? How did the clock know when to move its hands? What happened when you pushed the

buttons on the calculator?

I doubt that she ever really answered these questions. And if she did, she certainly never explained it to me. No matter. The point was in the searching not the finding. But what I did come to understand perfectly well was that there were nuts and bolts to things. That everything was built up. That mechanisms were human-made no matter how mysterious. No ghosts, no gremlins. Whatever she had in hand was just a device, invented by someone, maybe at a kitchen table like ours; perfected perhaps by some woman who went to work; assembled by some fellow with a family.

What I came to see was that machines are extensions of our ordinary lives, our hopes and dreams. And that they have inner workings just like us, sometimes fixable, sometimes not. That even as the Gizmos immerses us in its complexity, machines are still reflections of our human nature.

It is in that quiet moment just after something breaks that I think of her most. As the notion to open the thing up and see what's what begins to form in my mind, I feel her presence. The stubborn resolve, the faith in discovery, the understanding that every understanding is a joy.

And most of all her hand one mine as if to say:

“Life is hard, this we know. Now go and get the screwdriver.”

Future Imperfect

*“Prediction is very hard, especially
when it’s about the future”*

Yogi Berra



Lord Kelvin, in a famous lame prediction in 1895, announced that “heavier-than-air flying machines are impossible.” He was also the unseer who said “radio has no future.” But he was not alone in failing to see the inevitable. Einstein said in 1932 “there is not the slightest indication that [nuclear] energy will ever be obtainable.” And noted Yale economist Irving Fisher once intoned “stock prices have reached what looks like a permanently high plateau.”

The list goes on and on.

Thomas Watson, founder of IBM, in 1943: “I think there is a world market for about five computers.” Politics fading away, nuclear-powered vacuum cleaners, the auto as a mere fad, and then the classic advice to Elvis Presley from the manager of the Grand Ole Opry in 1954: “you ain’t goin’ nowhere son – you ought to go back to drivin’ a truck.”

Examples of wayward predictions run throughout the tale of the made world. How the airplane would usher in an age of planetary consciousness, how dynamite would end war, how we would all be wearing jetpacks by the 1960s.

Despite some informed guesses by science fiction writers (Jules Verne envisioned the fax machine in an 1863 novel), most futurecasting is so far off the mark that the future tends to look terribly passe in retrospect. The clunky robots of the fifties look as dumb to us as our shiny cyborgs will no doubt seem to our kid’s kids. From the steering wheel on Flash Gordon’s rocket ship to the gas lamps on Jules Verne’s mooncraft, we are always limited by the horizons of our current technology.

Take the case of the phonograph as a tiny example.

Everyone knows that Thomas Edison invented it and ushered in the age of recorded sound. And paved the way for wax recordings and gramophones and LPs and Victrolas and stereos and CDs and tapes and Napster and the transformation of audio from a lowly prefix into a billion dollar industry. You can probably visualize that first recording device in all its Victorian elegance with its hand-cranked cylinder turning a sheet of tinfoil under a needle, and that small cone collecting Edison's sound waves as he shouted "Mary had a little lamb" into it. Everybody knows that story.

There is a fairly straight line of progress from Edison's familiar gizmo to the audiophonic world we live in today. Or so it seems because the phonograph is famous; one of those devices that had to be. Who could not have predicted that sooner or later we would be able to reproduce the human voice and that this would lead to generations of improvements and, eventually, to my iPod with its 2,000 songs.

But then, what to make of the phonautograph?

Never heard of it?

The phonautograph was the direct predecessor to Edison's machine, but no one remembers it. Nor the name of Edouard-Leon Scott de Martinville for whom the phonautograph was the culmination of a life's work. Scott was trying to create a mechanical or automatic stenographer that would, in his words, "...permit the poet, the dramatist, the novelist, to fix at will his inspirations..." The machine that he constructed in 1857 to accomplish this looked amazingly similar to Edison's phonograph 20 years later. It had virtually the same construction...a sound-gathering horn, vibrating membrane, stylus, and a turning cylinder on which the motion of the moving stylus could be recorded.

The main difference between the two was that the entire purpose of Scott's device was to make a visual record of the sound, a graph of the sound waves. The moving stylus recorded a pattern that would allow scientists to see sound. In other words, and unlike Edison, Scott was trying to visualize sound waves not reproduce them.

He did not get very far with his machine; it failed to capture the imagination of investors. But there is little doubt that Edison knew of the earlier device and was perhaps even influenced by it. Although his patents had expired by the time of Edison's invention, Scott continued to defend his machine in public.

And here is where predicting the future becomes such a problem.

Scott and many others at the time believed without question that the phonautograph was the more important invention. They thought of Scott's device as a true scientific instrument and Edison's machine as just a toy. Why? Because Edison's device merely reproduced sound...it was not a sound-writer. And to Scott and his scientific supporters it was the printed transcription of sounds, not their mechanical reproduction, that would benefit the world.

This is difficult for us to understand from our vantage point at the far end of the line. But Scott was immersed in the 19th century fascination with record-

ing the truths of nature. He believed that the benefits of new technology would come from understanding the world directly via instruments, without the intervention of human sense and all its limitations. The point of all such devices was to get at reality, to expand the rational enterprise. Mere reproduction was nothing more than a diversion for children. But making an accurate scientific record, that was the goal of his and a whole host of other measuring inventions of the day.

Scott was right about the future value of scientific instruments to measure aspects of reality and tell us how the world works. Modern medicine alone proves his case. But boy was he wrong about the phonograph. And so were a lot of scientists. So was Edison himself, ironically, who was convinced that the importance of his own machine was in reproducing speech not music. After all, he reasoned, why on earth would anyone want to hear sounds that were not produced by live musicians?

The answer of course is obvious and it is the same reason that all future-casting ultimately fails.

It is because tomorrow had not been invented yet.

Rooting for Silicon

“The surest sign that intelligent life exists elsewhere in the universe is that it has never tried to contact us”

Bill Watterson



For home archeology, it was quite a find. An unusual shard from the dim digital past. At the bottom of a carton I found a stack of punch cards from an old college course called Introduction To Computing, back in 1967. Like the ossuary of Jesus, the discovery struck me as either a mysterious fount of information or else a musty tomb, I was not sure which.

Punch cards were rectangular pieces of cardboard with square holes punched in them in rows. They were the means by which instructions were put into the computer back in the days when computers did not know what to do until you programmed them to do it. I recalled working out a sequence of commands for the computer to follow in a language called Fortran and then typing each line of instruction on a keypunch machine. The stack of cards was placed into a reader that translated them into data that the computer could use.

All very quaint to be sure yet the idea of using holes to transmit information has a long history. Rolls of paper or fabric with poked holes were used to run automata and organs in the 1700s. By the 18th century Joseph Marie Jacquard used the idea to control the threads of a loom to create the intricate textile patterns that still bear his name. Cards were an improvement over rolls because they could be shuffled for new designs. The idea resurfaced again and again to control calliopes, riveting machines, census tallies. And eventually the computer in my college course.

But cards were cumbersome; hand-written lines of code had to be typed on a clunky keyboard and a printout had to be proofed against the original. Mistakes were rampant and errors meant that the cards had to be repunched. Plus, of course, the computer was the size of a Volkswagen, painfully slow, very hot, and had a lower IQ than an air conditioner.

Still, it was with warm nostalgia that I beheld those cards. They were

yellowing with age and wrapped in sprocketed paper from a lost era of hands-on computing. The moment was especially touching because I happened to find those cards on the day of an important moment in computation...the announcement of yet another chess match between the current Grand Master and a computer.

Call me a traitor but I was rooting for the machine.
Perhaps the punch cards pushed me to the dark side.

As a term project for the course, I had decided to program the computer to play a perfect game of blackjack with up to six players. I picked blackjack because I was neither a mathematician nor a gambler. It was simply the one game that I could understand well enough to outline the rules of play in a series of steps.

To my shock, the program worked, which is why I kept the cards all those years. There was something amazing about the way they held the understanding of a game inside them. Just some dumb cards; placed into two equal piles side by side they are roughly the same size as my laptop, itself a thousand times more powerful than the computer that guided Apollo 11.

Meanwhile back in the real world, the chess match was being touted as the ultimate contest between brain and chip, neuron and silicon. The math of possible outcomes versus the human intuition of deep structure. The whispers of the mind against the commanding oscillations of nanotech.

Lurking in the shadows was also a very human sense of payback.

Grand Master Garry Kasparov had already lost a match with IBM's Deep Blue, a customized RS/6000 SP computer that had 32 microprocessors and could scan 200 million positions per second. Kasparov could merely intuit the pattern, have an insight, be creative in his strategy. "I could feel – I could smell – a new kind of intelligence across the table," he said at the time.

Kasparov always claimed that the match was unfair because he was not able to study Deep Blue's past games because there weren't any and yet the computer knew all of his. Plus, the computer team made unannounced adjustments to the computer's strategic thinking between matches.

But of course all that is posturing. Then or now, sooner or later, a computer will master chess better than the best master. It will have to. And the usual folks will raise the usual lament about the inevitable downfall of our species. But I feel the opposite.

For one thing, playing chess is only the best test of chessplaying and even masterful computing is still not knowing. The chips may topple a king but they still could not invent a game like chess. So until we develop machines with brilliant audacity or spunky wit, we are still pretty safe in our domain.

Holding those punch cards again, I recalled the odd mix of defeat and triumph that I felt when the computer I programmed whopped me and took my last virtual penny. Confidence in my blackjackability suffered of course. But that

was overcome by pride in my own creation. Helped along when the machine and I went on to win a few bucks from other students in the class.

Don't get me wrong, I admire anyone with any kind of mastery. But this is only pride in the human genome, the evolution game. To root for the chips, on the other hand, is to cheer for human ingenuity itself. What we are capable of, what we can transcend through our creativity.

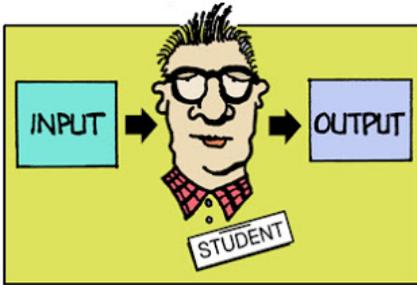
So when the computer says its final checkmate, I will toss my punch cards in the air like so much confetti and cheer.

Not for its triumph, but for ours.

Distant Learning

*“Give me a log hut, and a simple bench,
Mark Hopkins on one end and I on the other.”*

President James Garfield



My vote for the most important voyage of exploration does not go to Christopher Columbus... Columbus to you. Nor to Henry Stanley. Not even Leif Erickson. Instead, and for its great lesson in the human predicament, I vote for Abel Tasman. Never heard of him?

In 1642, Tasman went on his first exploration of the South Seas. He sailed south from Java and discovered the island of Tasmania, which he promptly named for himself. Then he sailed east and north and discovered New Zealand. Then he sailed back up to New Guinea, discovering new islands all along the way. It was a very successful trip, a fine example of courage and navigation.

Except for one slight problem.

Tasman had somehow managed to sail completely around Australia without sighting it.

To his credit, Tasman did discover the continent on a subsequent voyage, but the lesson of his first journey is clear. It is quite possible to follow your interests and instincts, wander thoroughly through all before you, and utterly miss something of vital importance.

The lesson for us here is that it is easy to founder in the sea of data, to forget where we were and where we are, and to miss the big picture, the big discovery. This is especially true in the online world, where we only see a chunk at a time and where whatever we are looking at is what there is. Everything fills the screen, has the same vividness, and is unfolding right now in front of us. If we jump to another place, it replaces this place, and it is easy to lose our place.

How do we make sure that we have a decent map, a sensible hierarchy, or at least a home port? How do we insure freedom of choice but not freedom of ignorance?

These questions are especially relevant when it comes to the future of education.

“Give me a log hut, and a simple bench, Mark Hopkins on one end and I on the other,” said President James Garfield talking about the ideal education. He was referring to his famous professor at Williams College. Garfield was reflecting a common attitude, then and now, that at its core education is the unmediated direct relationship between teacher and student, master and disciple.

Very nice if your teacher happens to be Mark Hopkins. Or Plato. Or Wittgenstein, whose brilliant students gathered and published his writing. But for the rest of us, that log bench is being replaced by the endless seats in a virtual stadium.

To the critics of the new online U, education is becoming more about packaging information and less about teaching and learning. But then, every new technology raises these same questions at first. When the telephone first became popular one of the major concerns was what people would use it to talk about. Doubters at the time said the new technology had no real value because it would only increase the amount of gossip. This was certainly the case but what those naysayers failed to realize is that gossip is valuable content, the mainstay of much conversation. The phone merely facilitated the need we have for it, while also making possible emergency calls, reassuring dialogues, intelligent discussions.

The blackboard, first developed in the 1600s, must have raised interesting questions about reducing discourse to lists of words, narrowing the focus of learning to key items, and perhaps even about the new erasability of ideas. You hear the same criticisms regarding the modern use of PowerPoint and learning modules and on and on.

The one thing we can count on as the Gizmos morphs is a shift in what we mean by education...whether it is access to answers or to methods for finding them, dialogue or chatter, writing or posting, knowing about or knowing how.

The role of the teacher will certainly change as the standard metaphors turn rusty: the teacher as banker depositing information into a passive recipient; teacher as cook, creating recipes to suit the tastes of each learner; educator as coach, relying on motivation, encouragement, and inspiration. In fact new metaphors are already emerging but, needless to say, no one is especially happy with any of them: teacher as manager of data, directing students to resources like a traffic cop; as edutainer, using all the tools of multimedia to coax interest from addled adolescents; as infopreneur, designing courses and collecting fees for each class like a Medieval professor.

The role of students, the very definition of them, will change as well. Their participation in a social environment may matter more than their interest in a subject matter, their knowledge of categories more important than facts. The technology may favor those who can write succinctly, more like copywriters than essayists, who are comfortable getting most of their information through reading, and who can sit at a computer screen for hours on end rather than mix and mingle. Or perhaps mobile access to the Cloud will shift all these ideas once again.

And that will include the very nature of inquiry itself as the next generation of virtual courses find new balances between visual information, text, resource access, interaction, and so on. Teachers will no doubt need to learn new approaches, strange new methods, unusual media while still focusing on the understanding not the data, the state of the student not state of the art, brains over chips.

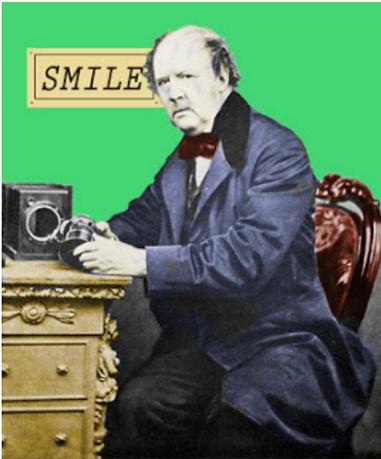
Will it all work?

Of course...but no one will think so.

I can already hear some future president saying, “give me a bench and a holoprojection, Einstein 8.0 at one end and I at the other...”

As a Matter of Faith

"You press the button, we do the rest."
Ad slogan for Kodak, 1888



Like everyone, I take my snapshots for granted.

Press the button, watch the screen, store the image. Then, of course, open in Photoshop, retouch, and print or send.

It does not take much effort to get visual mementos of my life with phone, tablet, camera. It all seems automatic, evident, obvious and my faith in it all working is secure. But that is only because I am at the far end of the long evolution of photographic technology. At the other end sits someone like William Fox Talbot who lived and worked back when having faith in a new technology really meant something.

Talbot was born in 1800 to an upper class family. Even before entering Cambridge, he embarked on a course of self-study in mathematics, astronomy, botany, and chemistry as well as Latin, Greek, Hebrew, Italian, French. He did so well on his own that, at the age of 20, he won a prize for translating Macbeth into Greek. Two years later he published a paper on mathematics that earned him membership in the Royal Astronomical Society. Before he turned 25 he had done original research in astronomy at the Paris Observatory, and in optics, electricity, oceanography and the chemistry of color.

Blessed with a long life – he lived to be 87 – Talbot eventually published more than 50 papers and books in the fields of science and math, including award-winning research in the optics of crystals and in integral calculus. He did all this while somehow finding time to serve as a Liberal member of Parliament. And this does not even hint at his significant discoveries and papers in the areas of etymology and folklore, or his renowned work as one of the leading experts on Assyrian hieroglyphics. At the age of 58 he was elected vice president of the Royal Society of Literature.

Yet the most astonishing thing about this scientist/mathematician/linguist/politician is that he is virtually unknown outside of England for any of these achievements. They were all overshadowed by what we now consider to be his greatest discovery...the invention of photography.

It was while sketching at Lake Como in 1833, that Fox Talbot first wondered if there was a way to make the transitory images of a camera obscura imprint themselves on paper. The camera obscura was a device that reflected images from the world into a surface so they could be traced. Talbot had no real drawing ability and it was his frustration with rendering the beauty of nature that marked the beginning of his photographic quest.

In the summer of 1835, he embarked on an exhaustive series of experiments that lead to what he called Photogenic Drawing, a means of fixing images on paper that is the basis of modern photographic method. Although others were working on similar ideas, it was Talbot who came up with the idea of printing positive images from a negative, a technique that eventually displaced the one-shot method created by others. He also invented a way to develop the latent images on the paper, which he called the Calotype, from the Greek word for beautiful. This technique shortened exposures from over an hour to a few minutes.

Images in his 1844 book *The Pencil of Nature* are among the finest photographs in the history of the art. Along the way he managed to outline the process of halftone printing, which marks the start of modern visual communications, and to discover a means of drawing on a darkened sheet of glass with a needle and imprinting this image on prepared paper. "I think it may prove very useful," he wrote, "to persons who wish to circulate a few copies among their friends of anything which they have written." It should not surprise us that Talbot foreshadowed the role of photocopying a century early.

Talbot's inventive genius did not extend to marketing and was overshadowed by Louis Daguerre's incessant self-promotion. Talbot spent his later years in a quagmire of legal suits over the matter.

Talbot was a genius, of course, but he was also a product of the Victorian Age, in which boundless energy, multiple talents, unbridled curiosity and concentration, and thorough knowledge of the natural world were everyday expectations of the upperclass into which he had the good sense to be born.

But like many of his fellow Victorians, he also had an uncompromising belief that the world could be made better through technology. This was the spirit of his age of exploration and discovery, a time during when it was right and proper to probe the unknown, to extend boundaries, to suffer hardships for the sake of a new discovery. A time of faith in the future, in technology itself and how it would improve the world.

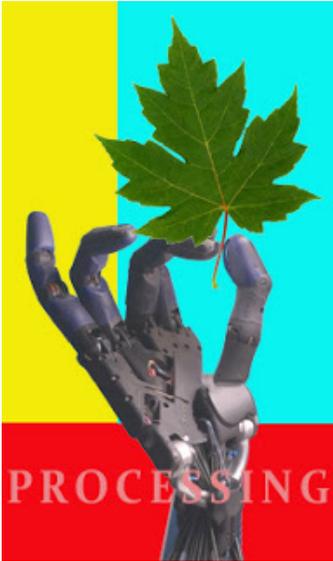
I imagine Talbot sitting in his studio in the dark, fiddling with some new chemical, coughing on the fumes, watching the developing bucket, waiting for an

image to emerge from nowhere, knowing that it will, that it must. And thanks to his faith at the start, I too have it all the way down at this end and I trust my memories to an invisible little chip of silicon I have never seen.

It is a faith we all share, not in this or that device perhaps but in the whole enterprise, the whole new world, the evolving Gizmos. This faith is constantly tested to be sure, but as man of the cloth will tell you, that is the only kind worth having.

The Edge of the World

“Boycott shampoo! Demand the REAL pool!”
Bumper sticker



Walking in Central Park in the spring, one is surrounded by natural beauty.

Everywhere you look the symphony of nature seems to be playing and the electric pulses of the hooked-in world seem to vanish. From certain vantage points even the buildings surrounding the park disappear behind the trees and for an instant one is lost in untainted wilderness.

Except for one problem...Central Park is man-made. It is as much a piece of the Gizmos as the bright lights you go there to avoid.

The park was an idea – a construction – based on the fact that great cities like Paris and London had great public parks and New York should too. In 1853, 700-acres from 59th to 106th Streets were set aside for the creation of the park. Writer Frederick Law Olmsted and English architect Calvert Vaux won a competition with their

so-called “Greensward Plan” to create a “democratic development of the highest significance...”

It was a complex plan including separate circulation systems for pedestrians, horseback riders, and pleasure vehicles, crosstown traffic hidden in sunken roadways, and artfully placed shrub belts to block out the city.

Before construction the area was cleared of its poor inhabitants, mostly free African-Americans and German or Irish immigrants. 1,600 working-class residents were evicted under the rule of eminent domain and whole communities were torn down and removed to make room. Half a million cubic feet of topsoil was transported in from New Jersey, ten million cartloads of material were removed from the site, and more than four million trees, shrubs, and plants were planted.

This was techno-industrial construction at the highest level.

All so visitors to the park might repose of a Sunday afternoon amid “the

pleasures and simplicities of nature,” as a writer at the time suggested.

A stroll through Central Park raises an interesting question about where the Gizmos ends and where the natural world begins. And the park itself is only the most obvious example. After all, a drive in the country is guided by GPS, a day at the beach includes summer reading on a Kindle2, a hike the mountains is enhanced by the shuffle of songs on an iPod.

Nature itself is a bold idea and worthy of our faith, commitment, and reverence. But its defining contour is so intertwined with our emergent technocosm that it is difficult to mark their boundaries.

The word that comes to mind here is hyperreality as used by the French writer Jean Baudrillard to mean that the fake has become more real to us than the real. The was on TV more important than the real one; the media hype the reality and the reality a pale reflection. This is generally applied to places like Las Vegas where the New York New York Hotel gives you the experience without the visit. But increasingly we have the Vegasing of the whole whopping world in which everyone is touched by technology all the time, everything is designed and fabricated, and everything we know from the rings of Saturn to the secrets of our own DNA is established by images in the media. The Gizmos rules.

As the difference between the real and the fake vanishes, the distinction between the vivid and trivial looms. If it seems to matter in any way, has any kind of impact, draws our attention, then it is as real as plastic to us and so rumors are real, even if they didn't happen and history is fake even if it did.

During World War II, in one of many attempts to confuse the British about their actual forces, the German high command hit on the idea of setting up a false airstrip filled with fake fighter planes. The planes were simply wooden shells painted to look like actual fighters in air surveillance photos. Hundreds of them filled acres of a false airport, some or them moved around occasionally with a tractor so that all the aerial photos would not look identical.

The British were only fooled temporarily. Once they realized that the number of planes at the strip never varied, they caught on to the deception. Naturally, the first thought was to ignore the bogus planes and concentrate on the real deals elsewhere in the German countryside. But then the question was raised...if they did not bomb the airstrip, wouldn't that make it obvious that the Brits knew that the planes were fake? That would force the Germans to find a new diversion, drawing even more Allied attention in a false direction.

So the British command decided on this basis that it was better to give the Germans a false sense of security by making them think the Allies were fooled. But when the plans were drawn up to bomb the phony airstrip, the British general in charge of military supplies balked. Why waste real bombs on a fake mission to destroy fake planes, he asked? Thus was the decision reached by a real army in a

very real war to drop fake wooden bombs on fake aircraft to convince the enemy that they themselves had been faked out when in fact they had not.

The perfect modern moment.

I still love Central Park, by the way, and go there to get in touch with the earth, even if it is only a pale echo of what I know from the Nature Channel.

The Book Is Dead?

*"I find television to be very educating.
Every time somebody turns on the set,
I go in the other room and read a book."*

Groucho Marx



The book is celebrating its 555th birthday. This romantic notion is based on the approximate publication of the '42-line' Gutenberg Bible. It was not the first book; before Gutenberg there were about 30,000 books in the world. But it was the big daddy of all printed books and ushered in the Age of the Book. By the 16th century there were 9 million of them. Worth celebrating.

The year is not precise, only feasible. But there is a bigger issue than accuracy here. The

question: will this birthday be the last?

New electronic formats are constantly being touted as the end of the book. All the iPads and Kindles and Nooks. Meanwhile literary luminaries bemoan the cozy book's demise at the hand of the cold, engulfing screen. Page mourners rhapsodize about the feel of the paper, the sharpness of the text, the neatness of the binding, the echo in the library. Without books our words might just vanish into the thin air like ghosts, they say, and fear a world of screen zombies, cool mules staring and glaring. Mouse potatoes, the online version of their cousins on the couch.

I would not write the eulogy yet though because there is always the Rule of Higgeldy-Piggeldy to consider. This says that it is impossible to accurately predict the shape of things to come since the Gizmos is an evolving system; new developments change the course of change. This is not to suggest that our future is chaotic, just unplanned. Our guesses are based on the current state of affairs, which is itself fluid. That is why predictions of the future always look so quaint in retrospect...like the stream-driven jet packs, the space ships with gas lanterns, and all that.

The unbook book will undoubtedly evolve in ways that we cannot even imagine yet. It will become something unexpected, not just a newfangled book, and will probably leave the oldfangled one intact because also at work is the Rule of Uncertain Displacement. This reminds us how tricky it is to guess which new

designs will replace rather than co-exist with existing ones. While the telephone replaced the telegraph within about 25 years, television and movies have already lived together for 60 years beyond their predicted collision. And neither of them has put live theater out of business as anticipated. Paperbacks themselves were expected to finish off hardcovers but, of course, they never did.

The lamenters are also operating under the Good Old Days Rule. What they look back upon with such nostalgia is not a better time, but a more comfortable time...that moment when they last felt cozy in the world. Read between the lines and you will see that most Luddites want to go back to the point of technology at which their own generation became empowered, but not one moment before. Typewriters better than computers, for example, but not all the way back to handwriting. It is familiarity that is at stake more often than quality.

I love books, have written dozens them, and own hundreds more. I too revel in the look and feel of them, the intimacy, the portability, familiarity. Book as furniture, friend, souvenir, memento, weight, link to the past.

And there are differences between books and screens. The pixels of light onscreen change the way we read because they glow with energy; scrolling gives no sense of where you are in the experience; hypertext links open the writing up to boundless digression; and online everything is malleable and this marks the end of the impervious word. Plus we get used to shorter and shorter blocks of text and a very different sense of narrative.

But digital books have many advantages as well. They are available to anyone anywhere and make texts more accessible through instant translations, explanations, explications, and cross-references. Their energy, interactivity, malleability, and brevity can all be seen as positive outcomes just as easily.

One other factor that appeals to me as a writer is the Dawn of a New Day Rule. New designs hardly ever just add to what exists, they change the entire system. New day, new possibilities. Digital books are not just new technodes, they are the end product of a complex cultural and industrial system that allows writers like me to completely circumvent the whole established structure of agents, editors, publishers.... this essay on my book blog is a perfect example.

That freedom is exhilarating but it is just this kind of revolution that terrifies the bibliophiles. They think it will lead to anarchy, a torrent of disposable writing, worthless texts, pointless claptrap published only for fast cash. I can't argue with that...in fact I am trying to succeed at it.

The critics are right in one way and it concerns a basic lesson in Gizmotics...the new always wrecks the old – for better and worse – and history itself proves the point. These were precisely the concerns – and the inevitable outcomes – of another disruption in the written word, the aftermath of an innovative new technology that threw everyone for a loop about 555 years ago.

It was called the book.

A Techumanist Manifesto

*“We shall not cease from exploration and the end
of all our exploring will be to arrive where
we started and know the place for the first time.”*

T. S. Eliot



The future is calling but what does it want?
And is anyone home to answer?

Recent history has been an object lesson in diminishment. Einstein's Theory of Relativity debunked absolute time, Heisenberg's Uncertainty Principle defined the limits of determination, Godel's Incompleteness Theorem described the limitations of complex systems. Freud suggested that our conscious minds are not in control and Darwin that our ancestors were goops. Meanwhile, what is the news from the machine world? It is not about mastery that is for sure.

So far we have relied on the quaint humanistic notion that life is going somewhere,

that better is better, that change is progress and that progress is our salvation. But is that enough in a world of systems evolving beyond our intentions? What can we truly control? What can we decide?

We are all both amazed and appalled by our stunning Gizmos and we have come to rely on it even as we worry that it is out of control. Every day seems to bring new wonders, exhilarating and exhausting. And the speed of these changes continues to speed up.

What is needed is a way of thinking that will keep our human needs at the center of our concerns but still acknowledge our deep and abiding to the machines. In a word, a kind of Techumanism.

It means thinking in human terms even as we morph into something more. Asking not just how does it work but how does it work on us. Focusing on not just the software but the emotional wear...and tear. Considering not only what it does but what it does to us as people. Is the technology we are using helping us do what we need to do or is it simply doing what it does best and is that good enough?

We have to acknowledge that there is such a thing as evolution too. Technology for the worst. Himmler had some good ideas about that. And so did Ted

Kaczynski even as he warned about it: “of course if my crime, (and my reasons for committing it) gets any public attention, it may help to stimulate public interest in the technology question and thereby improve the chances of stopping technology before it is too late...”

Note to all maniacal Neouds: it is already too late.

Remember the Borg, those human/machine zombies from Star Trek that caused such a mess? The techumanist approach is not to learn to fight the Borg but to understand that we already are the Borg. The technocosm is us. Put on a pair of sneakers or glasses or brush our teeth and we are instantly a mix of human and machine. Hopefully the zombie part is still up for grabs. We can choose to be a different hybrid, maybe a cross between a mench (a real human being) and a machine (a device)...in other words, a menchine.

A few basic gizmological truths might help here.

First, the tech of the technocosm is not just tools. The computer is not a tool, nor is the Web, any more than the Industrial Revolution was just a tool. These are world changing systems that guide our evolution just as surely and unevenly as we do theirs. Rather than trying to control the future, we ought to understand what we can manipulate and what we cannot. Humanize the first; get out of the way of the second.

Second, no technology is all good or all bad. All technodes are morally neutral but humans are not. We always have the opportunity to beat our swords into plowshares and even in the worst uses of our technology lie the seeds of promise. The single most significant impetus for the advancement of surgical techniques, for example, is the technology of warfare. But the opposite is true too. Even the gentlest tools can be weapons in the hands of madmen, as a study of the history of torture proves. We need to focus on compassion as well as computing.

Third, it's not us against the machines, although that makes for great sci-fi, because we are the machines and vice versa. The Gizmos is an evolving system of humans and devices, always has been. Our future is not about control; it is about awareness. All sorts of crashes, crumbles, and catastrophes are likely to happen since these words merely refer to unexpected results, which are unusually normal. We should think through these and do what we can to be prepared for them. In other words, we ought to be Lipshitzean about this...paranoid optimists. And always make backup copies of our files.

Gizmotics, an understanding of technology at the most personal level, should therefore be an essential component of global citizenship. After all, the latest supercomputers that can process info at 100 billion bits per second. Pretty much like a rat. But we can handle 100 trillion bits per second.

We still have an edge...for the moment.

A Glossary

Blamestorming: group debate about why something failed

Bozocentrism: humanity when it does not lead to tragic results

Bricollage: an assemblage of unexpected parts and pieces

Defenestration Point: that moment of utter despair on which one feels like throwing a technode out the window

Disinstruction: instructions that make it impossible to put something together

Drownloading: overwhelming information from too much time on the Web

Emailstrom: the common blizzard of emails

Emergence: new systems emerging from the old ones

Evilution: the constantly changing and adapting face of evil in the Gizmos

Frag & Frac: interactive structures as both fragmented (in need of coherence) and fractal (complex)

Futurecasting: the vain attempt to predict what the world will look like the day after tomorrow

Gizmos: the co-evolving system of humans and machines

Golemic: the feeling of helplessness when we try – and inevitably fail – to impose our will on machines

Humanity: the understanding that we are not the center of the universe

Irritainment: pervasively annoying, yet still vaguely amusing, media

Lineasts: people who work sequentially, one thing at a time and prefer linear modes of information

Lipshitzean: the necessary attitude that technology is good and bad at the same time

Menchine: the techuman animal who has not forgotten how to be human

Misguidance: the inability to explain technical things clearly

MOIO Factor: the idea that machines can think for themselves, rarely to our benefit

Mouse Potato: online generation's version of a couch potato, a digital oaf

Nanostalgia: nostalgia for things that happened a few media moments ago

Neoluds: modern Luddites who are opposed to technology not on political grounds but because of unfamiliarity

Ohnosecond: the irreversible instant in which you realize that you screwed up

Optophiles: people who like choices, pathways through which they can navigate on their own terms

Parabox: any piece of technology that does not work and therefore accomplishes the opposite of what it was meant to do

Perfluxity: a persistent feeling of confusion and disorientation resulting from constant changes in the Gizmos

Practology: the design of things that actually work according to human needs

Principle of Underlap: the co-existence of opposing technologies beyond the point of practicality

Principle of ReVision: the fact that everything is constantly being revised and remade

Profusia: paralysis of decision due to too many choices

Rule of Higgeldy-Piggeldy: the understanding that because we are not in control, futurecasting is doomed to fail

Rule of Uncertain Displacement: inability to predict which technologies will replace other ones and which will last

Synergence: the coming together of previously unmixed systems to unexpected effect