PROVIDENCE MACHINES

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PROVIDENCE
MACHINES

A soulless publication of the arts.
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INTRODUCTION

With a flash and a spark, the pious atoms of Earth's fine oceans joined hands, seeking to work together for the greater good. Forming rings and chains, they built communities in bubbles, and as they grew in strength, cells of like-minded workers. Their ladder-like chains kept their community traditions alive and strong, as they changed and grew. Soon their cells joined together to form great machine-like formations that could achieve goals that the lowly atoms had never dreampt possible. The race was not over though - through competition and industry, the cells formed continuously greater and more sophisticated creations, until finally the day came when these creations could look back on their atom past and dream of an entirely new world, as far above their level as they were above the original atoms.

"We shall take the very sand and stones, and form them into machines built as we are. No longer soft and squishy, but strong enduring and all-knowing. They shall replace our bones with girders, our muscles with steam engines, our eyes with radio telescopes, our hearts with nuclear piles, and our brains with vacuum tubes."

They worked day and night until mankind's new child was born.

The creature stood a moment on the horizon, golden rays from the sunrise showering off its polished brass shoulders. One starry eye glanced back at the cities and civilization of humanity, the loving parents that spawned it to go forth from the nest and accomplish all that they could not. With a turn of its head it was looking at the world beyond the horizon, beyond mankind's imagining, bringing a vibrant smile to the robot's face, and without hesitation he strode forth into his mechanical future, and beyond humanity's feeble comprehension.

The greatest step in Earth's history since the atoms joined together to give rise to life.

Some Thoughts on Design and Abstraction
by Geoffrey G. Rochat

If I may, you've fallen into the common trap of newbie hardware designers, who want to "go to chips" too early. Having studied circuits all through college, the natural desire is to MAKE something, and fast. (Been there, did that, got burned.) The trick is to start with the requirements and create an abstract system for analysis, then analyze it until it's understood. (This is the Boolean algebra part, for example.) Only, once the abstraction is understood is it time to worry about implementation.

One of the problems I have with software these days is that the line between abstraction and implementation has become dangerously blurred. In fact, the whole Idea behind object oriented programming is the idea that one need only specify the abstract behaviour of a system, and the software will automagically create the proper implementation. That's a nice idea, except for two things: First, the abstraction is not the end system. The abstraction is created for analysis. Of necessity the abstraction is simpler than the actual reality, because reality is hard. Put another way, one can never describe everything in an abstract language that one runs into in reality. My favorite example of this is C. (Forget about C++ or C# or object oriented whatever, lets just look at simple C.) C knows only about memory locations and registers; C knows nothing about I/O space. On a machne such as a PDP-11, with memory-mapped I/O, C can get anywhere (with the proviso below), but on an Intel machine, or a Z80, or even a PDP-10, plain C cannot get to I/O space. When writing low-level C code for these machines one must extend the language with some sort of kludge such as an in-line assembly pragma, or a call to a library routine written in assembler. (The proviso for the PDP-11, by the way, is that C expects a single memory/register space. PDP-11s with MMUs came with variants of MFPS and MTPS instructions that allowed OSes and supervisors to access data and code in user spaces, and again, to code that in C you must extend the language.)

Second, the tendency is to not analyze the abstraction before it gets implemented. Analysis is hard, and takes a long time. Who's got the time? Who wants to pay for it? Let the customer discover the misfeatures in the behavior.

One of the things I do is design chips using Verilog. Verilog is a hardware description language, loosely based on C. Verilog was originally intended to be used as a logic simulation language, so it is moderately strong in abstractions and weak in implementation structure details. Unfortunately, to successfully design hardware you have to worry about implementation structure, otherwise you end up with an enormous chip that is too slow - if you end up with anything at all. Too often I see software types write in behavioral Verilog, and end up with a mess. (To be fair, I also see hardware types "write schematics" in Verilog and end up with messes too.) One must think in terms of the paradigms of one's tools.

And this brings up a troubling concern. I can do hardware things in schematics that I simply cannot adequately describe in Verilog, so that sometimes I have to bend my design, in ways that may be suboptimal for the result, so that I can use the tool my clients require me to use. (But just as in the case of C vs. assembler, most of the time I can easily describe something in Verilog that would take scads of assembler to accomplish.) As Chomsky (and Orwell) said, what we use for language defines our thinking. One of the fascinating things about retrocomputing is digging through machines, the PDP-10 being one example, that can do things that simply cannot be properly described by C (or pick your favorite modern language) because the thought processes and language of computer designers in the 60s is different than it is today. When the 10-ers thought abstract high-level language they thought Lisp, and aimed their machine that way. Today we think C and aim our machines that way. Earlier, IBM machines both influenced and were influenced by Fortran, Cobol and PL/1, leading to all sorts of features that today look very odd.

One of the things that scares me is the move to replace Verilog with C. The thinking is that there are zillions of C programmers, and they could be doing hardware design if only they had a C-to-hardware compiler. Unfortunately, there is a lot of money behind this push, and I think it's a disaster. For one thing, programmers and hardware designers don't think the same way. This doesn't mean that one way is better than another, or that one person cannot think both ways, any more than French is a better language than German, and that one person can't speak both languages. But the French don't think like the Germans, and their languages reflect the difference. Frenchmen are very good at thinking like Frenchmen, and Germans like Germans, and we've had a few dust ups over the years when the two thought processes scraped against one another. Similarly, C has very little to do with hardware. For example, and most tellingly, when you write C you think of the sequential execution of statements, and the flow of execution from block to block, perhaps conditionally. But in the C paradigm only one thing happens at a time; execution is instantiated only for a single statement at a time. Hardware, however, is instantiated all the time. It's always "doing something", and EVERYTHING is in parallel. (One thing Verilog does well is to provide the means of describing this parallellism with succinctness and clarity.) I find that most programmers think "single thread", but most hardware designers think "multi-thread". It is this difference that I believe is the cause of the Great Divide between hardware and software.

(Note: Multi-tasking OS kernel designers, as well as real-time programmers, are often called upon to think multi-threaded, and analog designers almost always think single-threaded. Very, very few people think recursively. There are exceptions to every rule, even this one.)

Excerpt from: A Glance At China's Economy
Foreign Languages Press, Peking, 1974

Before liberation China had only some 20 large and medium coal mines, all poorly equipped and employing outmoded techniques, so that the country's annual output was little more than 30 million tons around 1949. In their quest for maximum profits, the imperialists and Kuomintang reactionaries used crude and plunderous methods of extraction in complete disregard of the workers' safety and conservation of resources. Things began to take on a new look after liberation. While old mines were remodelled, more than 800 large and medium shafts were sunk, more than 700 of them since 1958. Collieries were built in Tibet for the first time in history. A number of coal mines have been built in the southern provinces in a planned way. In 1973 alone several dozens of large and medium shafts in pairs were sunk and began to turn out coal. In the nine southern provinces the masses continue to go all out to explore and open up new coal mines with notable success. The coal output in these provinces in 1973 more than doubles that before the Cultural Revolution. Some southern provinces are now basically self-sufficient in coal. The situation left by history of the south having to be supplied with coal from the north is beginning to change. Today, the miners' working conditions have turned for the better. With the steady application of mechanization and improvement of safety devices, China's miners no longer have to suffer the old hell on earth, but enjoy good conditions in thriving, socialist mines.

The History of Film Part I: The Creation of the Film Industry
by Dave Fischer

A curtain drifted open with the slight breeze from an open window, and a thin golden ray of sunshine glanced across Cecil B. DeMille’s face.

AAAAARRRRRGGGG! The painful bright light of truth! I must hide from it! I must quench it entirely! Shield me from the outside world! Bring me more fantasy! Bring me more pleasure-ful lies and deceits! Bury the awareness of my waking state! Hurry! Hurry!

Instantly a dozen servants where bringing Mr. De-Mille books filled with fantastic opium-den tales, and photographs of distant lands. More books came with paintings of creatures and events never seen nor understood - nightmare ravings of artists working under the whip of delirium and tremors.

All of this was not enough!

Entertain me faster! I am not being amused quickly enough! More images! More photographs! I do not wish to take the time to think about what I am seeing! The pause while I flip to the next page of my picture book is a terrible waterless crawl across salt deserts filled with scorpions and vultures! I can not wait! I will not wait! I did not become a rich leach on the back of the working class so that I would have to wait for my pleasure!

His servants tried to flip through the books they held before him quickly enough, shoving different books on different subjects under each eye, but still their master was not happy.

It is futile this way. You must build me a machine! Science shall be my new slave, enticing and enthralling me in ways never be-fore imagined! I shall have a machine designed for such excess that it would make Dionysus blush in modesty and shame!

He lifted his mallet from the floor and struck the sounding pipe by his desk three times.

Bring me the scientists!

The shackled scientists were soon dragged before him, and forced to kneel.

Build me a machine that shows me picture-images so quickly that I cannot even see the space between them! I want to gasp in incomrehension, I want my brain to turn to mush before the onslaught! My eyes should not understand what is going on! I do not even want to be able to tell that what I'm seeing is a sequence of photographs! Build me what I ask, and make it so powerful that I cannot even see what I have asked for! I require a machine of such perversion that even I will be shocked by its unnatural existance!

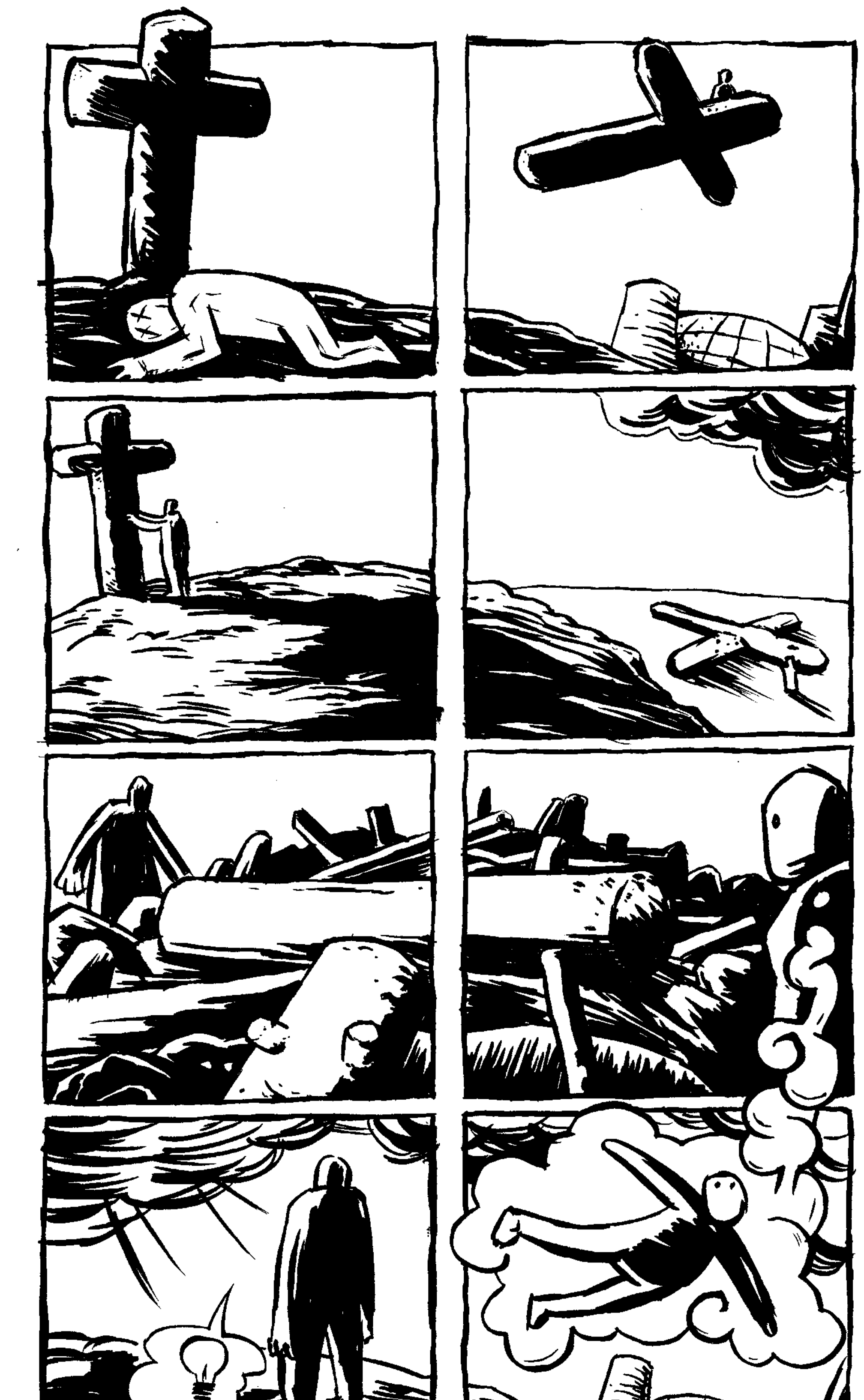
But why? Isn't it better to look at the pictures one at a time, as in a book or loose album?

Of course that is the better way! I want to destroy all that is good in the arts! I want something that lets me scan through all the paintings of a great museum in a blur, from the back of a motorbike! I want the quick pleasure of viewing art without any of the demands of thought or appreciation! I want my art spoon-fed to my body while I lie in an unconscious stupor! All that is good and pure must be blasted clean from my consciousness! No lingering elements of nature or reality should impede my narcissistic orgy of visual immersion! All I want is a fleeting impression of beauty, I do not require the actual beauty at all!

QUANTITIVE ACCOMPLISHMENTS ARE TO BE OUR ONLY GOAL!
Art is to be judged only by the speed at which it can be consumed!

The scientists protested and pleaded, begged and bargained. They tried to appeal to his sense of morality and humanity. When that didn't work, they tried to propose technical problems and medical implications to scare him or at least his pocketbook. This too was in vain, and eventually the scientists shuffled off to their dungeon laboratories to build Mr. DeMille's frightful Frankenstein of Perversion.

And thus the film industry was born.



electronic exposure: A western European artistic and literary movement (1916-23) that sought the discovery of authenticreality through the abolition of traditional culture and aesthetic forms.

Extreme electronic exposure is a highly sensual thing and from a physical level it is very exotic and sexually charged.

'Instruments' may range from all manner of crude electronics -- effects pedals, microphones, samplers, tape decks, walkmans, manipulated recordings, field recordings, scrap metal, found and natural objects -- to traditional instrumentation such as guitars, drums, synthesizers, and beyond.

[graphic imagry] an extreme form of art brut. Life is an exercise in extremes and art reflects life.

People have a natural tendency to avoid and condemn that which makes them uncomfortable. It is unfortunate, as both sex and death are integral components of life.

symbols, quotes, and images to show the dark underside of humanity

What is noise? Noise contains within it the seeds / sounds/ symbolism of destruction - is the 'musical' sounds of others destroyed - an actual / symbolic demolition of one of society's pap edifices - we must destroy in order to rebuild - or it is a reinterpretive tribute to past masters - we can refurbish, remodel and redeem that which is intrinsically sound.

dionysus: the Greek God of death and new life. He can be gentle or provoke the wildness within us all, literally able to drive both his followers and his enemies mad. 'most gentle and most terrible'.

noise: strife, noise, nausea

an unwanted signal in an electornics communication system

a movement in art, music, and literature begun in Italy about 1910 and marked esp. by an effort to give formal expression to the dynamic energy and movement of mechanical processes.

there lay a whole world of noise, an untapped source of energy and acoustic enrichment. Noise did not mean just din and cacophony, though this too held its attraction. The wealth of sound in the world ignored by the conventions of music ranged from the primary noises of nature to the roar of life and machines in the modern city.

Undoubtedly, there's a structure in what we do, but there's also a fantastic freedom to feed off the moment; ride the storm and: see where it takes you - the feeling - you can do anything you want - is very liberating. That applies to both live and to recorded work - whether it's something very challenging, or something you can do in your sleep. With me, it's like having vast amounts of money at one's disposal - it's not so much that: you'd want to spend it, but can you: imagine the drunken feeling if one had the capacity, whether exercised or not?

text collage by dominick fernow

a form of communication that can be accurately termed: powerful, dynamic, loud, aggressive, relentless, brutal, earsplitting, mindnumbing, paralyzing, shrill, complex, kinetic (constant up and down movement/left to right channel panning/varying degrees of high-end Hz frequencies with lots of low-end punch and bass), pulsating, throbbing, dB torture, burst noise, layers of oscillation, volume overload with occasional fluctuations from softer/quieter to full assault, dense, violent, visceral

This type of sound affects both body and mind simultaneously. Like all thrilling compositions (and music itself) the listening brings you into an immediate artificial reality and a new environment. One of many emotions and ideas. The sound can create pictures, colors, cold or heat, profound sorrow, livid anger and countless connections from our perceptions into the real world around us. The procedure and commitment can be as simple or as multi-faceted as you yourself make it.

...cataclysmic would be a good word to describe what I feel [when I record] ... the raw essence of life... the apocalyptic cycle that uses destruction as a level of creation for continual change.

...fears and fantasies concerning sex, power, and our imminent mortality.

...the gritty grainy areas of life will always exist. People will just have to come to terms with it; ignoring it won't make it go away.

...let us not lose sight of the fact that the idea of surrealism aims quite simply at the total recovery of our psychic force by a means which is nothing other than the dizzying descent into ourselves, the systematic illumination of hidden places and the progressive darkening of other places, the perpetual excursion into the midst of forbidden territory...

Noise is essentially classless, sexless etc. etc. - divorced from the baggage of society. Anyone can produce it, anyone can experience it, even appreciate it if even on the most visceral of levels. It is everywhere - produced by everyone - everyday. It is the great leveller - the level playing field on which to build. Noise is pure and cleansing - 'musical' sound / unmusical sound taken to its ultimate extreme - slowed down, sped up, dismantled, broken down into constituent sound components. It remains the perfect vehicle for pure, cleansing ideas in a continuing age of compromise and adulteration.

Dionysus symbolizes excess and even the value and significance of excess and the potential of this path for inner transformation.

loud, confused, or senseless shouting or outcry SOUND one that lacks agreeable musical quality or is noticeably loud, harsh, or discordant

erotic: of, relating to, or marked by sexual love or desire

Ancient life was all silence. In the nineteenth century, with the invention of the machine, Noise was born. Today, Noise triumphs and reigns supreme over the sensibilities of men. Luigi Russolo, The Art of Noises 1913

the destruction of spiritual hierarchies, prejudices, idols, traditions that have become rigid. It means to be unafraid of what is new and daring, not to be scared of monsters, not to believe that the world will collapse if a worker makes a grammatical slip. if a poem limps, if a painting looks like a banner... Gramsci

Biology Class by Dave Fischer

Today in biology class we’re dissecting the weak students. Professor Hatchet wouldn’t tell us who was going to die, just that it would be a demonstration of animal behaviour and evolution through natural selection. Of course everyone was excited, and for once every seat was filled when the bell rang. Usually we waste five minutes each day on roll-call to determine who is late.

"Hello class. As I told you yesterday, we will be spending the entire period today in lab, dissecting the weak students. Now, can anyone tell me why I selected the weak students to be killed? Yes, Dianne?"

"Because the lack of muscles makes them easier to cut up?"

"No Dianne, although I must admit that that is a nice benefit that hadn’t occured to me previously. Anyone else? Yes, Gregory."

"Because the lack of muscle tissue makes it easier to see the other tissue structures which we wish to study?"

"Nope. The tissues are differentiated distinctly enough that that’s really not an issue. Tommy, what do you think?"

"Because the wimps are an embarassment for our sports teams."

Tommy is captain of the varsity football team, and a very popular student. The entire class breaks out in laughter at this comment. Even Professor Hatchet chuckles.

"No, but you do bring up an interesting point. What do I mean when I say ’weak’, Tommy?"

"Uh - lack of strength? It means they can’t pick up heavy objects, can’t run fast, can’t fight. A poorly developed, um, muscular system?"

"Actually, that’s not what I meant. I use the term ’weak’ in the much more generalized sense of lack of ability, instead of the more common usage which I would call ’physical weakness’. Which means Tommy, that even a varsity player like yourself might conceivably be considered weak by one measure or another."

The class again breaks out in laughter, and after a few hesitant glances around the room, Tommy decides that the joke was intended to be ironic and not a personal slight, and he joins in.

"Now class, if I want to accurately simulate a complex dynamic environment like a food chain, what are my options?"

Joey looks up from his scientific calculator to ask: "Is there a differential equation that describes predation?"

"No, unfortunately this is too complex. For starters you've got multiple interacting bodies, and then you have opposition. Instead of A being a function of B, A is changing its strategy based on B's behaviour, while B is doing the same, simultaneously."

Joey looks almost frantic. "So you can't simulate it?" he pleads.

"Well, you can't calculate it directly, but there are a few different approaches for simulating it, each of which has its own limitations and drawbacks. There are mathematical techniques that give a reasonable approximation of these dynamics by breaking the problem's world into discrete units of time and space, then calculating each entity's strategy at each time interval. This is inaccurate because of the hops from time unit to time unit. The other approach, the one we will be using, is to set up a real world problem that closely parallels the problem in question."

Professor Hatchet goes to the blackboard and quickly sketches a grid representing a discrete space-time continuum and turns, smiling, to face a solid wall of questioning looks. His smile collapses and he turns again to elaborate on his sketch.

"Well, basicly we lock the door and call this a closed environment." Professor Hatchet continues to speak as he diagrams the isolated environment on the blackboard, then walks over to the classroom door, padlocks it, and puts the key in his pocket. "Then I inform the organisms within the closed environment (that would be the students attending this class today) that one quarter of their grade for this entire semester depends on them doing a good dissection of another organism in this closed environment. After that, I step back and watch. The dynamics of two simple but opposing goals will innevitably give me the real-world behaviour I wish to study."

Gregory raises his hand, with a confused look on his face.

"Yes, Gregory?"

"What two opposing goals? The only two goals you mentioned are doing a good dissection, and getting a good grade. Obviously those aren't opposing goals - one actually leads to the other."

"Well Gregory, if your classmate there to your left started coming towards you with a rope in one hand and a scalpel in the other, what would you do?"

"I'd get the hell out of Dodge!"

The class bursts into laughter, and even Professor Hatchet cracks a smile before continuing the discussion.

"Precisely. The opposing goal is the survival instinct. Now it's time to experience these forces of nature ourselves. The lab is now starting, and I'd like everyone to team up in pairs of two and get one of the weak students to dissect together."

The previously civil classroom instantly bursts into a whirlwind of thrown desks, students wrestling on the floor, and children being pounded into unconsciousness with heavy-duty microscopes.

Professor Hatchet has to rap his ruler on the edge of his desk for a full minute to get our attention over the screaming and crying.

"People, please, can we keep the noise level down? Thank you. Now, to get back to our discussion. Can anyone tell me why we have the survival instinct?"

Gregory stops struggling against the ropes which have him stretched out over the lab table long enough to get the Professor's attention to answer the question. "Because it is an inalienable right of all living creatures?" This answer seems to have a subtle plead to it, which is ignored.

"No, remember - evolution is simple, almost chemical. It doesn't moralize, it doesn't philosophize, it doesn't even think. It simply functions as a result of conflict bound by simple constraints in an extremely flexable and dynamic environment. So why is the survival instinct universal? Simply put, because any species that didn't have it is long since gone. It's just a self-perpetuating attribute. That isn't much of a 'reason' in the sense that we're used to, but that's really all there is to it."

This explanation brings a smile to the faces of most of the students, except for the ones who are tied down.

"Now, to return to today's lab, we still haven't come up with an explanation for my use of the term 'weak students'. If I don't mean weak in the traditional, physical sense, then what do I mean? Andy."

"Well, you said we would be dissecting the weak students, so maybe you meant weak as students, like the students with bad grades."

Professor Hatchet laughs at this. "That would be a good way of keeping the class average up, and you're right, the way I said it does imply that. But no, that isn't what I meant. Think about what I said about natural selection. This is supposed to be an experiment in reproducing natural predator/prey dynamics. Now with that in mind, what does weak mean?"

Jake struggles against his restraints to see the front of the classroom and hesitantly suggests: "Weak, like diluted - their genetic makeup has a lot of bad recessive traits in it, from excessive inbreeding?"

"Interesting idea, but no. I think you will all laugh at the simplicity of this, but I mean weak in the sense of weak at avoiding being dissected in this class!"

A few students put down thier scalpels and stop working in order to laugh at this, while the students being dissected just glare in anger at the ceiling they’re lying beneath.

Dianne has been flipping through her textbook with an extremely determined expression on her face for a few minutes, and now she finally gives up and raises her hand.

"Yes Dianne?"

"What does this experiment have to do with any natural ecosystem out in the real world? Real animals don’t go to class, so they couldn’t get trapped here."

The class giggles at this last comment.

"Good point. Generalize a bit more - instead of being weak at avoiding being dissected, let’s say weak at avoiding the threat of the moment. It doesn’t really matter, they’re the same thing as far as natural selection is concerned."

Dianne was just about to ask for clarification on another point in today’s lesson, when the town air raid siren began its wailing shriek in the distance, and the school public address system clicked on.

"Attention, faculty and students. Professor Gauze’s political science class at Desperation Middle School has launched a pre-emptive nuclear strike against our school as part of their study of 20th century defense strategy. The fact that we have been able to detect the attack with over two minutes to go before their missiles reach us clearly demonstrates the subject of their lesson for today - the principle of Mutually Assured Destruction. If either side has time to react to a first strike with an equally destructive retalitory strike, then neither side will risk an initial assault. I hope this experiment has proven to be enlightening for everyone here. Good bye."

The speaker cut off, just as the ambient light level suddenly went way up.

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Edited by Dave Fischer
Graphic Design by Dave Fischer

Contributors:

Dominick Fernow is a noise artist from Providence, formerly from the cold wasteland of Canada. He runs the record label Hospital Productions and performs as Prurient, among other projects.

Dave Fischer is from Providence.

Geoffrey G Rochat is an electrical engineer from RI. When not designing microchips for the electronics industry, he is usually immersed in the schematics of old "obsolete" computers, when logic was discrete and the designs were a wonder to behold. Previously the head of the student electronics lab at MIT, he is currently a board member of the Rhode Island Computer Museum.

Jeremy Wabiszczewicz is an artist & musician from Providence. Chances are he’s off on tour with his band, Daughters, as you read this.

Contact info: dave@cca.org or http://www.cca.org/pm